
Parliamentary Mace
Lester B. Pearson
Sir Isaac Brock
Marshall McLuhan
Sir
Seal
of Canada


TERRY FOX
MARATHON
OF
HOPE
Crowfoot
Susanna Woodie
Jeanne Sauvé
Victoria Cross
Alex Baumann
Ted Hanlan
Sir Frederick Banting
Tom Thomson
Tom Longboat
CANADA
FIVE 5 CENTS
1927

Digitized by the Internet Archive
in 2013

http://archive.org/details/canadianencyclo02mars

THE CANADIAN ENCYCLOPEDIA

VOLUME II
For - Pat

Hurtig Publishers
Edmonton

Copyright © 1985 by Hurtig Publishers Ltd.

All rights reserved.
No part of this book may be reproduced or transmitted
in any form by any means, electronic, electrical,
mechanical, chemical, optical, or otherwise, including
photocopying and recording, or by any information
storage or retrieval system, without written permission
from the publisher, except for brief passages
quoted by a reviewer in a newspaper or magazine.

Hurtig Publishers Ltd.
10560 – 105 Street
Edmonton, Alberta
Canada T5H 2W7

Every attempt has been made to identify and credit sources for photographs. The publisher would appreciate receiving information as to any inaccuracies in the credits for subsequent editions.

Canadian Cataloguing in Publication Data

Main entry under title:
The Canadian Encyclopedia

Editor in Chief: James H. Marsh.

ISBN 0-88830-269-X (set). — ISBN 0-88830-270-3
(v. 1). — ISBN 0-88830-271-1 (v. 2). — ISBN
0-88830-272-X (v. 3)

1. Canada – Dictionaries and encyclopedias.
I. Marsh, James H.
FC23.C36 1985 971'.003'21 C84-091250-1
F1006.C36 1985

Designed, typeset and manufactured
in Canada

Forest Fire, a moving combustion reaction, spreading outwards in a band from its ignition source. Rates of advance downwind range up to 6 km/h, but few fires spread faster than 1 km/h, and most move at less than 0.5 km/h. Combustible matter includes leaf litter, dead grass, dry moss or lichen, dead and live brush and live tree foliage. Fires are classed mainly according to whether they remain on the ground surface or rise into the tree crowns. In Canada only CONIFER forests support crown fires; no appreciable part of the live tree trunk burns in this type of fire.

On the average about 9200 forest fires occur annually in Canada. Of these, 65% are caused by humans and 35% by LIGHTNING. Lightning fires account for much more damage on the average, because they are generally less accessible: each burns an average of 560 ha (compared to 50 ha for a human-caused fire); of the average 2.0 million ha burned each year (0.5% of the entire forest), 85% is destroyed by lightning fires. Although 85% of all forest fires affect areas of under 5 ha, occasional single fires exceed 100 000 ha and the largest 2% of fires account for 90% of the area burned. During the period 1972 to 1981 the largest area burned in a single year was 5.4 million ha (1981); the smallest, 289 000 ha (1978). Each year about $250 million is spent in controlling forest fires. About one-fifth of the area burned annually is classified as commercial forest; the remainder is in remote northern areas or in stands which have no current industrial potential. The average annual area harvested is about 800 000 ha.

The amount of damage done by a forest fire depends largely on the related factors of size and intensity. Intensity is best measured as the rate of energy output per unit length of moving fire front, expressed in kilowatts per metre (kW/m). Frontal intensities range up to 150 000 kW/m, with flames 50 m or more high, although a slow-moving surface fire may produce only 200 kW/m, with flames no higher than one metre. The immense variation in the behaviour of forest fires depends on the moisture content of the combustible matter, affected by both current and past WEATHER, current WIND speed and the kind of forest. Similarly, the great variation in burned area (annually and from region to region within Canada) results primarily from weather variations. Without the efficient and effective action of Canadian fire-control agencies the average burned area would be several times greater. However, when fire weather is critical (strong wind and low humidity after several weeks without rain), it is almost impossible to prevent some fires from becoming very large. A system of forest-fire danger ratings (the Fire Weather Index) is used throughout Canada to measure daily the susceptibility of the forest to fire and to provide fire-control agencies with information on which to base their activities.

Because most forests below 60° N lat are under provincial jurisdiction, fire management is carried out by provincial forestry departments. The Canadian Interagency Forest Fire Centre, established in Winnipeg in 1982, provides information, keeps statistics and co-ordinates interprovincial exchanges of fire-fighting forces and equipment. The federal government's Atmospheric Environment Service collects and processes daily weather data and provides fire-danger ratings to provincial fire agencies. The Canadian Forestry Service, in co-operation with several universities, carries out most of the research on forest fires in Canada.

Fire detection in Canada is usually by aerial patrols along standard flight patterns; these patrols have superseded the traditional fire tower. Patrols are backed up by lightning-detection systems that pinpoint probable locations and expected numbers of lightning fires. Fire-control methods include aerial water dropping (sometimes with fire-retardant additives), or control from the ground through portable water pumps with hose lines, tank trucks, bulldozers and hand tools. Burning out from a prepared line to stop an oncoming fire is sometimes feasible. Computerized fire-management systems are increasingly improving the efficiency of control operations.

Fire Ecology and Economics Fire, along with CLIMATE and SOIL, is one of 3 primary physical factors that have shaped the Canadian forest and have kept it from encroaching on grassland. Most of this forest was historically dependent on ecological recycling by periodic fire for its long-term stable existence. The southeastern hardwood forest and the West Coast coniferous rain forest are exceptions to this pattern. In the boreal forest, for example, the main tree species are black SPRUCE, jack PINE, lodgepole pine, trembling ASPEN and white BIRCH, all of which are adapted to regenerate after fire even though all individuals in a large area are killed. In the pre-industrial era ignition was by lightning, and perhaps 2-3 times as much forest burned annually as does at present. In the absence of either fire or forest management, deterioration would eventually occur, since these species do not reproduce well without disturbance and it is doubtful that a satisfactory fire-free forest of other desirable tree species would arise in its place. Other prominent species, eg, red and white pine, white spruce and DOUGLAS FIR, require ground that has been prepared by fire for optimum regeneration, but some surviving trees are needed to produce seed. Aspen and POPLAR sucker prolifically from root systems when above-ground trees are killed by fire; other hardwoods sprout from the base of dead trees. Jack and lodgepole pines and black spruce store protected live seeds in their cones for years, only shedding them when the trees are killed. Ecologically then, fire is neither good nor bad, but simply an environmental necessity for the perpetuation of the forest in its natural state.

Economically, fire competes with the forest industry for the annual tree growth on which the industry is based. Some fire-killed timber is salvaged, but salvage is impractical on a large scale. In the ideally managed forest, each stand is regenerated after harvest by silvicultural means, eg, through cultivation and perhaps the use of prescribed fires. Accidental wildfire is excluded. Because it is physically impossible to eliminate all naturally occurring forest fires, an economic compromise is struck. As fire-control efforts are increased, it costs more and more to reduce the average annual burned area. The ideal position is the point at which the cost of further reduction in burned area equals the value of the corresponding potential increase in the harvest (*see* FOREST ECONOMICS). Other recreational and economic forest uses are also taken into consideration, and the safety of forest towns is a primary concern.

The ecological realities of fire create a dilemma in large natural parks and other unmanaged, or lightly managed, areas because certain kinds of forest cannot be maintained in perpetuity in the absence of fire. The administrators of Canada's national PARKS are aware of this problem and are developing policies to cope with it. The interaction of ecological and economic factors complicates forest-fire management and debate about the optimum level of fire control is actively under discussion throughout Canada. The Canadian Forestry Association and its affiliated provincial forestry associations, as well as provincial forestry departments, maintain fire-prevention programs aimed at reducing the number of human-caused fires. Whatever the policy differences of fire management, the rule "do not start forest fires" remains as valid as ever for the individual citizen.

C.E. VAN WAGNER



Over 9000 forest fires occur in Canada annually, 65% of which are caused by human carelessness and 35% by lightning (*courtesy Canapress*).

Forest Harvesting, the process of cutting TREES and delivering them from the forest to sawmills, pulp mills and other wood-products-processing plants. It includes forest engineering, forest-road construction, logging and log transportation.

Forest engineering is the field of ENGINEERING that specializes in planning forest harvesting (*see* FORESTRY EDUCATION). A forest engineer working in naturally grown forests must plan and locate permanent roads which meet the long-term goals of forest management and which may later become public-access routes and highways. The logging system best meeting environmental and financial objectives must be chosen; branch-road networks planned; road construction supervised; and logging machines selected. A forest engineer requires knowledge of the prin-

ciples of FORESTRY, SURVEYING, GEOLOGY and SOIL SCIENCE, and familiarity with available machinery. When developing a harvesting plan, the engineer starts with a long-term forest-management plan, usually prepared by government and industrial foresters in consultation with specialists in fish and wildlife habitat, recreation, water and soil quality. This plan shows the timber area to be cut, the proposed rate of cutting and the special requirements of other forest users.

Forest-Road Construction

The Canadian forest industry builds approximately 15 000 km of logging roads each year, of which over half are temporary winter snow roads and unsurfaced summer roads. Nevertheless, these roads and associated culverts, bridges and other structures constitute huge engineering and construction projects. Bulldozers are used to build roads over dry, sandy soil. In the flat wetlands of the boreal forest in northern Canada, bulldozers and backhoes are used to build up the road from the soil on a wide right-of-way, creating a dike for the road and a deep ditch on either side.

Roads constructed on the BC coast are very costly because of the difficulty of clearing large trees and blasting solid rock encountered in the mountains. All roads are surfaced because the ground is never dry or frozen for predictable periods. Bulldozers and backhoes usually pioneer the subgrades until they encounter rock and require assistance from rock drills. Roads built on steep ground interrupt natural water-drainage patterns and require carefully constructed culverts and bridges to minimize EROSION.

Logging

Cutting methods include progressive clear-cutting, patch cutting and individual tree selection. Progressive clear-cutting is commonly practised in natural, undeveloped forests. It requires the least initial road construction, permits loggers to concentrate their operations and enables foresters systematically to prepare sites and engage in REFORESTATION after cutting. Large cut-over areas are unpopular with the public and cause potential fire hazards. Logging scattered patches requires more initial road construction and exposes the fringes to wind damage. Patch logging is the usual way to cut successive crops from a forest. Individual tree selection is used to thin an immature forest to increase growth and to cut hardwood species which will grow in shade.

The word "logging" may refer to all harvesting operations or may apply only to the stump-to-roadside activities.

Felling Hand-held chain-saws are commonly used for felling (or falling) trees. The faller uses an undercut and wedges to control the direction of fall. Felling is dangerous and requires skill, especially if trees are partially rotten or have intertwined branches. Mechanical felling machines mounted on tractors or excavators, which direct or bunch the tree, are used to fell trees up to 80 cm in diameter. Shears are used to cut pulpwood. Mechanical chain-saws, augers and circular saws are used to cut sawlogs where damage to wood from shears is unacceptable. Multi-function tree harvesters are used in stands of small trees (up to 50 cm diameter). They cut, limb and top the trees and move them to the roadside or perform any combination of these functions. These machines are expensive and operate best where large numbers of trees can be cut in one location.

Skidding involves dragging logs or trees to the roadside with a horse, wheel skidder or tractor. Horses and farm tractors are used on small private woodlots, but articulated, centre-steering wheel skidders (developed in Canada in the 1950s) have replaced horses on most operations. A faller with a hand-held chain saw and a skidder operator often operate as a team: they log "hot," ie, skid each tree soon after it is cut. If mechanical cutters are used, the trees are felled days or weeks before skidding. Trees felled and bunched with a feller buncher are often skidded with a grapple skidder which can pick up the complete bunch. Crawler tractors with bulldozer blades are used for skidding on steep ground where trails are required.

Yarding is the dragging of logs from stump to roadside using cables and yarders (winches). The most common methods are high-lead, in which logs are lifted at one end and dragged across the ground, and skyline, in which the log is transported wholly through the air. Normal yarding distances are up to 300 m, but special systems can yard at distances of 500 m and, in some cases, 700 m. Helicopters are used for logging valuable timber from places inaccessible by road or where roads would cause unacceptable damage.

Slashing involves cutting the tree into pulpwood bolts, usually 1.25 or 2.5 m long. Roadside slashers are large machines with conveyor systems and circular saws.

Sorting Logs are sorted by species and grade so that they can be manufactured into the most valuable products. Sorting takes place at landings, points of transfer from trucks to secondary transportation, or at mills. Front-end loaders, log stackers and cranes are used for sorting. Frequent communication between forest operations and mill is essential to ensure that specific logs go to the correct mill.

Log Transportation

Most trees harvested in Canada are transported from the forest by truck. Front-end loaders, cranes and special log loaders are used to load trucks in the landing. Pulpwood is hauled crossways on flat-deck semitrailers, an efficient system which permits hauling of maximum allowable loads. In eastern Canada, tree lengths are also hauled on flat-deck trailers. In BC, where logs are long enough to span the distance between truck and trailer, pole trailers are used.

Logging railways were common in Canada until the 1950s. Because of high track-maintenance costs and the need to have large volumes of timber available to one route, most have been replaced by trucks. Commercial railways are used as secondary transportation for moving logs long-distance over routes already serviced by railways.

Water transport is a common form of secondary log transport on lakes and rivers and on the Pacific coast. Most river drives in eastern Canada have been eliminated because of environmental concerns and log losses through sinkage. On the BC coast, logs are transported by truck to the water and then formed into rafts of log bundles for transport to mills. Bundling logs reduces losses from sinkage and escape. Logs from the Queen Charlotte Is and the W coast of Vancouver I are transported through rough seas on barges and log ships. Water transport is cheap and is the only method of transporting logs from isolated islands or coastal inlets. The forest industry in BC supports a large secondary industry of tugs and barges, which move not only logs but pulp, pulp chips, lumber and other products.

Forest Products

Canada's forests produce a variety of commercial products. Higher-grade BIRCH, MAPLE, OAK, DOUGLAS FIR, sitka SPRUCE and western red CEDAR are manufactured into expensive veneers and finished lumber. White spruce, western HEMLOCK and lodgepole PINE are used for construction lumber; black spruce, jack pine and hemlock are excellent for newsprint. Lower grades of all species are made into pulp. In many parts of the world, fuel wood is the major forest product. In Canada the use of wood as fuel has decreased until recently. The ENFOR (energy from the forest) program has stimulated interest in forest waste as a fuel and encouraged the forest industry to produce more of its own energy (*see* BIOMASS ENERGY). The manufacture and sale of forest products is becoming more integrated, to ensure that each log is cut into the most valuable product. In this way, Canada can conserve its remaining stands of quality trees and ensure that maximum benefits are derived from forests.

G.V. WELLBURN

Forest Ranger The term ranger probably has its origins in the N American wars of the 18th and 19th centuries, when, because land was heavily forested, armies developed special combat units of woodsmen and marksmen to carry out reconnaissance as well as surprise and diversionary raids. In Canada, similar knowledgeable woodsmen were the fur trappers and COUREURS DE BOIS, who later showed industrialists and government officials the locations of valuable forest stands. Most of these men were capable of withstanding long periods of isolation and had learned from the native people the art of survival in the forest. With the birth of a large-scale FORESTRY industry, supervisors and high-ranking administrators were in many cases drawn from the ranks of self-taught foresters. The need to replace them upon retirement ultimately led, beginning in the 1920s, to the creation in Canada of forest-ranger schools, which provided specialized training, first at the secondary-school level and later at the technical-school level (*see* FORESTRY EDUCATION). The Maritime Forest Ranger School, NB, is the only such school still using the term forest ranger.

In the US system of national forests, rangers are in charge of administrative units of up to 200 000 ha and manage all renewable resources within the unit. In Canada, as a result of the changing nature and specialization of forestry work, the term has been superseded by more precise designations (eg, forest technician, wildlife manager). Despite the fact that the role and responsibilities of forest rangers or wardens have changed greatly over the years, films and television persist in portraying the ranger as the amiable protector of the forest and its woodland creatures. Young people interested in forestry are encouraged by groups such as the Junior Forest Wardens in western Canada and the 4-H CLUBS in Québec.

MARCEL LORTIE

Forest Regions Canada's forest scientists have mapped its great tracts of forest and divided them into 8 regions. A forest region is defined as a major geographic belt or zone characterized by a broad uniformity both in physiography and in the composition of the dominant TREE species (*see* VEGETATION REGIONS). Emphasis is placed on the forest region as an areal entity. The complex effect of CLIMATE and other past and present environmental components have not been taken into account in setting boundaries.

Boreal Forest Region Approximately 80% of Canada's forested land is in this immense boreal forest region, which in Canada swings in an arc S from the Mackenzie River Delta and Alaskan border to NE British Columbia, across northern Alberta and Saskatchewan, through Manitoba, Ontario and Québec, terminating in northern Newfoundland on the shores of the Labrador Sea. The northern boreal region consists of open forest with trees growing farther apart and smaller in size as the forest stretches towards the TUNDRA, where only dwarf specimens persist. The southern boreal region presents a denser, closed forest which, at its SW boundary in the Prairie provinces, gives way to a transitional zone dominated by POPLAR. Known as the aspen grove, this part of the forest thins out into open, almost treeless prairie. White and black SPRUCE are the principal species of the predominantly coniferous boreal forest, but other CONIFERS (eg,

balsam FIR, jack pine and, especially, tamarack) also have a wide distribution. There is a general admixture of broad-leaved trees in the region, including white BIRCH, balsam poplar and the wide-ranging trembling ASPEN.

Great Lakes-St Lawrence Forest Region, less than one-tenth of the size of the boreal forest, is Canada's second-largest forest region. With the exception of a 322 km gap, where the boreal region touches the N shore of Lk Superior, it stretches from SE Manitoba to the Gaspé Peninsula. It is bordered to the S by the deciduous forest region, and is a transitional forest between the coniferous and broad-leaved regions. Characteristic species are eastern white pine, red pine, eastern HEMLOCK and yellow birch. Sugar and red MAPLES, red oak, basswood and white ELM are also found, as are many boreal species.

Acadian Forest Region Closely related to the Great Lakes-St Lawrence Forest Region, this region is confined to NS, PEI and a large portion of NB. Red spruce, balsam fir, yellow birch and sugar maple are commonly found here. Black spruce, white and grey birch, red oak, white elm, black ASH, red maple, trembling aspen and balsam poplar are widely distributed.

Deciduous Forest Region, Canada's smallest forest region, borders on the SE shore of Lk Huron and the northern shores of Lakes Erie and Ontario. Despite its small size, this region contains the largest number of native tree species of any region. Along with the broad-leaved trees common to the Great Lakes-St Lawrence Forest Region are found the cucumber tree, tulip tree, black gum, blue ash, sassafras and others which are at the northern limits of their range. Conifers occur only as a scattering of eastern white pine, tamarack, eastern red CEDAR and eastern hemlock.

The remaining forest regions are located almost completely within British Columbia.

Coast Forest Region covers the lower slopes of British Columbia's Coastal Mountain Range and extends to the coastal islands. Characteristic species are western hemlock, DOUGLAS FIR, western red cedar and Sitka spruce, all renowned for their value as timber-producing trees. By comparison, the region's broad-leaved trees (eg, black cottonwood, red ALDER, big-leaf maple) have limited distribution and minor economic importance.

Subalpine Forest Region, composed of coniferous forests, is situated on the mountain uplands of BC and western Alberta. Characteristic trees are Engelmann spruce, alpine fir and lodgepole pine; occasional species include western LARCH, whitebark pine and limber pine, together with yellow CYPRESS and mountain hemlock on the more westerly ranges. The subalpine region makes an impressive contribution to the scenic splendour of the Canadian CORDILLERA and offers unique features of watershed protection and stream control in high-mountain source areas. Trees at lower elevations are harvested for timber.

Montane Forest Region includes British Columbia's central plateau and several valley pockets adjacent to the Alberta boundary, areas which share a prevailing dry climate. The characteristic tree of this region is the blue Douglas fir, a smaller variety of the coast-region type. Lodgepole pine and trembling aspen are generally present and white spruce is found in cooler, shaded, valley locations. In southern parts of the region's more open forest, ponderosa pine is common. Engelmann spruce and alpine fir from the subalpine region, together with western white birch, are important species of this region's northern limits.

Columbia Forest Region lies in SE British Columbia between the Rockies and the central plateau and fingers its way through the subalpine region along river valleys and lakes. The forest of this interior wet belt strongly resembles that of the coast region, although fewer species occur in the interior. Characteristic trees are western red cedar and western hemlock. The blue Douglas fir is widely distributed, and in southern parts western white pine, western larch, grand fir and western YEW are found. Engelmann spruce is found in the upper Fraser Valley and occasionally at higher elevations in the remainder of the region. C.R. STANTON

Forestiers et voyageurs, novel by Joseph-Charles Taché (1863), is a unique blend of fact and fancy. It bridges the folk tale and the episodic novel, humorously recounting the stories and adventures of "le père Michel," a typical Canadian VOYAGEUR. Realistic descriptions of hunting and fishing, with Indians and with seigneurs, develop into the narrative of Michel's escapades further afield, helping the North West Co defeat the Hudson's Bay Co traders. Both locales are nostalgically characterized as the sources of French and aboriginal legends and songs, which form part of the national heritage. Taché's manuscript, containing a wealth of etymological and anthropological lore, was serialized in *Les* SOIRÉES CANADIENNES (1863) and *Le Foyer domestique* (1878-79); it was first published as a book in 1884. MICHÈLE LACOMBE

Forestry can be defined as the SCIENCE, art and practice of managing and using for human benefit the natural RESOURCES that occur on and in association with forestlands. The forest resource is of major social and economic importance to Canadians. In 1982 the logging, wood, paper and allied industries of Canada directly employed 260 000 people. An analysis of forest-based communities has established that for each individual employed in the woods and mills, one job is created locally and another elsewhere within the national economy; thus the forestry sector alone generates jobs for over 780 000 workers. Expressed another way, approximately 7.4% of Canada's 1982 work force relied upon the forests for their livelihood. Exports of forest products in 1982 were $12.1 billion or about 14% of the country's total domestic export values. Forest products' net earnings of $10.9 billion contributed more to the positive balance of trade of $16.8 billion than any other major commodity group.

Impressive as the economic contributions of forest products may be, they do not fully reflect the importance of the forest resource and its management. Streamflow, soil erosion, sedimentation, fish and wildlife may all be profoundly influenced, depending on how the resource is managed. Forests remain the home of many of Canada's native peoples and provide a domain for camping, hunting, hiking, angling, photography, nature study and sightseeing for all Canadians and visitors. Such activities generate much of the multi-billion-dollar contribution which the recreation and tourism industry makes to the national economy. Forests provide an additional, although intangible, benefit: the opportunity for renewal of the human spirit.

History

Canada's native peoples used forest materials for housing, canoes, etc, and found much of their food in the forest. They drew upon the forest bounty as needed, but because of their relatively small numbers and stone-age tools, their demands upon the resource were limited. The great impetus for the growth of the TIMBER TRADE in eastern Canada came after 1763, as Britain reserved timber in her new colony for naval supplies. By the 1820s, three-quarters of Britain's timber needs were provided by British N America.

Sawmills appeared on Canada's West Coast in 1846. Following the Fraser River GOLD RUSH of the 1850s, many prospectors remained to try logging and were soon joined by veteran lumbermen from eastern Canada and the US. Logging in the western forest required different methods than those used in the East because of the profusion of huge trees on rugged terrain. One method employed was hand logging, where trees were simply felled on slopes or near cliffs and then rolled or toppled directly into the sea. In another technique, lines of logs chained together (turns) were skidded from felling sites by large teams of oxen. Oxen were later replaced by horses, which in turn gave way to the steam donkey engine. Soon afterward, steam-driven winches were introduced for moving felled trees by the high-lead and skyline systems. Cables and blocks were attached to spar trees, and logs were either partially dragged along the ground (high-lead system) or totally transported through the air (skyline system) to mills or forwarding points. Logging railways appeared in BC around 1900; by 1917, the year BC became the foremost lumber-producing province in Canada, 62 were operating there. By 1969, however, only 2 logging railways remained; their work had largely been taken over by diesel trucks.

After WWI the eastern lumber industry declined while that of BC expanded to account for over half the country's total output. In the East, readily accessible, merchantable timber supplies had dwindled; costs had risen; and competition with Baltic countries adversely affected trade with Britain. At the same time, US legislation almost closed that market to Canada. From 1933 to WWII, however, a fairly steady improvement took place, as a result of new trade agreements with the US and the establishment of the IMPERIAL PREFERENCE. Britain was again isolated from Baltic suppliers in WWII and Canadian lumber production rose dramatically to meet British and Allied as well as Canadian needs. At the end of hostilities, domestic demand for lumber was high and exports reached record levels. In 1946 lumber production was 12 million m^3; in 1965, 25.5 million m^3. Following slight recessions in 1974 and 1975, lumber production reached an all-time high of 46.7 million m^3 in 1979.

A growing demand for paper in the latter half of the 19th century led to experiments which established wood fibre as an effective substitute for rags and straw in papermaking. By 1869 Canada's first chemical pulp mill was in operation near Sherbrooke, Qué, and the 1880s saw the industry expanding in eastern Canada. Wood-pulping operations in BC started in 1909. The output of Canadian PULP AND PAPER INDUSTRIES increased impressively during the first 2 decades of the 20th century, and mills began specializing in producing newsprint, for which Canada was destined to become the world's foremost supplier. Following temporary declines in 1921 and in the early 1930s, the industry made a substantial recovery; by 1939, 100 mills were in operation, 27 making pulp, 24 making paper and 49 producing both. In the first years of WWII wood-pulp production increased markedly. This trend changed as manpower was absorbed by the armed forces and electricity was diverted to manufacture essential war materials. In the postwar era the pulp and paper industry resumed its expansion. By 1961 there were 125 mills shipping goods valued at over $1.6 billion; by 1970 the mills had increased to 139, shipping $2.85 billion. Mill numbers increased modestly to 142 in 1982, but the value of shipments more than tripled to $10.65 billion.

Forest Ownership and Administration

Canada's land area (excluding water) is almost 9.2 million km^2, and of this total about 4.4 million km^2 is forestland. Forest inventories have been completed on 3.4 million km^2, or about 78% of forestlands. Most Canadian forestland is administered by provincial and federal

governments. Provincial governments are responsible for about 67% of inventoried forestland; the federal government for 27%; private owners for 6%.

The BRITISH NORTH AMERICA ACT of 1867 assigned "The Management and Sale of the Public Lands belonging to the Province and of the Timber and Wood thereon" to the exclusive jurisdiction of each provincial legislature, regardless of when it joined Confederation. However, the federal government continued to administer the forests of Manitoba, Saskatchewan and Alberta and the forty-mile-wide railway belt along the route of the CPR in BC until 1930.

Each province has a forestry agency, usually a branch or service located within a ministry charged with responsibility for natural resources. This agency is normally concerned with a wide range of forestry matters: timber disposal; FOREST-FIRE protection and management; protection against insects and diseases; forest inventory; extension and information services; forest management and silviculture, REFORESTATION and forest research. Forest resources of the YT and the NWT as well as those on federal crown lands (Indian reserves, military bases and national parks) are the responsibility of the federal government. Privately held forestland, 80% of which is located E of Manitoba, is managed by its owners, but provincial governments may subsidize private forest management in some regions and may influence it through taxation policies, protection regulations, etc.

Canada's Major Forest Industries

Based on the 5-year period 1978-82, Canada's estimated average annual roundwood cut amounted to 148.6 million m^3. The 1982 wood harvest reached an estimated 127 million m^3 and the ranking timber-producing provinces of BC, Québec and Ontario were responsible respectively for 44%, 23% and 16% of that total. The timber produced was 91% softwood, 9% hardwood. In 1982 the major forest industries (logging, wood, and paper and allied) employed 260 000 workers, who collectively earned almost $6.4 billion in salaries and wages. Canada's total forest-products export income for 1982 was over $12.1 billion: 67% from the US, 7% from Japan, 6% from the UK and the remainder from numerous other trading partners.

In 1982 Canada's logging industry, which produces logs, bolts, pulpwood, pulpwood chips, poles and piling, employed 40 000 people earning a total of $1 billion. In the same year the industry shipped $4-billion worth of goods, most of which were processed domestically; exports of raw wood materials amounted to only $225 million. Japan, the US and the People's Republic of China were Canada's major customers for logs. All pulpwood chips and most pulpwood exported also went to the US and Japan.

The wood industries of Canada include sawmills and planing mills; shingle mills; veneer and plywood mills; sash, door and millwork plants; wooden-box factories; the coffin and casket industry; and miscellaneous wood industries responsible for producing such commodities as particle board, wafer board and cooperage. In 1982 the 97 000 workers employed in these areas earned $2.1 billion. The value of goods shipped reached $7.2 billion; exports totalled $3.6 billion. Lumber accounted for $2.9 billion of export sales, 66% to the US. Japan, the UK, Saudi Arabia, France, Australia, Algeria and West Germany were also important lumber customers. Exports of shakes and shingles earned $156 million, with the US accounting for 97% of the market. The US also bought 76% of veneer exports valued at a total value of $91 million. The main plywood importer was the UK, which took 36% of the $124-million market; the US ranked next, followed by Belgium-Luxembourg and West Germany.



Loading pine logs near Smithers, BC (*photo by Tom W. Parkin/Pathfinder*).

The paper and allied industries include pulp and paper mills, asphalt roofing manufacturers, paper box and paper and plastic bag manufacturers, and miscellaneous paper converters producing such items as waxed paper, facial tissue, toilet paper and stationery. In 1982 the 123 000 people engaged in these occupations earned $3.3 billion. The establishments they worked for shipped goods worth $14.8 billion and total exports of wood pulp, paper, paperboard and other paper products amounted to $8.3 billion. The major export items were wood pulp and newsprint, which earned $3.2 and $4.1 billion, respectively. The US was Canada's principal customer for each of these commodities, purchasing 52% of the wood pulp and almost 79% of the newsprint. Japan, West Germany, Italy and the UK also imported substantial quantities of Canadian wood pulp, and the UK, Venezuela, Brazil and West Germany were major customers for newsprint.

Forest fire under control in British Columbia (*courtesy National Film Board/Photothèque*).



No reference to Canada's forest industries would be complete without mention of 2 much smaller forest ventures, the Christmas tree and maple syrup industries. Canada's main Christmas tree species are balsam fir, spruce, Scots pine, lodgepole pine and Douglas fir. Some trees occur naturally and others, particularly Scots pine, are plantation grown. No accurate figures are available for Christmas tree production but it is estimated that approximately 5 million were cut in 1980. Exports for the same year amounted to 2.4 million trees valued at $14.3 million. Almost half of the exported trees were grown in NS; the balance largely in Québec, NB, Ontario and BC. The US took 96%, the remainder going largely to Caribbean and Caribbean-rim countries.

The 1982 production of maple syrup amounted to 8153 kL. Just over 90% of this volume was tapped in Québec. Ontario was responsible for most of the balance with minor contributions from Nova Scotia and New Brunswick. The gross value of 1982 production was $25.2 million. Exports for the same year were valued at $17.7 million and the main buyer was the US, which purchased 93% of this total.

Forest Enemies

Canada's forests are constantly threatened by forest fires, INSECT PESTS and PLANT DISEASES. Significant research, management and forest-protection efforts are directed towards mitigating losses. Between 1972 and 1981, an average of 9160 fires burned just over 2 million ha of forest annually; losses of timber, together with real and personal property, averaged $183 million per year. During the 1982 fire season a total of 8941 fires burned almost 1.7 million ha. Timber and property losses amounted to $196.6 million and fire-fighting costs reached $141.6 million, about 32% over budget. In 1982, 65% of forest fires were caused by people; 32% by lightning; the remainder were of unknown origin.

During the 1977-81 period, the average annual loss caused by important forest pests has been estimated at 107.4 million m^3 of wood. This loss, 58% attributable to insects and 42% to diseases, represents a combination of tree mortality and growth reduction. By far the most important of the insect pests is the spruce budworm, followed by aspen defoliators, mountain pine beetle and spruce bark beetle. Decay accounts for just over half of the losses caused by disease; hypoxylon canker and dwarf MISTLETOE are responsible for most of the balance.

Forestry Research

The dominant role in forestry research in Canada is assumed by the federal government, through the Canadian Forestry Service (CFS). The CFS, part of Environment Canada, has its headquarters in the National Capital Region. It operates 6 regional forest-research centres across the country and 2 research institutes: the Forest Pest Management Institute at Sault Ste Marie, Ont, and the Petawawa National Forestry Institute at Chalk River, Ont.

Through departments responsible for forestry, the governments of BC, Ontario and Québec support substantial research programs. The remaining provinces generally support smaller programs. Provincial research organizations and industrial research corporations, such as the Centre de Recherche Industrielle du Québec, the Ontario Research Foundation, British Columbia Research, the Pulp and Paper Research Institute of Canada, the Forest Engineering Research Institute of Canada, and FORINTEK Canada Corporation, conduct a wide range of forestry research projects. Major forest-industry companies, along with industrial suppliers, also make

significant contributions, especially in the area of pulp and paper research.

University-based forestry research is closely associated with Canada's 6 professional forestry schools located at the Universities of New Brunswick, Laval, Toronto, Lakehead, Alberta and British Columbia, but considerable work is also accomplished in other university departments and faculties across the country.

Forest Management

Forest management in Canada is concerned with forest harvesting, site preparation and improvement, forest regeneration, tending and conversion of timber stands, tree improvement, and protection of the forest from fire, insects and diseases. In a broader context, forest management melds the foregoing activities with the country's economic, social and environmental objectives.

From the birth of the square-timber trade to the present, the emphasis in Canada has been on the exploitation of public forests for their timber values. Notwithstanding forest-management commitments to sustained yield in more recent years, the country now finds itself on the threshold of a serious wood shortage. Timber reserves have been reduced to critical levels by a combination of factors, the most important of which has been neglect of forest renewal. Heavier-than-anticipated losses from fire, insects and diseases, coupled with the establishment of parks and wilderness preserves and environmental constraints placed upon timber harvesting, have also contributed to the problem. Only 4 provinces now have uncommitted softwood reserves which, unfortunately, are largely uneconomic to log because of remoteness and other factors. Two provinces appear about in balance; the remaining 4 are in a deficit position. Higher-value hardwood stands in the East have been severely overcut as well, and renewal is virtually nonexistent. More than half the country's hardwood forests consist of poplar species which, for reasons of quality and product suitability, are unattractive commercially.

In light of Canada's economic reliance upon its forest-products industries, the spectre of wood shortages is serious indeed. With substantial increases in world consumption of paper and paperboard, wood-based panels and lumber projected for the period 1980-2000, the urgent need to address the country's timber supply problems becomes even more apparent. Wide-ranging consultations involving departments of the federal government, the provinces, the forest industry, the Canadian Council of Resource and Environment Ministers, the Canadian Forestry Advisory Council, forestry schools and non-government organizations have recently taken place. There has been agreement on findings regarding timber supply, market potential, research and manpower needs, the urgency of forest renewal and the formulation of a new forestry strategy. The key elements of this new approach relate to the application of intensive forest management and improved protection against forest fire, insects and diseases.

Intensive forest management means greater effort in such areas as site preparation, the use of genetically superior planting stock, prompt and effective planting after harvest or natural loss, thinning, fertilization and weed control. Experience suggests that gains of 50-100% in wood volume are possible through application of intensive forest management. Improved protection against fire and pests is believed capable of reducing average annual losses by some 15%. Besides these potential benefits there is a recognized need for a program of timber-stand improvement, and for efforts to rehabilitate some of the inadequately stocked, burned and cutover productive forestland — estimated in 1977 to be close to 30 million ha. Given success in such management measures, there is hope of reaching the target harvest level of 210 million m^3 endorsed by the Canadian Council of Resource and Environment Ministers for the year 2000. Achievement of this goal would mean an increase of 65% over the 1982 harvest level.



Tree planter in the Arrow Forest district near Castlegar, BC (*photo by Doug Leighton*).

Canada is necessarily moving out of an era of forest exploitation into one of intensive sustained renewal. Demands on the forestland base have increased to meet such legitimate developments as wilderness areas, parks, urban expansion, highways and reservoirs. However, if Canada, with a finite area of economically productive forestland, is to remain competitive in forest-products production, these demands cannot continue indefinitely and, more importantly, cannot infringe on land regarded as the best available for forest production.

It is possible to manage forestland for such diverse values as recreation, timber, water, forage, wildlife, fisheries and SOIL CONSERVATION, but it is not easy. A complex host of technical factors contribute to the difficulty, but the principal problems arise because people have not yet fully realized that the days of reaping unlimited, wide-ranging benefits are past. Unquestionably, most forestland belongs to the people of Canada, and it is right that their views and desires respecting its use be considered and accommodated to the point where the most desirable mix of economic, social and environmental goals is attained. Such judgements are ultimately the responsibility of Canada's governments. When these judgements are confirmed as essentially fair, wise and practical, forest management in Canada will have become integrated forest-resource management.

C.R. STANTON

Reading: Donald MacKay, *The Lumberjacks* (1978); C.R. Stanton, *Canadian Forestry — The View Beyond the Trees* (1976).

Forestry Education concerns training people in the science or art of managing forestlands and their renewable RESOURCES to ensure continuous production of forest goods and services. It draws on a number of basic disciplines (eg, BIOLOGY, MATHEMATICS, PHYSICS, CHEMISTRY, GEOLOGY, ECONOMICS) as they apply to such areas as the protection, harvesting, renewal, management and use of the forest and its products. Forestry education has 2 principal objectives: to train students at various levels to apply scientific knowledge to forestry problems and to make the general public aware of the importance of forests. Depending on the objective, forestry education involves a variety of groups, including universities, specialized schools and associations.

University Training

Undergraduate Training Canada's first efforts in forestry education were devoted to the university training of professionals. University of Toronto established the country's first faculty of forestry in 1907. By 1984 there were forestry programs also at U of New Brunswick, Laval U, UBC, U of A and Lakehead U.

Programs offered in Canadian universities were initially influenced by those in the US, which in turn drew upon European sources.

Objectives of Canadian university forestry programs are tailored to the qualifications needed to practise FORESTRY, labour-market requirements, new concepts such as multiple-use forest management, the growth of knowledge and, more recently, the needs of foreign countries. Initially, forestry schools were professional schools, training specialists.

Since training requirements are becoming increasingly complex and difficult to meet, academic experience has led Canadian forestry schools to abandon monolithic programs and to adopt others which meet the specific interests of students, while providing a common basic training that satisfies the profession. This delicate balance is frequently modified to meet new imperatives of the forest industry.

In the early 1980s in Canada, 400-500 men and women graduated in forestry each year. Under normal conditions, this number would be required to meet the country's various needs, but the recession of 1981-82 has left graduates without jobs. Even in optimum economic conditions the Canadian situation is not comparable to that of several other forested countries. The US, with less forested land than Canada, has 10 times as many university forestry schools and graduates, a fact that reflects the status of forestry in the 2 countries. The continued intensive and multiple-use management in the US cannot, however, be compared with Canadian forestry, with its emphasis on forest harvesting. Many observers suggest that if Canadians wish to continue using their forests to advantage, they must soon change their attitudes toward a resource that, though at first judged inexhaustible, is now beginning to show signs of depletion. The movement toward increasingly intensive management should lead to an increased demand for professional foresters, which the

Canadian university forestry schools should be able to meet, at least until the year 2000.

Postgraduate Studies are offered in all 6 Canadian university forestry schools. Nevertheless, despite what could have been a productive experiment, these schools have had trouble achieving their objectives in postgraduate studies. The transformation from professional schools to university faculties concerned with research has proved difficult. The domination of forestry reseach by the Canadian Forestry Service (CFS) has probably also slowed the growth of university research programs. Some professors, however, have qualified for grants from funding organizations such as the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL (NSERC), or from provincial agencies, eg, the Québec Researcher Training and Co-operative Action Program. In 1981 NSERC created a special program to develop forestry research. Other provincial activities, such as the creation of a forestry research foundation in BC, are being organized. To promote careers in forestry research, the CFS developed a grant program for university forestry schools in the 1960s. However, research positions were rare in the 1970s. Summer employment programs intended to introduce students to research have almost disappeared in the last few years, and candidates interested in careers in research have accepted high-paying jobs in the forest industries. As a consequence of these trends, Canadian universities awarded only a dozen PhDs and about 60 MAs each year during the late 1970s and early 1980s. About 30-40% of graduates are foreign students who return to their own countries upon graduation.

These weaknesses in forestry training are having serious consequences at a time when Canadian forest renewal is beginning. Like the universities, research agencies such as CFS face serious problems in finding trained candidates to carry on the work. The Canadian Forestry Advisory Council indicated that in 1982 the development of postgraduate studies in forestry was the primary concern of forestry education in Canada.

Technical Training

For a long time in Canada, there has existed a level of forestry employment the training requirements of which are of a technical, trade or craft nature. These needs were eventually met by the creation of special programs. Apart from attempts made by U of T in 1918 and UBC in the early 1920s, Québec was the first province to establish a FOREST RANGER school (1923).

Today in Canada, about 20 schools, institutions and regional or community colleges offer courses in forestry techniques through 1-, 2- and 3-year programs. Other schools train forest technicians in programs concentrating on particular aspects of forestry, eg, WILDLIFE CONSERVATION AND MANAGEMENT. In the early 1980s, about 800 students graduated annually. In difficult economic times, this number exceeds labour-market demand, but might not meet requirements generated by recovery in Canada's forest sector.

While the content of technical training programs was being refined, programs dealing with forestry practice also became more specialized, particularly in forest operations (eg, training heavy-machinery operators, scalers) and in sawmills (sawyers, wood graders). These courses (usually one year) are part of, or run parallel to, the secondary level of technical training. In most technical programs, theoretical training is supplemented by practical work with commonly used equipment.

The need to improve forest production has resulted in increased demand for silvicultural workers to fill over 20 000 new jobs. This specific need is met, at the moment, by intensive on-site courses, especially for introductory and silviculture training programs which have resulted from government policies concerning private forests. New Brunswick's 1978-82 forest-employment program is a case in point. Programs to train the owners of woodlots are also provided through government advisory services and provincial forestry associations, alone or in conjunction with the Canadian Forestry Association.

MARCEL LORTIE

Forges Saint-Maurice, Les, (St Maurice Forges), Canada's first heavy industry. The St Maurice iron-ore deposits near TROIS-RIVIÈRES were developed by the second company endowed with a monopoly grant (25 Mar 1730) and state subsidies, after an earlier company had failed. Iron production began in 1738. Bankruptcy of the company's director, F.E. Cugnet, led to state takeover in 1742, and after the TREATY OF PARIS (1763) ownership passed to the British Crown. The ironworks were then run by lessees, the most important being Matthew Bell in the years 1800-45. The most technically advanced ironworks in America in their first 100 years, the forges had long been obsolete when shut down in 1883. The plant employed over 100 specialized craftsmen and 300-400 labourers, and produced forged iron and moulded products such as pots, pans and stoves. Experiments with steelmaking and cannon-founding in 1747 were not fruitful. The work force, originally from the iron-producing regions of Burgundy, developed as a distinctive community, living in Canada's first COMPANY TOWN. In 1973 the St Maurice Forges became a National Historic Park, and archaeological research continues on the site. *See* IRON AND STEEL.

DALE MIQUELON

Forget, Sir Joseph-David-Rodolphe, stockbroker, politician (b at Terrebonne, Canada E 10 Dec 1861; d at Montréal 19 Feb 1919). As a partner in the brokerage firm of his uncle, Louis-Joseph FORGET, Rodolphe Forget became actively involved in the affairs of the Montreal Street Railway Co (later Montreal Tramways), and the Richelieu and Ontario Navigation Co, the Montreal Light Heat and Power Co, Canada Cement and other companies. After the partnership with his uncle was dissolved (1907), he devoted himself to reorganizing the transportation and utility companies in Québec C, and to controversial attempts to sell the securities of the Quebec Railway, Light and Power Co in France. Although this company was modelled on Montreal Light, Heat and Power, it was far less successful and Forget had to call on government assistance during WWI. He was chairman of the Montreal Stock Exchange, 1908-11, a Conservative MP, 1904-17, and was created a knight bachelor in 1912.

T.D. REGEHR

Forget, Louis-Joseph, stockbroker, politician (b at Terrebonne, Canada E 11 Mar 1853; d at Nice, France 7 Apr 1911). Forget established his own brokerage firm in Montréal in 1873, dealing mainly in transportation and utility company securities. His main business interests included the Richelieu and Ontario Navigation Co, the Montreal Street Railway Co and several Montréal utility companies that were merged to form Montreal Light, Heat and Power Co. In the latter 2 ventures Forget was closely associated with Sir Herbert HOLT. Until 1907 he worked in partnership with his nephew, Joseph-David-Rodolphe FORGET. He was president of the Montreal Stock Exchange, 1895 and 1896, and was appointed to the Senate in 1896.

T.D. REGEHR

Forillon National Park (est 1970, 238 km^2) lies at the outer tip of the GASPÉ peninsula. Wild and beautiful, the PARK is a dramatic product of EROSION. Its coastline is framed by soaring limestone cliffs, pebble beaches and rocks sculptured by the pounding sea. Rugged hills and gorges laced with tumbling streams lie inland. The park is covered mainly by boreal forest, but the limestone cliffs are characterized by tundra species.



Forillon National Park, which preserves the dramatic coastline of the Gaspé Peninsula (*courtesy Parks Canada*).

Wildlife includes deer, moose, lynx, black bear and red fox. Whales and seals can be seen from coastal cliffs. An estimated 220 bird species visit annually. Some, such as the herring gull, double-crested cormorant and black-legged kittiwake, nest in cliff-side colonies. The area was a traditional summer hunting and fishing ground for the Micmac. Jacques CARTIER explored the region in 1534. French and English settlers arrived 200 years later and harvested cod, herring, mackerel and salmon — fish still abundant in surrounding waters. The park offers opportunities for outdoor recreation.

LILLIAN STEWART

Forrestall, Thomas De Vany, painter (b at Middleton, NS 11 Mar 1936). After graduating in 1958 from Mount Allison (where he studied with Alex COLVILLE), Tom Forrestall was assistant curator at the Beaverbrook Art Gallery in Fredericton (1959), but became a full-time painter the following year. His realistic works, often done in egg tempera, convey his ideas of the East Coast landscape and its dwellings. From the early 1960s, Forrestall experimented with panels shaped from triangles to T-forms, each chosen to fit his painterly ideas. He has also painted a large number of out-of-doors watercolours which express much the same ideas as his egg tempera works, but in a more relaxed and joyous mood. His watercolours, in contrast to his more metaphysical and individual canvases, form one long series and deal with a sense of place.

JOAN MURRAY

Reading: P. Duval, *High Realism in Canada* (1974).

Forrester, Alexander, clergyman, educator (b in Scot 1804; d at New York C, NY 20 Apr 1869 and buried at Truro, NS). Ordained in the Church of Scotland, Forrester left it in 1843 to help establish the Free Church. In 1848 he immigrated to NS, serving the Free Church in Halifax before being named superintendent of education, and first principal of the Normal School in 1855. Like his predecessor John William DAWSON, he was a strong advocate of compulsory assessment, teacher training and a centralized system of education. Author of *The Object, Benefits and History of Normal Schools* (1855) and *The Teacher's Textbook* (1867), from 1858 to 1860 he edited and published the *Journal of Education.* Many of his proposals were incorporated in the free-school legislation passed by Charles TUPPER's administration in 1864-65. Forrester, an ardent Liberal, was replaced as superintendent, but continued as principal of the Normal School until his death.

WILLIAM B. HAMILTON

Forrester, Maureen, contralto, teacher, consultant (b at Montréal 25 July 1930). She first studied piano and then began singing in Montreal church choirs. At 20 she became a student of Bernard Diamant and at age 21 made a successful professional debut with the Montreal Elgar Choir. Assisted by a scholarship from the Ladies' Morning Musical Club and by J.W. MCCONNELL, who undertook to finance the first 2 years of her career, she made debuts with the Montreal Symphony Orchestra, CBC radio and TV, and the Toronto Symphony, and toured Ontario and Qué-



Maureen Forrester, contralto, photographed during a performance of *"Dido's Lament"* by Purcell for the CBC television series *"The Music of Man"* (*courtesy Canapress*).

bec for JEUNESSES MUSICALES. Following her New York Town Hall debut in 1956 she became one of N America's most sought-after contraltos and over subsequent years performed with leading symphony orchestras and appeared in recital throughout N America, Europe, Australia, Israel, Russia, China and Japan. From 1965 to 1974 she sang with Lois MARSHALL in the famous Bach Aria Group. Her operatic career, though successful, has been mostly limited to Canada and the US. Her teaching career included a series of workshops in China, filmed by the National Film Board. A superb musician, Forrester is comfortable in most of the contralto and mezzo literature, particularly the work of German composers, and her darkly rich voice inspired Canadian composer Harry SOMERS to write *Five Songs for Dark Voice* for her. Her appointment in late 1983 as chairman of the Canada Council is an appropriate recognition of her concern for the arts in Canada. In addition to many national and international honours, she was made companion of the Order of Canada in 1967 and received the MOLSON PRIZE in 1971. MABEL H. LAINE

Forsey, Eugene Alfred, intellectual, senator (b at Grand Bank, Nfld 29 May 1904). A Rhodes Scholar, Forsey was educated at McGill and Oxford, where he studied philosophy, politics and economics. By the time he became lecturer in the Dept of Economics and Political Science at McGill, his constitutional conservatism and social radicalism were firmly established. He worked for the CANADIAN LABOUR CONGRESS and became well known for his socialist politics; paradoxically, he was also close to Conservative Arthur MEIGHEN, whose views on the KING-BYNG AFFAIR Forsey found compatible. He published one influential study, *The Royal Power of Dissolution of Parliament* (1943), but he is best known for his innumerable debates and acerbic articles and letters on public affairs. He twice ran as a CCF candidate, but he refused to join the New Democratic Party because of its policy of DEUX NATIONS. Appointed to the Senate, Forsey sat as a Liberal 1970-79 but left the party in 1982 after disagreements over constitutional amendments.

ROBERT BOTHWELL

Reading: Eugene Forsey, *Freedom and Order: Collected Essays* (1974).

Forster, John Wycliffe Lowes, portrait and landscape painter, writer (b at Norval, Canada W 31 Dec 1850; d at Toronto 24 Apr 1938). In 1869 he began studying portraiture in Toronto. He traveled to England and Europe in 1875 and 1879 and studied painting in Paris. He returned to Toronto to establish a permanent studio in 1883, and over the next few decades he exhibited with the Ontario Soc of Artists, the Royal Canadian Academy, the Art Assn of Montreal and the Canadian National Exhibition Fine Art Dept, as well as internationally at the large exhibitions.

The successor to G.T. BERTHON, Forster was among the most popular academic portraitists in Toronto during the late 19th and early 20th centuries. His sitters included Alexander Graham BELL, Bliss CARMAN, Timothy EATON, and PMs LAURIER, MACDONALD and MACKENZIE, among others. His commissions for the Ontario government included portraits of historical figures, James WOLFE, John Graves SIMCOE, Isaac BROCK and William Lyon MACKENZIE. He is represented in the federal and Ontario parliamentary collections and numerous other public collections. His writings include 2 volumes of autobiography and a survey of early Ontario artists.

ROBERT STACEY

Forsyth, Lionel Avard, lawyer, industrialist (b at Mount Benson, NS 1 Aug 1890; d at Montréal 1 Jan 1957). Forsyth graduated from King's College (Windsor, NS) and attended Harvard before joining the BANK OF NOVA SCOTIA in 1913. After 18 months in Havana, Cuba, he became a professor of modern languages at King's. Forsyth taught himself law and was admitted to the NS bar in 1918. In 1926 he left a successful Halifax law practice to join Montgomery, McMichael, Common, Howard and Ker in Montréal. There he developed a large corporate clientele and by 1946 was a director of over 40 companies. In 1950 he became president of Dominion Steel and Coal Corp, which employed one-sixth of Nova Scotia's work force. Forsyth rejuvenated the company, developing an ambitious and successful expansion program and establishing harmonious industrial relations.

CHRISTOPHER G. CURTIS

Fort Amherst, on the W shore of Charlottetown Harbour, PEI, built in late 1758 by the British. The site had been known previously as Port La Joie, established 1720 as the capital of the French colony of Île Saint-Jean. During the SEVEN YEARS' WAR British troops captured Port La Joie in mid-Aug 1758 following the surrender of LOUISBOURG. With the end of hostilities Ft Amherst soon fell into disrepair, and in 1768 the garrison was permanently withdrawn to Halifax, the centre of maritime defence. Nonetheless, in 1799 a blockhouse and battery were erected near the site, although the major defence works were at Charlottetown. In 1967 Fort Amherst National Historic Park was created. *See* HISTORIC SITE.

ROBERT ALLEN

Fort Battleford When the settlement of BATTLEFORD, in what is now W-central Saskatchewan, was named the capital of the North-West Territories (1876), the North-West Mounted Police established a post to deal with anticipated native problems. Adjacent to the territorial government complex and a developing townsite, the fort consisted of about 10 buildings, including officers' quarters, a barracks, a storehouse, a workshop and stables. By 1880 a palisade enclosed the buildings in an area 145 by 155 m. During the NORTH-WEST REBELLION in the spring of 1885, the fort became a shelter for white settlers and an operations base for troops, as Métis and native insurgents sacked the Battleford townsite and farmsteads within the region. The post continued as a divisional headquarters and barracks until 1924. In 1951 the site became a national historic park, with many of the buildings restored or reconstructed for public visitation.

MARK RASMUSSEN

Reading: A. McPherson, *The Battlefords: A History* (1967).

Fort Beauséjour, on the W bank of the Missaguash R near present-day Sackville, NB, built 1751-55 by the French as a counter to nearby British Ft Lawrence (near Amherst, NS). Ft Beauséjour was in poor condition in June 1755 when an attacking force of Massachusetts volunteers and British regulars laid siege. Within 2 weeks, and after suffering a direct hit on a "bombproof" shelter, French commander Du Pont Duchambon de Vergor capitulated. The British renamed the site Ft Cumberland and strengthened the works. In Nov 1776, during the AMERICAN REVOLUTION, Ft Cumberland, under Lt-Col Joseph Goreham of the Royal Fencible Americans, thwarted an attack by New England colonial rebels. Some repairs were made to the fort at the beginning of the WAR OF 1812, and a military presence remained until 1833. In 1926 Fort Beauséjour National Historic Park was established. *See* HISTORIC SITE.

ROBERT ALLEN



Fort Chambly, est 1665 as Fort Saint-Louis by the French CARIGNAN-SALIÈRES REGIMENT on the Richelieu R near modern Chambly, Qué. By 1709 strategic considerations demanded that the site be strengthened, and a stone fort replaced the original wooden structure. Chambly subsequently became a warehouse and supply depot for other forts on the Richelieu. In Sept 1760 the crumbling and weakly defended Chambly surrendered to the British without a shot being fired. Early in the AMERICAN REVOLUTION, Chambly was captured by the colonial rebels, but in June 1776 the British reoccupied it, and for the rest of the conflict Chambly was not threatened. In 1813, during the WAR OF 1812, construction of a vast military complex was undertaken. Insufficient maintenance reduced Chambly to a dilapidated condition, and it was abandoned in 1851. Private restoration in 1882-83 preserved the site, which became Fort Chambly National Historic Park in 1921.

ROBERT ALLEN

Fort Churchill, *see* PRINCE OF WALES'S FORT; CHURCHILL.

Fort Duquesne, located at the confluence of the Allegheny and Monongahela rivers at the site of present-day Pittsburgh, Pa, was begun by the British in 1753. In Apr 1754 it was captured by the Sieur de Contrecoeur before completion; the French completed construction. In 1755 Gen Edward Braddock and a powerful force were soundly defeated in an attempt to recapture the fort. The British recovered the site in 1758 but the French destroyed the fortifications before withdrawing. The site was renamed Ft Pitt and rebuilt by the British after 1761. It was unsuccessfully attacked by PONTIAC in 1763. *See* FORTIFICATION.

JAMES MARSH

Fort Erie, Ont, Town, pop 24 096 (1981c), inc 1931, located at S entrance to the NIAGARA R, opposite Buffalo, NY. LOYALISTS settled in the area in 1784, followed by German immigrants, but

Peace Bridge across the Niagara R at Fort Erie, Ont, one of the busiest border crossings between Canada and the US (*photo © 1984 Hartill Art Associates*).



forts had guarded this strategic point since 1764. The village near the British fort of the same name amalgamated with the town of Bridgeburg, a railway centre, and became the town of Fort Erie, in 1931. The town is the site of one of Canada's largest horse-racing tracks; it also includes summer cottages and recreational communities along Lk Erie, eg, Crystal Beach, and is the S entrance to the Niagara R Parkway, as well as the terminus of the Queen Elizabeth Way from Toronto. Two early forts were destroyed by the powerful Niagara R, and the third was partly destroyed by American soldiers in 1814 — the last troops to occupy Canadian soil. Today the Peace Bridge (1927) soars across the river and the town is one of the busiest border crossings between Canada and the US. JOHN N. JACKSON

Fort Frances, Ont, Town, pop 8906 (1981c), inc 1903, located at the mouth of the Rainy R where it drains into RAINY LAKE in northwestern Ontario. The river forms the boundary with the US and Fort Frances is linked by a bridge to International Falls, Minn. Located along the traditional canoe route to the western fur country, it was the site of Ft Saint-Charles — the first in a chain of posts constructed (1731) by LA VÉRENDRYE. The NORTH WEST CO built Fort Lac La Pluie here around 1770 and subsequently the HBC also established a post, which was named Fort Frances after the wife of the HBC governor, Sir George SIMPSON. As settlers were attracted to the western plains it became a staging post on the Dawson Road, an artery of lakes, rivers and wagon roads linking Lk Superior to Red R, inaugurated 1870. The turbulent falls at the site attracted milling activity and the town became a centre for sawmilling, and later pulp and paper manufacturing. It is also at the hub of popular fishing and hunting country. DANIEL FRANCIS



Fort Frances Case (1923) In 1917, under the WAR MEASURES ACT, the government fixed the price and quantity of newsprint paper produced; subsequent legislation created the Paper Control Tribunal which set retroactive prices through 1919, although wartime conditions had ceased. In *Fort Frances Pulp and Power Co Ltd* v *Manitoba Free Press Co Ltd*, the Judicial Committee of the Privy Council ruled that Parliament, because of its authority under the PEACE, ORDER AND GOOD GOVERNMENT clause of the Constitution Act, 1867, may adopt a measure such as the War Measures Act and authorize the governor-in-council to enact orders-in-council concerning the control and supply of newsprint. The emergency power may outlive the duration of the conflict which gives rise to it; Parliament may adopt measures which normally would fall within provincial jurisdiction.
GÉRALD-A. BEAUDOIN

Fort Franklin, NWT, Hamlet, pop 521 (1981c), is located about 10 km NE of the head of the Great Bear R, 544 air km NW of YELLOWKNIFE. Named after Sir John FRANKLIN, the settlement was a trading post for both the NORTH WEST CO and HUDSON'S BAY CO. The local DENE retained a nomadic life-style until about 1950 when the community became more settled with the establishment of a tipi-shaped Catholic mission, a school and store. Today the local residents still subsist mainly on hunting, fishing and trapping. ANNELIES POOL

Fort Frontenac was located at the mouth of the Cataraqui R, at the site of present-day KINGSTON, Ont. Construction began during negotations between GOV FRONTENAC and a delegation of Iroquois in July 1673. Ostensibly the fort, initially known as Ft Cataraqui, was meant to provide protection for Ville-Marie [Montréal], but it was intended as much to further fur-trading interests in the Great Lakes and Ohio Valley areas. After the Iroquois assault on Lachine in 1689 GOV DENONVILLE ordered the fort abandoned. When Frontenac returned to New France he revoked the order and the fort continued to serve French interests on Lake Ontario, acting as a counterpoise to the English Ft Oswego across the lake. In 1756, at the beginning of the SEVEN YEARS' WAR, Ft Frontenac was an arsenal and naval base for French forces on the Great Lakes. Reinforced by troops under François-Charles de Bourlamaque and later MONTCALM, it nevertheless fell to the British under John Bradstreet in Aug 1758. *See* FORTIFICATION. JAMES MARSH



Fort Henry's sunken, star-shaped pattern was typical of 19th-century fortifications. It was built during the War of 1812 and rebuilt in 1836 to defend the Rideau Canal (*photo by Malak, Ottawa*).

Fort Good Hope, NWT, UP, pop 463 (1981c), is situated on the E bank of the MACKENZIE R, 805 air km NW of YELLOWKNIFE. Established by the NORTH WEST CO in 1805, it was the oldest fur-trading post in the lower MACKENZIE Valley. The settlement is known for its picturesque and unusual church, Our Lady of Good Hope, which was decorated with murals by a Catholic priest in 1878. In recent years the settlement has become known as the home of many DENE political leaders. Most of the residents still trap, hunt and fish for their livelihood. ANNELIES POOL

Fort Henry, Kingston, Ont, originally built during the WAR OF 1812 on Pt Henry, beside Lk Ontario, to guard the outlet to the St Lawrence R and the Kingston Navy Yards. The strategic importance of the location increased after the completion of the RIDEAU CANAL, which provided a military supply route between Montréal, Bytown [Ottawa] and Kingston; the fortress was rebuilt in 1836, the better to defend the end of the canal most vulnerable to American attack. It was the principal fortress of UPPER CANADA, garrisoned by troops of the British Army until 1870 and then by units of the Canadian Militia until 1890, when the fort was abandoned as a defensive structure. In both world wars it housed PRISONERS OF WAR. During the 1930s it was acquired by the Ontario government, which had it restored as a historic park as part of a Depression works project. Today Old Ft Henry, a major historic attraction in a city that boasts many fine old buildings, houses a museum of military arms and equipment. During the summer the "Fort Henry Guard" demonstrates precision drill maneuvres. *See* HISTORIC SITE; FORTIFICATION.
C.J. TAYLOR

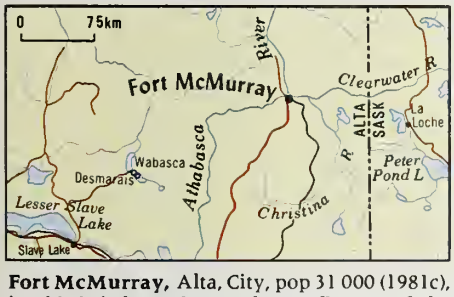
Fort Langley, est 1827 on the Fraser R, 32 km E of Vancouver near present-day LANGLEY, BC, was important in the province's development until the post's abandonment in 1886. Part of a network of trading posts established by the HUDSON'S BAY COMPANY on the Pacific slope, it was initially a FUR-TRADE post, but soon became a provisioning and administrative centre for the company's Columbia District. The old fort was abandoned in 1839 and a new one was built 35 km upstream. After a fire it was rebuilt in May 1840. The fort operated a large farm, initiated fish packing and became a commercial centre for the colony of British Columbia. By the time it became a national HISTORIC SITE in 1923 its buildings were crumbling. But beginning in 1955 several buildings were reconstructed, and Ft Langley is now an important tourist attraction. C.J. TAYLOR

Fort Langley, located on the Fraser R, was first established in 1827. It was declared a national historic site in 1923 (*courtesy Parks Canada/Steve Shaw*).



Fort Liard, NWT, UP, pop 405 (1981c), is located on the S bank of the LIARD R, 544 air km SW of YELLOWKNIFE and about 25 N of the BC border. One of the oldest continuously occupied aboriginal sites in the NWT, the area has been used as a fishing camp by Indian cultures for about 9000 years. As late as 1966, most of the DENE residents still lived the traditional life-style and spent winter months away from the settlement and on the trapline. Today, trapping and hunting are combined with a wage economy. The community was isolated until the opening of the Liard highway in 1983. ANNELIES POOL

Fort Macleod, Alta, Town, pop 3139, inc 1892, is located on the Oldman R, 165 km S of CALGARY. In Oct 1874, 150 North-West Mounted Police established the first police post in present-day Alberta on an island in the Oldman R, and named it after Asst Commissioner James F. Macleod. Annual flooding forced the post's move to the present site 10 years later. It was the headquarters of the force 1876-78, a divisional centre to 1919 and thereafter a subdivisional headquarters. The centre from which the whisky trade was wiped out in the southern plains, Fort Macleod was a judicial seat and the scene of several famous trials, including that of Charcoal, arrested for the murder of an NWMP sergeant. Even as it declined as a police centre, Fort Macleod continued to function as a regional distribution point for a ranching and farming hinterland. Today tourism is a major industry. The Fort Museum (a reconstruction of the original fort) and the heritage buildings located on the main street attract over 60 000 visitors a year. FRITS PANNEKOEK



Fort McMurray, Alta, City, pop 31 000 (1981c), inc 1980, is located near the confluence of the Athabasca and Clearwater rivers in northeastern Alberta. A former NWMP post, it was rebuilt in 1870 and named after HBC Factor William McMurray. It functioned primarily as a fur-trade post and transportation centre connecting Edmonton to the Athabasca country. The horse and stern-wheeler were critical to its survival until 1922 when the railway reached Waterways, 12.8 km S. Several fish plants and a salt-extraction industry developed thereafter. During WWII the town was an important base for the Canol project. Fort McMurray is located in the midst of the 78 000 km^2 oil sands, said to contain an estimated 3.9 billion m^3 of recoverable synthetic crude oil. Experimentation in oil recovery and its impact on the town's economy date from the early 20th century. In 1964 the Great Canadian Oil Sands project was given permission to start construction and modern Fort McMurray was born, growing from 1200 people that year to 10 000 a decade later. FRITS PANNEKOEK

Fort McPherson, NWT, UP, pop 632 (1981c), is located on the E bank of the Peel R, 1107 air km NW of YELLOWKNIFE. Named for an HBC trader, the settlement has been a Loucheux DENE village since 1852, when Dene moved there because the site commands an excellent view of the MACKENZIE R Delta. It is the home of Chief John Tetlichi, who became the first Dene member of the NWT Territorial Council in 1967, and Wally Firth, who was elected in 1972 as the first native MP. Although the community has now been influenced by the construction of the Dempster Hwy and oil exploration, the Loucheux inhabitants maintained an independent bush life-style well into the 1960s. ANNELIES POOL

Fort Nelson, BC, Village, pop 3724 (1981c), inc 1971, is located in the NE corner of BC, 410 km N of FORT ST JOHN. A NORTH WEST CO trading post was established here 1800 (re-established by the HBC 1865). The area has grown rapidly in recent years through new developments in the forest industries and renewed interest in local petroleum and natural-gas resources. Services for the transporation sector are also part of the local economy. Completion of the BC Rail extension from Fort St John in 1971 played a large role in the area's subsequent expansion. ALAN F.J. ARTIBISE

Fort Norman, NWT, UP, pop 286 (1981c), is located at the junction of the MACKENZIE R and Great Bear R, 624 air km NW of YELLOWKNIFE. Because of its location at a river junction, the site has always been of seasonal importance to the Slavey DENE. Sir John FRANKLIN used it as a transportation centre for his explorations into the region. A notable feature of the settlement is the Anglican church, built of squared logs in the 1860s. The trapping life of the Dene is now supplemented by employment in the oil industry at nearby NORMAN WELLS. ANNELIES POOL

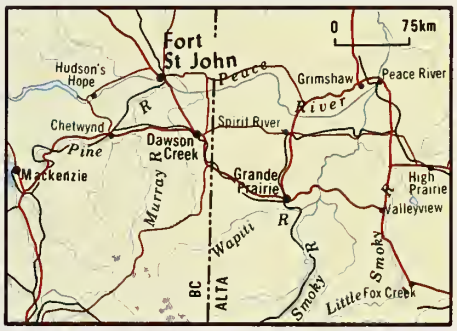
Fort Prince of Wales, *see* PRINCE OF WALES'S FORT.

Fort Providence, NWT, UP, pop 605 (1981c), is located on the NE bank of the MACKENZIE R, 233 air km SW of YELLOWKNIFE. Local Slavey DENE were attracted to this community after a Roman Catholic mission and an HBC trading post were established at the site in the mid-1800s. Prior to 1950, agriculture was an important feature of life, but today the small community is a stop on the Yellowknife highway and the site of a Mackenzie R ferry crossing. The Dene residents still enjoy the traditional hunting and trapping life-style, combined with a wage economy. ANNELIES POOL

Fort Qu'Appelle, Sask, Town, pop 1827 (1982), inc 1951, is located 70 km NE of Regina in the scenic Qu'Appelle Valley. Named for the QU'APPELLE R, Fort Qu'Appelle was the hub of several historic trails that traversed the northwest. An Anglican mission was established there in 1854, and 10 years later the HBC erected a provisioning post and district headquarters. The Cree and Saulteaux signed Treaty No 4 at this site in 1874, and a year later a NWMP outpost was established near the present townsite. In 1881 Chief Sitting Bull and a party of Sioux warriors travelled to Fort Qu'Appelle to secure provisions and negotiate with Supt James WALSH. The fort was chosen by General MIDDLETON as a temporary headquarters and base of operations for his troops on the way to Batoche during the NORTH-WEST REBELLION (1885). Though it lost out to Regina in a bid to succeed BATTLEFORD as the territorial capital in 1882, the town has prospered through the exploitation of its considerable recreational potential and benefited from the mixed farming that predominates in the area. GARTH PUGH

Fort Reliance, YT, is an abandoned post, established 1874, located on the E bank of the YUKON R, 13 km downstream from Dawson. It remained the centre of the fur trade and mining on the upper Yukon R for more than a decade. In 1886 a gold discovery drew miners to the mouth of the Stewart R, and when a new post was built there, the buildings at Ft Reliance were dismantled and used for fuel on riverboats. Many of the creeks and settlements on the Yukon, such as FORTY MILE, were named for their distance from Ft Reliance. H. GUEST

Fort Resolution, NWT, UP, pop 480 (1981c), is located on the S shore of GREAT SLAVE LK, 153 air km S of YELLOWKNIFE. This community, where trapping still provides the livelihood for the majority of DENE and MÉTIS residents, dates back to the establishment of the North West Co trading post in 1786. The HBC established a post in 1815, and when the companies united in 1821, the post was called Fort Resolution. The community became an important medical and educational centre when the Oblates and Grey Nuns built a large tuberculosis hospital there in 1938-39. When the responsibility for the care of TB patients was transferred to Edmonton in 1956, Fort Resolution began to decline in importance as a regional centre. The traditional hunting-trapping economy of the community was diversified in 1964 with the construction of a local sawmill. Today, many residents are employed in the wage economy provided by nearby Pine Point Mines. ANNELIES POOL



Fort St John, BC, City, pop 13 891 (1981c), inc 1975, is located in northeastern BC, about 500 km N of Prince George. In 1793 Alexander MACKENZIE reached a point on the Peace R south of here. A series of forts were established during the fur-trading era, and over the years the community has moved from one side of the river to the other. Towards the end of WWI and into the 1920s, settlers moved westward to the fertile agricultural lands on both sides of the Peace R. Population increased greatly after completion in 1942 of the Alcan Military Road. The discovery of oil S of the city in 1951 attracted more people and turned the town into a BC oil-exploration centre. Fort St John has since become the largest centre in BC north of Prince George, with a trading area population of 26 000. Agriculture, forestry and the oil and gas industry are the basis of the expanding local and regional economy. Taylor, an incorporated community just S of the city, is the site of a refinery, a sulphur plant, natural gas and oil pumping stations, and a large sawmill. The city's facilities include a campus of Northern Lights Community College. ALAN F.J. ARTIBISE

Fort Selkirk, YT, is an abandoned settlement located at the confluence of the YUKON R and Pelly R. Formerly Yukon headquarters of the HBC (est 1848 by Robert Campbell), and after 1898 of the Yukon Field Force, it was abandoned permanently after the completion of the Alaska and Klondike highways brought an end to commercial traffic on the Yukon R. H. GUEST

Fort Simpson, NWT, Village, pop 980 (1981c), inc 1973, is located on an island at the confluence of the MACKENZIE and LIARD rivers, 378 air km SW of YELLOWKNIFE. The original fort, called Fort of the Forks, was built by the NWC in the early 1800s; in 1821 it was named after HBC governor Sir George SIMPSON. The oldest continuously occupied trading post on the Mackenzie, the community in the late 1960s became a base for oil exploration and a NWT government administration centre. It is the terminus of the NWT highway system. The mixed native-white population is employed in government, the transportation industry or traditional hunting and trapping activities. ANNELIES POOL

Fort Smith, NWT, Town, pop 2298 (1981c), inc 1966, is located on the SW bank of the SLAVE R near the Alberta-NWT border, 724 air km N of Edmonton. Situated on the river that was an important link between the Prairies and the MACKENZIE R Valley, the site was a portage route around 3 sets of rapids. The HBC established a trading post here in 1874. The post was named in honour of Donald SMITH, later Lord Strathcona, an HBC governor and member of the first NWT Council. The settlement was affected by the YELLOWKNIFE gold rushes when prospectors rushed through the area. Fort Smith was the first administrative centre in the NWT and served as government headquarters until the territorial capital was established in Yellowknife in 1967. Today the town's residents depend on trapping, tourism and government employment for their livelihood. ANNELIES POOL

Fort Steele, BC, UP, pop 100 (1983e), is located at the junction of Wild Horse Cr and the Kootenay R, 17 km NE of Cranbrook. The Wild Horse gold rush opened the area to settlement in 1863. An estimated $9 to $20 million was taken out of creeks in the area. Prospectors found a black stallion, giving rise to the original name "Stud Horse Creek." A second rush for gold in 1884 led to friction between miners and Kootenay Indians. Sam STEELE and the North-West Mounted Police were brought in, and they built the post named Fort Steele. After 1904, when the railway bypassed it to make Cranbrook the region's principal centre, Fort Steele became a ghost town. In the 1960s the province made the town a heritage site and reconstructed it on an 1880s theme. Tourism and some ranching are the area's chief enterprises. WILLIAM A. SLOAN

Fort Walsh, located in the CYPRESS HILLS, 170 km SW of present-day Swift Current, Sask, was an early North-West Mounted Police post constructed in 1875 by men under the command of Insp James WALSH, for whom it was named. It became headquarters of the force in the West in 1878, and until it was dismantled and abandoned (1883), Fort Walsh played a vital role in preparing the Canadian West for peaceful settlement. A bustling frontier town sprang up near the fort. Following the Custer massacre (1876), the Mounted Police centered on Fort Walsh were called upon to mediate with refugee Sioux who had followed Chief SITTING BULL across the US border, thereby creating an international incident. With the coming of the railway, the signing of treaties and the return of the Sioux to the US in 1881, Fort Walsh was abandoned. In 1942 the RCMP established a remount ranch to breed and raise horses for the force. In 1968 the property was transferred to Parks Canada and became a national historic park.

GARTH PUGH

Fort Walsh, in the Cypress Hills of SW Saskatchewan, was constructed in 1875 and played a vital role in preparing the West for peaceful settlement (*photo by Jim Merrithew*).



Fort William In 1803 the NORTH WEST COMPANY constructed a new fort at its Lk Superior headquarters, replacing GRAND PORTAGE, which had come under US jurisdiction. At the mouth of the Kaministiquia R some 50 km N of the international boundary, the new depot served until 1821 as the site for the NWC's annual summer rendezvous of Montréal agents and WINTERING PARTNERS, and as its major transshipment point for furs and trade goods. Named in 1807 after NWC chief superintendent William MCGILLIVRAY, Ft William occupied a pivotal place in the company's vast trading network. In 1816-17 Lord SELKIRK occupied Ft William for 10 months as a consequence of the SEVEN OAKS INCIDENT. This occupation, combined with major financial difficulties, led to the NWC merger with the HUDSON'S BAY COMPANY in 1821. With the Montréal transportation system virtually abandoned in favour of the HBC's, Ft William lost its importance in the FUR TRADE. As a post and fishing station of the HBC, it gradually declined until its closure in 1883. In 1902 its last standing structure, the NWC's Stone Store, was demolished to make way for the CPR's expanding grain and freight shipping facilities. The only reminders of Ft William's fur-trade past now at its original site are the local historical society's cairn, unveiled 1916, the Historic Sites and Monuments Board's marker, erected 1981, and neighbouring street signs bearing the names of renowned NWC and HBC fur traders.

Prompted by the community's active interest in Ft William's role as gateway between East and West, and also by the recognized potential of heritage attractions for tourism, the Ontario government decided in 1971 to reconstruct Ft William to the NWC period. Known as Old Fort William, the reconstruction is located in Thunder Bay, Ont, at Point de Meuron, 14 km upriver from the original site. Through its costumed staff, the fort's living historical program depicts the activities of the rendezvous, the annual gathering of Scots traders, French Canadian VOYAGEURS and Indian trappers. It also portrays the fur-trade society and material culture of the early 19th century. Other facilities include an interpretive centre, a resource library, a gift shop, a historic-food outlet and programs for schools and special-interest groups. *See* HISTORIC SITE.

JEAN MORRISON



Fort William was constructed in 1803 to replace the NWC post of Grand Portage. Until 1821 it was the pivotal transshipment point for furs and trade goods. The present reconstruction is located in Thunder Bay, Ont, 14 km upriver from the original site (*courtesy Ontario Ministry of Tourism and Recreation*).

Fort William Freight Handlers Strike by 700 nonunionized immigrants occurred 9-16 Aug 1909. Greek and Italian strikers engaged Canadian Pacific Railway police in a protracted gun battle on Aug 12, whereupon Col S.B. STEELE restored order using the local militia and the Royal Canadian Mounted Rifles from Winnipeg. A federal conciliation board granted a satisfactory settlement, but in 1910 the CPR fired its 400 southern European employees. J. MORRISON

Forteau, Nfld, Community, pop 520 (1981c), inc 1971, is a fishing and services centre on Forteau B in southern Labrador, 25 km across the Str of Belle Isle from insular Newfoundland. Its name likely derives from the French *fort* ("strong"), referring to the bay's strong winds. A major site of Maritime Archaic Indian, Montagnais and Inuit habitation from 7000 years ago, Forteau was used by BASQUE whalers, and later by French, English and Newfoundland fishermen from the late 1500s. A garrison fort was erected in Baie Forteau 1710, and the bay was a base for the French migratory fishery; after the British were granted Labrador in 1763, Jersey and British merchant firms took over the fishery. In 1857 the Pointe Amour navigational light, the tallest (33 m) in Newfoundland and Labrador, was built, and remains today. A GRENFELL Mission nursing station opened 1909 and a Grenfell boarding school by 1939. The first high school on the Labrador coast opened there in 1964. The modern town, still dependent upon the fishery, services much of the southern coast of Labrador.

JANET E.M. PITT AND ROBERT D. PITT

Reading: J.A. Tuck, *Newfoundland and Labrador Prehistory* (1976).

Fortier, Paul-André, dancer, choreographer (b at Waterville, Qué 29 Apr 1948). A strong, unsettling presence, Fortier emerged from the cradle of Montréal indépendantiste dance, Groupe nouvelle aire, in the mid-1970s. Given the Jean A. Chalmers Award for choreography in 1981, he founded his own company, now Fortier Danse-Création. His 14 choreographies, ranging from *Derrière la porte un mur* (1978) to *Ça ne saigne jamais* (1983), comment on society, using sex and violence as a metaphor for power. His style oscillates between post-modern minimalism and the hard-edged German expressionism of the 1930s. He taught literature and theatre at Granby 1971-75 and dance at Concordia and UQAM 1981-82. KATI VITA

Fortification, a barrier thrown up between a defender and his assailant, its sophistication depending mainly upon the skills of the defender and the weapons available to the assailant, and whether the structure is permanent or a temporary defence. The earliest fortifications probably consisted of felled trees, interlaced thornbushes

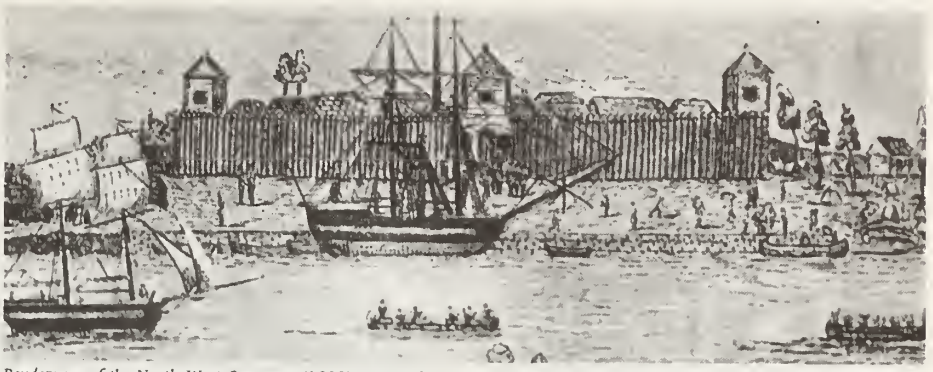
or stones rolled together. Fortifications of this type were built by the HURON and other Iroquoian groups before the arrival of the Europeans. Among Europeans these primitive forms eventually developed into walls of earth, timber, stone or baked brick. Although the barrier posed by these walls was sometimes increased by setting a ditch below their outer faces, fortification did not progress beyond this rather simple conception until the 16th century. The chief reason for the lack of innovation is that the main agent of assault continued to be infantry, to which a good wall was a formidable barrier, while such infantry-support weapons as the battering ram or machines for throwing stones posed relatively little threat to solid walls. The technological breakthrough of the late 15th century was artillery, and the early modern revolution in fortification was a response to this new threat. Gunpowder first appeared in Europe in the 14th century, but it was not until the 15th century that tubes using it to launch projectiles were effective. From the late 15th century, when several Italian fortresses fell to French artillery, defensive designs changed rapidly.

Early modern fortresses used elements of medieval defences but builders covered them against artillery fire by sinking the complexes into the ground. A deep ditch in front of a low wall remained a barrier to infantry while offering a smaller target to artillery. The earth from the excavation was piled on the outer side of the ditch in a long slope which further reduced the target area of the wall and also slowed charging infantry. Although there were refinements, these were the basic elements of the new fortifications, and the star-shaped designs of the central complex allowed every point of the fortified perimeter to be swept by the defenders' guns.

Both medieval and early modern fortification styles were built in Canada, the choice depending upon whether a place would have to face artillery. Artillery was used only by Europeans, and — because of the cumbersome nature of early guns — the only fortifications built for defence against artillery were normally those near water transportation routes accessible to Europeans. Thus, the PORT-ROYAL habitation built by Champlain in 1605 in Nova Scotia — the earliest European fortification in America N of the Spanish settlements — is but a few connected buildings huddled around a court, presenting solid blank walls on the outside. However, the small complex is embellished with a little walled battery for light guns facing the water. Champlain built a similar structure at Québec in 1608. The choice of style was determined more by location than by the period during which construction took place: simple palisaded strongpoints were constructed well into the 19th century in the West, whereas LOUISBOURG, built on Cape Breton I in the second quarter of the 18th century, is the most highly developed example of early modern fortification in N America.

In NEW FRANCE most forts were built on the Lake Champlain-Richelieu R invasion route (*see* FORT CHAMBLY), although fortified trading posts were built deep in the interior (*see* FORT DUQUESNE); later, in UPPER CANADA, the focus was on the threatened Niagara frontier (*see* NIAGARA HISTORIC FRONTIER). Around 1800 the British built high, round stone towers to strengthen the ports of Halifax and Saint John. In the North-West, simple wooden palisades sufficed except at PRINCE OF WALES'S FORT on Hudson Bay and at Upper and Lower Fort Garry on the Red R, where stone walls were built as protection against attack.

The WAR OF 1812 ended in a stalemate, thanks in part to British naval power on the Atlantic and Lake Ontario, and the RUSH-BAGOT AGREEMENT OF 1817 severely limited warships on the Great Lakes and Lake Champlain. Because the US, with a 10-to-one population advantage over British North America, had a greater potential to build ships in the interior, the British government built the RIDEAU CANAL so that gunboats could be rushed from the Atlantic to vital Lake Ontario; and elaborate stone forts in sunken star-shaped patterns were built at Kingston (FORT HENRY) where the Rideau Canal would reach Lake Ontario, at Île-aux-Noix where the Richelieu R flows out of Lake Champlain, at oft-besieged Québec City (*see* QUÉBEC CITADEL) and at Halifax, the Royal Navy's N American base.



Rendezvous of the North West Company (1805), engraving by an unknown artist. Fort Kaministiquia (which was renamed Fort William in 1807) was the hub of the NWC's activity. Similar fortified posts were strung out across the Northwest (*courtesy Public Archives of Canada*).

A technological revolution in warfare in the mid-19th century upset long-established assumptions about the relative strengths of attack and defence. Ironclad enemy steamships, firing conical shells from rifled cannon, might suddenly destroy the Royal Navy in its bases. Britain reacted by overstressing coast defences, first at Portsmouth and Plymouth and then in British North America. When the AMERICAN CIVIL WAR briefly renewed the possibility of war with the US, the British government undertook major new forts in Bermuda and Halifax and at Lévis, opposite Québec City (*see* MARTELLO TOWERS).

With a half dozen new batteries, Halifax harbour was fortified on a scale to resist the combined fleets of the world. An example shows the rapid evolution of the fort-maker's art. In the early 1860s the lower (and thus more vulnerable) battery on George's I was remodelled to give its rifled, muzzle-loading cannon protection behind iron-shielded, stone portholes in thick earthworks. In the late 1880s York Redoubt's guns were remounted in circular concrete pits to permit all-round fire and placed behind gently sloped parapets designed to deflect, rather than to resist, incoming shells. In the early 1890s Halifax began the changeover to breech-loading guns, and complete rearmament took place 1898-1906 (*see* HALIFAX CITADEL).

In 1905-06 the Canadian government took over the British fort at Halifax and a similarly defended one at Esquimalt, BC. As the 20th century progressed, the range of artillery batteries became but one element in an integrated harbour-defence system which included mines, submarine nets and aircraft. During WWII Canada built a new system of modern coastal forts at Esquimalt, Prince Rupert, Vancouver, Halifax, Sydney, Saint John and a number of Newfoundland ports. Since WWII self-propelled missiles and atomic warheads have created a technological revolution necessitating another reappraisal of techniques of defence. *See* ARMAMENTS.

G.A. ROTHROCK AND C.S. MACKINNON



The governor's bastion, Louisbourg. The fortress, built on Cape Breton I in the second quarter of the 18th century, is the most elaborate example of an early modern fortification in N America (*courtesy Network/R.K.S. Davies*).

Fortin, Marc-Aurèle, painter, engraver (b at Ste-Rose, Qué Mar 14 1888; d at Macamic, Qué 2 Mar 1970). Fortin's work, devoted entirely to landscape, demonstrates his love for a rich and bountiful nature. His brush transforms heavy clouds, thick foliage and rising hills into large, free forms, vibrating with colour. Despite studying in the rather conservative setting of the École du Plateau with Ludger LAROSE, the Monument national with Edmond DYONNET (1904-08), and at the Chicago Art Institute (1908-14), he developed a modern view of rural subjects. The Laurentian lowlands, the Montréal suburbs, the Charlevoix region and the Gaspé Peninsula in turn attracted his attention. Only relatively late in life did this solitary painter receive limited recognition: the Jessie Dow Award (Art Assn of Montreal, 1938), associate of the Royal Canadian Academy of Arts (1942) and a retrospective exhibition at the Musée du Québec (1944). Fortin remained unfathomable for most of his contemporaries. His prolific production, constant experimentation with various media and personal vision of nature have established him as a pioneer of modern art in Québec.

LAURIER LACROIX

Fortin, Pierre-Étienne, politician, surgeon, conservationist (b at Verchéres, Lower Canada 14 Dec 1823; d at La Prairie, Qué 15 June 1888). After graduating from the Petit Séminaire de Montréal (1841) and McGill Coll (1845), he practised medicine at GROSSE-ÎLE (1847-48). As the first magistrate responsible for protection of fisheries in the Gulf of St Lawrence 1852-67, he initiated early conservation efforts, provided early faunal studies, promoted new marine initiatives, and sought greater rights for Canadian fishermen. He represented Gaspé in the Commons 1867-74 and 1878-87 and in the Québec legislature 1867-78, serving as commissioner of crown lands 1873-74 and Speaker 1875-76. His efforts helped initiate fire protection, forest conservation, the Baie de Chaleur Ry, and portions of telegraph, postal and lighthouse services for the Gaspé. He was appointed to the Senate in 1887. MARTIN K. MCNICHOLL

Forty Mile, YT, is an abandoned settlement on the YUKON R named for its distance from FORT RELIANCE. Gold was discovered in the area, and in 1887 A. Harper and L. McQuesten built a store at the mouth of Forty Mile R. William C. BOMPAS opened an Anglican mission the same year, and a rival store opened 1893. The 2 posts formed the nucleus of a thriving community which served several thousand miners until their exodus to the KLONDIKE in 1896. H. GUEST

Forty-ninth Parallel is the line of latitude that forms the boundary between Canada and the US from LAKE OF THE WOODS to the Str of GEORGIA. The section from Lake of the Woods to the summit of the ROCKY MTS was agreed to in the Convention of 1818 and that from the Rockies to the Str of Georgia in the OREGON TREATY of 1846. As ultimately surveyed and demarcated, the boundary actually consists of several chords drawn between astronomically determined points on the curved parallel. The parallel also forms the first baseline for the Dominion Lands Survey System by which the territory that became the provinces of Manitoba, Saskatchewan and Alberta and some adjacent parts of British Columbia and Ontario was subdivided. It and the baselines every 24 miles (38.6 km) N of it are E-W survey control lines which are run as 6-mile (9.6 km) chords to curved parallels of latitude. N.L. NICHOLSON

Forward, Frank Arthur, engineer, educator, inventor (b at Ottawa 9 Mar 1902; d at Vancouver 6 Aug 1972). Known internationally for his metallurgical-process discoveries, Forward was also a prominent educator and science administrator. Forward taught and conducted research at UBC from 1935 to 1964, serving in WWII as technical director of the War Metals Research Board. In the 1950s he invented and developed a highly successful process for leaching NICKEL and other metals from sulphide ores, an achievement that brought him international recognition and many honours. Director of the Canadian Uranium Research Foundation in the 1960s, Forward was also president of both the Canadian Council of Professional Engineers and the Canadian Institute of Mining and Metallurgy. In 1964 he became the first director of the Science Secretariat of Canada (a Privy Council office) where he helped to formulate a SCIENCE POLICY for Canada. JOHN LUND

Fosheim Peninsula, about 10 230 km², on western ELLESMERE I, is bounded S to NE by Bay Fjord, Eureka Sound, Greely and Cañon fjords. The northwestern part is low and undulating, but low mountain ranges in the E reach 1295 m, dotted with small ice fields and glaciers. Protected on all sides by mountain ranges, the peninsula is relatively sheltered and supports a polar semidesert. Arctic hares are periodically abundant; muskoxen are common, but caribou are scarce. The peninsula was sighted by A. Greely of the US Army in 1881, but was first explored in 1899 by the expedition led by Otto SVERDRUP, who named it after a member of his party, Ivar Fosheim. S.C. ZOLTAI

Fossil [Lat *fossilis*, "dug up"], trace of an ancient ANIMAL OR PLANT preserved in the Earth's crust. PALEONTOLOGY is the modern, scientific study of fossils, but these curious objects have attracted attention since ancient times. Opinions were divided as to whether they were relics of once-living creatures, or were random results of processes without any particular significance. A few original thinkers deduced that not only were they products of ancient life, but that they also recorded the former distribution of land and sea. The Greek scholar Herodotus concluded that the presence of marine shells in the interior of Egypt demonstrated that the area had been inundated in former times. In the 16th century, Leonardo da Vinci not only accepted fossils as relics of former life but also argued, from their presence high in the mountains, that there had been profound changes in the level of the sea. Glimpses of the true meaning of fossils were offered by the 17th-century English physicist Robert Hooke, who suggested that fossils recorded changes in climate and succession of life.

The great breakthrough that established fossils as the chroniclers of GEOLOGICAL HISTORY was made independently, early in the 19th century, by William Smith in England and Georges Cuvier and Alexandre Brongniart in France. They discovered that a distinct succession of fossils exists in stratified layers of SEDIMENTARY ROCKS. They also noted that while deposits of the same age carry the same kinds of fossils, rocks of different ages carry different fossils. Study of the succession of fossils in rock layers (biostratigraphy) provides a basis for establishing a history of the Earth. By 1842, the broad divisions of geological time had been defined for Europe and N America, and much detail had been worked out on local sequences of rock formations and their fossil contents. L.S. RUSSELL

Fossil Animals The first ANIMALS were microscopic in size and left no known FOSSIL remains The oldest animal fossils occur in sediments deposited under shallow equatorial seas over 600 million years ago. Probably less than 100 species are known, most being jellyfish and leaflike, soft corals. These fed on microscopic organisms filtered from seawater, while less abundant, wormlike animals sifted organic debris from soft sediments on the seafloor. The most important fossil sites in the Western Hemisphere, both for their great age and the relatively deepwater environments they represent, are located on the Avalon Peninsula, Nfld.

By 500 million years ago, primitive jointed-legged animals (eg, TRILOBITES) were abundant in the seas, together with small, shelled animals and primitive, noncoralline, reef-forming organisms. The BURGESS SHALE, a UNESCO World Heritage Site in YOHO NATIONAL PARK, has yielded superbly preserved fossils of archaic soft-bodied animals, buried in fine-grained mudstones at the base of a tropical algal reef. Approximately 140 species have been identified at this site alone, including antecedents of backboned animals. It is the most diverse fauna known for this time. The nutrient-rich coastal margins of shallow equatorial seas provided a centre of origin for new kinds of marine animals, which usually displaced the more primitive forms toward the ocean basins. Accordingly, about 450 million years ago, the trilobite faunas were displaced by shallow-water communities dominated by primitive corals, lamp shells, sea lilies and straight-shelled MOLLUSCS. Their fossil remains are found in flat-lying marine limestones, shales and sandstones throughout Canada (eg, at Stony Mountain, Man).

An extinction interval occurred approximately 435 million years ago, coinciding with the spread of continental ice sheets over what has become the Sahara Desert, and the withdrawal of shallow seas from the continents. However, representatives of most major groups of marine organisms survived and repopulated the seas. The Hagersville, Ont, site containing large, shallow, marine shellfish is dated at 380 million years old.

A symbiosis between FUNGI and green ALGAE gave rise to the land PLANTS, which spread across fertile deltas and coastal lowlands 400 million years ago. Terrestrial arthropods also appear in the record at this time. About 350 million years ago, a brackish water lagoon near Miguasha, Qué, was the burial site of outstandingly preserved specimens of about 2 dozen species of lungfish and lobe-finned FISHES. Among them are the remains of the oldest known AMPHIBIANS. Another profound extinction of unknown cause occurred shortly thereafter.

By 300 million years ago, the major groups of marine animals were again highly diverse. The oldest, truly terrestrial, backboned animals were lizardlike REPTILES, the skeletons of which are preserved in still-standing hollow tree trunks, buried in sediments now exposed in the sea cliffs near Joggins, NS. These reptiles fed on arthropods, initiating an ecological relationship between the 2 major groups of terrestrial animals which has continued to the present. Backboned animals did not begin to feed directly on land plants until 20 million years later. From this period on, the number of major



Albertella limbata (Rasetti) fossil was collected from near Bow Lake, Alta. It is 530 million years old.



Ogygopsis klotzi (Rominger), 530-million-year-old trilobite moult.



Olenoides serratus (Rominger), a fossil collected from rocks about 530 million years old, near Field, BC. This animal was a predator which grasped its prey with the sharp spines on the inside of its powerful walking legs (*photos by Brian D.E. Chatterton*).

groups of terrestrial animals was at least half that of major groups of marine animals. Fossils of primitive, mammallike reptiles estimated to be about 275 million years old are found on ancient semiarid deltas at Charlottetown, PEI.

The greatest recorded mass extinction occurred about 230 million years ago. It has been estimated that 90% of marine animal species disappeared, and major groups were unable to regain their former importance. Land animals were reduced similarly. The extinctions have been linked to the coalescence of continental blocks into a single super-continent, although the brevity of these extinction intervals is seen by some to be incongruent with ponderous continental movements. Marine faunas, hereafter, were characterized by an abundance of molluscs, arthropods and bony fishes; on land, large reptiles close to the ancestry of MAMMALS were replaced by reptiles related to crocodiles. As during other extinctions, small insectivorous, backboned animals did not seem to suffer as greatly as many of their larger relatives. Another, less severe, extinction occurred 195 million years ago. Crocodilelike terrestrial faunas were then replaced by communities dominated by mammals and DINOSAURS. Mammals were small during the period of dinosaurian ascendancy and probably possessed high metabolic rates in relation to their body size. These rates enabled insectivorous mammals to match activity levels sustained by INSECTS as a consequence of their still smaller body size. Primitive BIRDS, descended from small carnivorous dinosaurs, are also presumed to have had high metabolic rates. Conversely, herbivorous dinosaurs became large, in part as a result of economies gained by a relative decrease in the effort required for locomotion and a reduced basal metabolic rate associated with increased body mass. They were energy-efficient browsers of bulk vegetation. The largest and most diverse assemblage of dinosaurs known is represented by skeletons preserved in the badlands of DINOSAUR PROVINCIAL PARK, Alta, another UNESCO World Heritage Site. More than 300 specimens belonging to 31 species have so far been collected. The wealth of fossil materials has served as a basis for studies on dinosaurian ecology of about 75 million years ago.

About 65 million years ago, a mass extinction abruptly eliminated the dinosaurs and an estimated three-quarters of then living species. The extinctions are associated with a chemical anomaly in the sediments of the time which suggests the impact of an asteroid. Marine molluscs, arthropods and bony fishes soon regained and surpassed their former levels of diversity. By 50 million years ago, Earth had ceased to be predominantly a water world, as many vital substances were captured and retained in terrestrial ecosystems. Birds and mammals diversified on land, their generally smaller body sizes favouring the existence of a larger number of species than was the case in dinosaurian faunas. Fossils of early mammals, turtles and crocodiles in warm, broadleaf forests estimated to be about 50 million years old occur on ELLESMERE ISLAND, NWT. In the CYPRESS HILLS, Sask, an abundant and diversified fauna of large, fossil mammals (about 35 million years old) occurs. The ancestors of man appeared in equatorial regions of Africa and Asia about 3 million years ago. In the OLD CROW BASIN, YT, 30 000-year-old fossils of Ice Age mammals and early man are found in unglaciated terrain (*see* PREHISTORY).

During the past 400 million years, arthropods have dominated land faunas in number of species and individuals, and in the volume of organic material consumed. This domination is now being challenged by one uniquely successful species of backboned animal, *Homo sapiens*, which has acquired a highly complicated brain giving it an enormous selective advantage over other animals.

The fossil record retains an enormous amount of unexplored and interesting information on the EVOLUTION of animal life. It can reveal the physical or biological conditions that will produce evolutionary stagnation or evolutionary acceleration. The record will provide the means to measure the progress of trends such as the differentiation of primitive, segmented worms into more complex organisms like butterflies and birds; the development of simple communities dominated by archaic jellyfish into the intricate animate realms of modern coral reefs; and the appearance of similar structures in unrelated animals (eg, the brain in an octopus and an owl). The record will also have important implications for the study of the evolution of animate organisms in extraterrestrial worlds. It will show whether mass extinctions stimulate evolution toward higher levels of animal complexity or the converse. The record of animal life on Earth should provide a framework for projecting its evolution into the next few million years. In a general way, the specialization of animal structures and multiplication of animal species has been stimulated by competition in the struggle for existence. Thus the rate at which the number of animal species increased, over periods of tens of millions of years, has been approximately proportional to the number of species in existence. The total number of species present on Earth, accordingly, tends to to grow ever more rapidly. In a similar manner, humanity's most valuable competitive asset, its brain, has evolved according to a pattern that suggests that the rate of increase in brain size is proportional to brain size. This implies that competition between individuals of our species generates the selective pressure in brain evolution, and increase in brain size should continue. A long-term trend toward an increase in the variety and complexity in animal life has been interrupted periodically by shorter intervals marked by severe extinctions. The causes of individual mass extinctions may differ. Mankind is clearly implicated in the extinctions that began toward the end of the last ICE AGE (10 000 years ago) and which continue today. After earlier mass extinctions, the few surviving organisms soon differentiated into an array of different species, which developed many modifications of the successful ancestral body plan. Perhaps our species is the primitive stem of a new kind of animal, the intellectual qualities of which will differentiate and expand into another array of different and increasingly complex animals in the history of terrestrial life.

DALE A. RUSSELL

Fossil Plants Paleobotany is the study of ancient PLANT life using FOSSIL evidence. "Plant" refers to familiar land plants, and also to aquatic plants, MOSSES, LIVERWORTS and ALGAE. Although not plants, FUNGI and bacteria are often included. The first organisms to evolve on Earth resembled bacteria. They consumed organic molecules from which they themselves originated and molecules formed by the combination of carbon dioxide, water and nitrogen, accumulating since oceans first formed. These organisms reproduced rapidly and, over millions of years, devoured all available food. Greater success required the EVOLUTION of plants — organisms capable of manufacturing their food using sunlight and inorganic molecules. The simplest living photosynthesizers are BLUE-GREEN ALGAE, which now live in nearly every environment and, in some aquatic habitats, produce stromatolites — mounds composed of layers of sediment. The earliest signs of life are 3.5-billion-year-old cells in Carbonaceous cherts from western Australia, which resemble modern blue-green algae. Stromatolites 3 billion years old have been found in Africa. The Canadian SHIELD contains stromatolites as old as 2.5 billion years. On the shores of Lk Superior, near Kakabeka Falls, stromatolites and the microscopic organisms that grew on them 1.9 billion years ago have been preserved in silica; these organisms compare closely with living blue-green algae. Their description, by E.S. Barghoorn and S.A. Tyler in 1965, startled geologists and biologists. Before this, although it had been hypothesized that such ancient organisms existed, it had not been proven. These fossils, the first indisputable evidence that life existed at such an unimaginably distant time, started investigation of Precambrian algae around the world.

Throughout most Precambrian time, Earth was dominated by blue-green algae and bacteria; complex algae and ANIMALS appeared less than 1 billion years ago. Complex life forms appeared so late because of the chemistry of life. Free oxygen (O_2) is necessary for the aerobic (oxygen-requiring) metabolism common to all living plants and animals (except anaerobic blue-green algae and bacteria). Ancient Earth had no free oxygen, so most modern life forms could not exist. The origin and maintenance of free oxygen on Earth derives from plant photosynthesis. The oxygen produced by early blue-greens quickly reacted with elements (eg, iron, to produce rust). Algae literally had to "rust" Earth for 2 billion years before oxygen began accumulating in the air and oceans. Transition from anaerobic to aerobic conditions occurred near the close of the Precambrian. Evolution then proceeded, fueled by the fires of aerobic metabolism, at a great and seemingly ever-increasing rate. Survival of such ancient organisms as blue-green algae is due to their remarkable adaptability in an ever-changing world, and to the ever-present place in the environment for such small and simple life forms. The fossil record of higher algae is poor, except for lime-secreting red algae and green algae. Since Cambrian time, these algae have been important in the construction and cementation of reefs. The Leduc, Swan Hills and Rainbow Lk reefs of Alberta form natural reservoirs for some of Canada's oil.

Invasion of land by plants from an aquatic environment occurred about 410 million years ago, after the build up of atmospheric oxygen and formation of the ozone layer, shielding Earth from deadly ultraviolet radiation (UV). Water, of prime importance to living things, is easily available to aquatic organisms, but ancestors to land plants had to develop water-conserving features for survival out of water: cuticle, a waterproof waxy coating; roots for absorbing water; a conducting system for water transport; and watertight reproductive bodies. With life possible on land, a vast, new habitat was available to any algal group overcoming the water barrier. Many must have tried; only 2 succeeded, both evolving from green algae: bryophytes (mosses and liverworts); and vascular plants, with internal woody tissue for support and water movement. Since the initial colonization of land in the Silurian, no new groups of land plants have evolved from algae. Competition with pre-existing, increasingly well-adapted groups became too severe. Bryophytes, bound to a life-style and structure that keep them small, are usually fragile, and seldom occur as fossils. Mosses and liverworts first appear in Devonian rocks. Forty-five-million-year-old fossil mosses from BC are very similar to living mosses, suggesting that many species of bryophytes are ancient and evolve very slowly. Vascular plants have been the dominant land vegetation for over 400 million years and have been continually evolving in response to climatic and environmental change. Evolution of new, extinction of old, and survival of well-adapted forms is the recurrent theme.

The earliest vascular plants, rhyniophytes, were small, naked, simply branched herbs with-

out roots or leaves. They gave rise to 2 groups in the early Devonian: zosterophylls, usually covered by soft spines; and trimerophytes, tending to complex branching and a shrubby habit. Well-preserved fossils of all 3 early Devonian groups are found at famous fossil plant locations at Gaspé and Chaleur bays (Qué and NB, respectively) and the Abitibi R near James Bay, Ont. These fossils provide much information about plant structure and evolution. J.W. DAWSON first examined them and recognized their significance. His discovery of these strange, leafless plants was largely ignored; none believed such a world existed. Dawson persevered and is now recognized as the founder of Devonian paleobotany. In the middle to late Devonian, several new groups evolved. Zosterophylls gave rise to plants with leaves which evolved from spines: CLUB MOSSES and giant scale TREES (Lepidodendrales). The trimerophytes left, by far, the greatest number of descendant groups: HORSETAILS, with whorled appendages; FERNS, with compound leaves evolved from large branching systems; and progymnosperms, woody, free-sporing ancestors to SEED PLANTS, which were of 2 types — those with compound, fernlike leaves (seed fern type), and those with simple leaves evolved from small terminal branches (CONIFER type). Progymnosperms developed thick, woody stems and formed the first extensive FORESTS, some preserved at Escuminac Bay and Gaspé, Qué; Ghost R area, Alta; and Hess Mts, YT.

The Mississippian period differed markedly from the Devonian as rising sea levels flooded most of the continent. Few fossil plants are known from this time in Canada. As sea levels fell in the Pennsylvanian, great swamps developed on old seafloors. Sydney and Pictou coalfields, NS, and Minto coalfield, NB, are legacies of these swamps. Pennsylvanian fossils from these coalfields, extensively studied by W.A. Bell, reveal a strange world of scale trees, giant club mosses over 30 m tall, and calamites — giant horsetails 30 m tall. Calamite twigs with star-shaped whorls of leaves are abundant and easily recognized. Cordaites, extinct relatives of conifers, were the only tough, woody plants of the swamps. Ferns and seed ferns, unrelated groups, produced similar types of fernlike foliage; many types of fernlike leaves actually bore seeds.

Plants that grew in dry uplands of the Pennsylvanian were rarely fossilized. True conifers, hardy ferns and seed ferns were evolving in these dry areas. The Permian and Triassic periods brought further lowering of ocean levels, GLACIATION in the Southern Hemisphere, and desert conditions in much of N America. Pennsylvanian swamp plants became extinct and plants adapted to dry conditions flourished. Triassic forests of conifers, cycads and cycadeoids (seed fern descendants with stubby trunks and stiff, feather-shaped, compound leaves), ferns and seed ferns are preserved in coal-bearing rocks of AXEL HEIBERG and ELLESMERE islands. The "Age of Conifers and Cycads" had begun and continued for over 100 million years, paralleling the "Age of Dinosaurs." When ocean levels rose and moisture increased in the Jurassic and Cretaceous, these plants spread to available habitats. Many early Cretaceous fossils are found in western Alberta coalfields (Canmore, Luscar and Grande Cache). In the early Cretaceous, seed ferns became extinct but, before doing so, gave rise to flowering plants. These angiosperms developed advantages over contemporary groups (eg, rapid reproductive cycle), which made them highly efficient plants, well adapted to "weedy" growth. These modifications, including flowers for attraction of insect pollinators, proved advantageous in many habitats. Interaction between plant and pollinator has been a driving force behind diversification of both groups. Some of the earliest known flowering plants are found in northeastern BC coalfields. These fossils vaguely resemble living angiosperms, but represent archaic, extinct groups. Late Cretaceous floras of the Dawson Creek area of BC, and Milk R, Alta, reveal increasing dominance by angiosperms, but relationships to living groups remain unclear.

At the end of the Cretaceous, the climate cooled, inland seas covering much of western Canada drained, and DINOSAURS became extinct. For the first time, fossil plants took on a modern appearance. Leaves of sycamore, katsura, dawn redwood and maidenhair are common. Although the climate had cooled, forests grew as far N as Ellesmere I. Early Tertiary (Paleocene) fossils are found over much of Alberta (eg, Red Deer R, Lk Wabamun coalfields, Robb to Coal Valley coalfields) and southern Saskatchewan (eg, Eastend to Ravenscrag area, Estevan coalfield). Climate warmed briefly in the early Tertiary (Eocene). Eocene fossils in BC (Princeton, Kamloops, Smithers areas) reveal increasing numbers of modern plant families, with extinct species of birch, maple, beech, willow, pine and fir. Climate began cooling again in the middle Tertiary, culminating in the glaciation of Canada 2 million years ago. Miocene peat beds on Banks and Meighen islands, containing spruce, birch, walnut, pine and larch, represent some of the last high arctic forests. Late Tertiary fossil plants are uncommon in Canada. The most recent ice advance ended about 10 000 years ago. Tertiary cooling and glaciation eliminated the old northern forests from Canada. Many plants found refuge in southeastern N America and China, where their descendants still live. Floras in these 2 areas are similar even today. Most modern Canadian plants are recent migrants from unglaciated areas and are very different from those of previous ages. The modern world is only the most recent chapter in the long and fascinating history of life. It is fortunate that the ROCKS of Canada preserve, often in exquisite detail, such a significant part of this history. *See* GEOLOGICAL HISTORY. JAMES BASINGER

Foster, Sir George Eulas, politician (b in Carleton County, NB 3 Sept 1847; d at Ottawa 30 Dec 1931). Educated at UNB, he became professor of classics there, 1873. Elected to the Commons as member for Kings in 1882, he was appointed minister of marine and fisheries (1885) in the MACDONALD government. In 1888 he took over finance, a portfolio he kept through the succeeding prime ministerships of ABBOTT, THOMPSON, BOWELL and TUPPER. A leading member of the Conservative Opposition, he joined the BORDEN government as minister of trade and commerce, 1911. He was a Canadian delegate to the 1919 peace conference and was appointed to the Senate in 1921. Foster was intelligent, able and hardworking. Borden also found him remarkable for lack of tact, for having an incredibly messy office — where Cabinet papers could disappear — and a penchant for extending his jurisdiction in every direction. Though never greatly loved, Foster was respected for his rigorous administrative abilities. P.B. WAITE

Foster, Harold, artist, author (b at Halifax 16 Aug 1892; d at Spring Hill, Fla 28 July 1982). Father of the adventure comic strip, Foster crossed Halifax harbour on a 12-foot (3.6 m) raft at age 8, skippered a 30-foot (9 m) sloop at 12, and after moving to Winnipeg helped support his family by hunting and fishing. He discovered a million-dollar gold lode near Rice Lk, Sask, and when he lost it to "claim jumpers" he bicycled 1600 kilometres to Chicago, Ill, for formal art training. He twice revolutionized newspaper comics. His *Tarzan* (1929-37) introduced adventure and realistic artistry, and in 1937 he created *Prince Valiant*, an original "illustrated historical novel" with complex, realistic characters, plotting and a literate text. Foster wrote and illustrated *Prince Valiant* for 42 years. His work, based on visits to the locales used and on research into medieval life, has been praised by both historians and teachers. GERALD J. RUBIO

Foster, John Stuart, physicist (b at Clarence, NS 30 May 1890; d at Berkeley, Calif 9 Sept 1964). After receiving a doctorate from Yale, Foster was appointed assistant professor of physics at McGill in 1924. A specialist in experimental spectroscopy, he made important contributions to the study of the "Stark effect" (the effect of an electric field applied to an atom), which played a critical role in the transformation of modern PHYSICS. Elected a fellow of the RSC in 1929, he received the Levy Medal of the Franklin Institute in 1930 and in 1935 was elected to the Royal Society of London. During WWII Foster was liaison officer for the NATIONAL RESEARCH COUNCIL at the Radiation Laboratory of MIT, centre of the US effort in radar development. His most important contribution to the war effort was a rapid scanner now known as the Foster scanner. He returned to McGill in 1944, and worked on constructing a proton accelerator, completed in 1949. In 1964 his laboratory, which had trained almost 80 nuclear physicists, was named after him. YVES GINGRAS

Foster, Walter Edward, businessman, politician, premier of NB (b at St Martins, NB 9 Apr 1873; d at Saint John 14 Nov 1947). Chosen Liberal Opposition leader in 1916 and premier following the Liberal victory in 1917 he sat for Victoria in 1917 and Saint John City in 1920. An advocate of Maritime Rights, his government established the Dept of Health 1918, enfranchised women (1918) and created the NB Electric Power Commission 1920. Owing to personal financial problems, he resigned in 1923. He was named secretary of state in 1925 but was defeated in a federal election that year. Appointed to the Senate in 1928, Foster acted as Speaker, 1936-40. DELLA M.M. STANLEY

Foster, William Alexander, barrister, essayist (b at Toronto 16 July 1840; d there 1 Nov 1888). He was a leading spokesman for a Toronto-centered group of intellectuals and public men who, in the wake of Confederation (1867), came to believe that without a unifying sense of purpose Canadian nationhood would succumb to American hostility, British indifference, racial animosity and political partisanship. In *Canada First* (1871) he described a Canadian national identity forged out of the process of nation-building, particularly Canadians' continuing confrontation with an inhospitable northern environment. Pride in their accomplishments and a belief in their destiny would give Canadians a sense of purpose before the forces of national disunity and dismemberment. In the wake of the PACIFIC SCANDAL, Foster and his friends launched the Canadian National Assn and the CANADA FIRST Party in 1874. They intended to enter politics on a platform of pure administration, political reform, protective tariffs and patriotism, but failed to nominate or elect a single candidate. DAVID GAGAN

Foulis, Robert, civil engineer (b at Glasgow, Scot 5 May 1796; d at Saint John 26 Jan 1866). Foulis studied medicine, engineering and painting in Glasgow and Edinburgh. In 1818 he was painting in Halifax and in 1821 moved to Saint John. He installed the machinery in the second and third steamers to ply the Saint John R, established the Saint John Foundry, lectured in chemistry, established a "School of Arts" and was a founding member of the Mechanic's Inst. He presented his plan for a steam fog whistle to the Lighthouse Commissioners in 1853. A steam alarm was installed on Partridge I in 1860 but not until a government report recognized Foulis's earlier contribution did he gain recognition as inventor of the world's first steam-

operated fog alarm. He also invented a "Tide Machine" designed to harness the tides of the Bay of Fundy, an "Amphocratic Steam Engine" for use in sawmills, an "Illuminating Gas Apparatus" for making coal and water gas, and a method of telegraphing by means of steam whistles. HAROLD E. WRIGHT

Foulkes, Charles, army officer (b at Stockton-on-Tees, Eng 3 Jan 1903; d at Ottawa 12 Sept 1969). Educated in London, Ont, Foulkes joined the Canadian Army in 1926, commanding the 2nd Canadian Infantry Division in Normandy before taking over the 1st Canadian Corps in Italy (Nov 1944) and then Northwest Europe (Feb 1945). He accepted the surrender of German forces in Holland in May 1945 and returned to Canada as chief of the general staff. In 1951 he was appointed chairman of the chiefs of staff. An advocate of close military ties with the US, he resigned in 1960 in opposition to the non-nuclear policies of the DIEFENBAKER government. He taught strategic studies at Carleton (1968-69). STEPHEN HARRIS

Foundations are "non-governmental, non-profit organizations with funds (usually from a single source, either an individual, a family, or a corporation) and program managed by (their) own trustees or directors, established to maintain or aid social, educational, charitable, religious, or other activities serving the common welfare primarily through the making of grants" (F. Emerson Andrews, first president, The Foundation Centre, NY).

The development of charitable foundations in N America has been a phenomenon of the 20th century. Unlike the US, however, it is only in the past 20 years that foundations have assumed a major role in Canadian philanthropy. A study by The Canadian Centre for Philanthropy in 1982 suggests that only about 2% of Canadian foundations existed prior to 1940. In the following decade another 5% were founded, followed by 17% in the 1950s, 29% in the 1960s and 47% in the 1970s. Figures for the 1980s are not available, but new foundations are being established.

Reflecting the minor role of foundations in Canadian society, prior to 1977 the rules governing the establishment and donations practices of foundations were extremely relaxed: a foundation had only to be registered with the Dept of National Revenue if it wished to issue income tax receipts for donations received. In that year, however, major legislation was enacted governing the establishment of foundations and their disbursement practices. The new rules required that all foundations be registered with Revenue Canada to obtain tax-exempt status and that substantial minimum disbursement levels be met on an annual basis. Foundations were required to register as "private" (established by an individual or family) or "public" (where a fixed proportion of board members are not related and funds are from more than one source) foundations, and the actual disbursement requirements depended on that classification.

Most foundations found these rules to be equitable, but the federal government apparently perceived that they were open to abuse. The budget proposals of 12 Nov 1981 indicated an intention to effect drastic increases in disbursement requirements that would have eroded foundations' capital so as to effect their eventual disappearance. Following vigorous representations from all sectors of the philanthropic community, these proposals were modified in a release from the minister of finance dated 21 Apr 1982. An accompanying statement indicating the government's support for the idea of foundations should once again ensure growth in this sector.

Role and Responsibilities Foundations occupy a unique place in Canadian philanthropy. Unlike most other granting sources, their incomes are generally constant, sometimes even greater every year. They have relative freedom from outside pressures, which gives them continuity and stability and offers opportunities to provide "venture capital" for innovative programs or support to new or unpopular causes. Generally, however, their support is given to traditional activities. Foundations have played an important role in the maintenance of a pluralistic Canadian society — historically a healthy and productive balance between government measures and private philanthropy. As their role in Canadian society expands, foundations are finding it necessary to assume new responsibilities, including a high level of public accountability, the provision of expert or technical advice to charitable organizations, and as "lead" donors for major charitable campaigns.

Facts About Canadian Foundations There are little more than 700 foundations in Canada, compared to over 22 500 in the US, yet the relative impact on philanthropy is greater for Canadian organizations. In Canada it is estimated that foundations account for 8.2% of all charitable giving; in the US they are responsible for only 4.9%. Total assets held by Canadian foundations now exceed $1.2 billion, and from that base in 1980 grants of more than $110 million were made. They ranged in size from hundreds of thousands of dollars to a single dollar provided for a subsidized rent, charged for the premises in which an Edmonton group runs a shelter for battered women and children. Canada's top 50 foundations now hold 88% of foundation assets and make 74% of all grants.

Canada's Largest Foundations

Rank by assets	Foundation	Total assets	Rank by grants	Total grants
1	McConnell, J.W.[1]	179 009 282	2	7 960 200
2	Vancouver	77 385 784	3	7 506 492
3	Hospital for Sick Children	63 822 721	4	6 494 650
4	Law Foundation of BC	55 785 012	8	2 954 678
5	Donner Canadian	54 000 000	5	4 835 810
6	Macdonald Stewart	44 866 092	6	4 211 797
7	McLaughlin, R. Samuel	41 737 945	11	2 500 000
8	Physicians' Services Inc	30 198 097	15	1 663 087
9	Bell, Max	29 846 000	9	2 682 000
10	Bickell, J.P.	26 042 052	10	2 563 000
11	Kahanoff[2]	25 992 634	–	210 189
12	Eldee	23 547 130	14	1 680 256
13	Winnipeg	21 287 906	13	1 772 545
14	Morrow, F.K.	20 034 471	16	1 531 332
15	Molson Family	20 000 000	22	1 066 000
16	VanDusen	19 497 210	18	1 413 585
17	Atkinson Charitable	19 487 960	17	1 426 494
18	Associated Medical Services	19 277 752	32	702 783
19	Windsor	19 207 386	25	977 500
20	Bronfman Family, Samuel and Saidye	19 000 000	12	2 500 000
21	Lee, Clifford E.	17 065 223	24	979 895
22	Laidlaw	16 193 000	19	1 368 580
23	Devonian Group	14 999 000	1	8 336 000
24	RHW	14 159 140	42	444 850
25	Beaverbrook Canadian	13 558 095	26	971 532
26	Lawson	11 365 507	33	697 078
27	Ivey, Richard	11 177 632	27	924 750
28	Birks Family	10 434 107	44	418 030
29	Levesque, J. Louis	10 424 609	36	616 323
30	Ivey Fund, Richard and Jean	10 071 254	29	813 500
31	Eaton	9 112 944	23	988 035
32	Dunn, Sir James	8 984 967	–	69 500
33	Woodward's Mr and Mrs P.A.	8 922 205	38	557 982
34	McLean	8 900 000	31	717 280
35	Muttart, Gladys and Merrill	8 432 255	–	346 305

[1] Combined with the Griffith Foundation
[2] The foundation received most of its funding during 1980

Regional Analysis Although western Canada has 27.74% of Canada's foundations, Saskatchewan and Manitoba are seriously underrepresented with 0.40% and 3.3%, respectively. Québec with 26.2% lags behind Ontario with 44.68%. NS has 0.98%, NB has 0.40%, and PEI and Newfoundland have none at all. Since many foundations restrict their giving to their own province or regions, the most economically disadvantaged regions of Canada are also those with the least access to foundation support.

Foundation Interests Because of the lack of commitment to research on the part of both governments and business in Canada, a multitude of research areas are funded by foundations: aeronautical, agricultural, applied scientific, auditing, behavioural science, biological, communications, education, energy, environment, epidemiology, industrial society, medical research, social science, theological and transportation. Grants are also made to the arts, educational, health and religious institutions, and to social welfare *(see* EDUCATIONAL FOUNDATIONS).

Types of Foundations Canadian foundations fall into 4 principal categories. *Family Foundations* Most Canadian foundations have been established by an individual, a family or related group of people: 44 of the country's 50 largest foundations are family foundations, the typical "private" foundation. These foundations are usually established to support causes of interest to the original donor or donors and, even after their deaths, family foundation boards are likely to maintain the general direction established by the founders. *Community Foundations* The funds of community foundations come, most commonly, from bequests of the citizens of the community. These "public" foundations, having a broad, representative board of directors, can provide a continuing source of funds that can be used for innovative or preventive programs within a community that cannot be funded by governments or annual campaigns. In the words of Alan G. Howison, executive director of the Winnipeg Foundation, "the main funders in the social welfare scheme, government and The United Way, have their plates so full of 'have to do' projects that there is little money left for prevention." *Corporate Foundations* Although they provide an excellent opportunity for stabilizing corporate donations programs, corporate foundations have not been widely used by Canadian companies. Through the foundation mechanism a reserve can be built up in good years so that a consistent donations program can be maintained during economic downturns. In 1980 Canadian corporate foundations listed only $7 million in assets and grants totaled just over $3 million. These figures suggest that corporate foundations are used primarily as a management tool for centralizing the corporate donations program. Recent tax measures may encourage growth of Canadian corporate foundations to match that of the US, where they are the fastest growing members of the foundation sector. *Special-interest Foundations* are those whose assets have been acquired from a variety of sources, usually for quite specific purposes. The Physicians' Services Incorporated Foundation, founded with money from a private medical insurance plan that was superseded by government, is an example. Another, and growing, example is the hospital foundation, of which there are close to 100 in Ontario alone. Five of Canada's top 50 foundations fall in the special-interest category and together they hold assets in excess of $171 million.

ALLAN ARLETT

Reading: Allan Arlett, ed, *The Canadian Directory to Foundations and Granting Agencies* (1982).

Four Seasons Hotels Ltd, with head offices in Toronto, owns and manages hotels and properties. Incorporated in 1968, the company owned

and operated Toronto's Inn on the Park hotel. In 1969 the Four Seasons Israel opened and the company launched a joint venture with Sheraton Hotels to open the Four Seasons Sheraton in Toronto. Further international expansion began in 1970 when Four Seasons opened the Inn on the Park in London, Eng; today the company also has interests in the US. In 1983 it had sales or operating revenue of $306.7 million (ranking 205th in Canada), assets of $143.7 million (as of 31 Dec 1981) and 8000 employees. Four Seasons Holdings Ltd holds 100% of the shares.

DEBORAH C. SAWYER

4-H Clubs The 4-H movement began in the US at the turn of the century; the first similar club in Canada was organized in Roland, Man, in 1913, and the concept quickly swept through the settled agricultural regions of the country. As the movement spread across Canada, national agencies (eg, the railways, the federal Department of Agriculture) became involved, helping, for example, to sponsor a national judging competition in connection with the Royal Winter Fair in Toronto. By 1930 the need for a national organization to help sponsor and coordinate the program across Canada became apparent, and in Jan 1931 the Canadian Council on Boys and Girls Clubs was organized. In Canada the name "Boys and Girls Clubs" was used until 1952 when the name 4-H, used in the US and many other countries, was adopted. The Canada 4-H Council combines private and government efforts and resources and offers a forum for national discussion and exchange of information as well as many national programs for 4-H members and their leaders.

The stated purpose of the early Boys and Girls clubs was to provide rural young people with the opportunity to learn farming and homemaking skills. The 4-H program now emphasizes all aspects of the mental, emotional, social and physical growth of its members. The motto "Learn to Do by Doing" is the basis of all 4-H activities. Members are responsible for developing and executing projects as varied as raising a calf, sewing a dress or learning photography. By helping members acquire a positive attitude toward learning, 4-H helps them increase their knowledge and develop skills that are valuable personally, economically and socially.

Agricultural Extension Services (*see* AGRICULTURAL EDUCATION) have traditionally provided organizational leadership, while encouraging members actually to run their clubs. Volunteer leaders are vital to the success of the 4-H program. In Canada about 17 000 volunteers provide guidance to the approximately 70 000 club members between the ages of 9 and 19 who regularly recite the 4-H pledge: "I pledge my Head to clearer thinking, my Heart to greater loyalty, my Hands to larger service, and my Health to better living, for my Club, my Community, and my Country." HELGI H. AUSTMAN

Fowke, Edith Margaret, née Fulton, folklorist, collector, writer, teacher (b at Lumsden, Sask 30 Apr 1913). After receiving an MA from U of Sask, Fowke moved to Toronto and became interested in Ontario FOLKLORE, collecting and recording on her field trips throughout the southern part of the province many of the folk songs she presented weekly on CBC "Folk Song Time" (1950-63), "Folk Sounds" (1963-74), "Folklore and Folk Music" (1965) and "The Travelling Folk of the British Isles" (1967). In 1971 she began teaching folklore at York U. An avid collector of folk song recordings and prolific writer on Canadian FOLK MUSIC, Fowke was a founding member of the Canadian Folk Music Society, becoming editor of the *Canadian Folk Music Journal* in 1973. MABEL H. LAINE

Fowke, Vernon Clifford, economic historian, professor (b at Parry Sound, Ont 5 May 1907; d at San Francisco, Calif 24 Feb 1966). He graduated from U Sask in 1929, and immediately joined the teaching staff. He continued his graduate studies at U of Chicago and U of Washington, where he received his PhD in 1942. His doctoral thesis, published as *Canadian Agricultural Policy* (1946), remains a key study and established him as the most influential historian of Canadian agriculture. It was supplemented by *The National Policy and the Wheat Economy* (1957) and (with George BRITNELL) *Canadian Agriculture in War and Peace* (1962) and numerous articles. Fowke also advised numerous royal commissions including the Rowell-Sirois Royal Commission on DOMINION-PROVINCIAL RELATIONS and, after 1946, served on the Transportation Advisory Board, where he played a key role in defending the CROW'S NEST PASS AGREEMENT.

One of the most influential Canadian economists of his day, he was elected a member of the Royal Soc of Canada in 1954, an honorary life member of the Canadian Assn of University Professors and first Britnell Professor of Economics at U Sask in 1962. PAUL PHILLIPS

Fowler, Daniel, painter (b at Champion Hill, Eng 10 Feb 1810; d at Amherst I, Ont 14 Sept 1894). He studied 1831-34 with painter and lithographer J.D. Harding, then spent a year in Europe sketching and painting. In 1843 he came to Canada for health reasons, bought a farm on Amherst I, and did not return to painting until 1857. The slightly mannered style of his European period gave way to an original and lively approach as he worked directly from nature, painting flowers, dead birds and landscapes. He was unique in Canada at that time in exploring broken brushwork, the spatial composition and structure associated with the French impressionists and Cézanne. FRANCES K. SMITH

Fowler, Robert MacLaren, lawyer, executive (b at Peterborough, Ont 7 Dec 1906; d at Hawkesbury, Ont 13 July 1980). Fowler played many roles but was best known for chairing a royal commission and a federal committee on broadcasting. He attended U of T and Osgoode Hall, and built a career as president of the Canadian Pulp and Paper Assn. A friend of Liberal politicians and bureaucrats, Fowler was named to head the Royal Commission on BROADCASTING of 1956. His report the next year strongly supported the CBC but called for a new regulatory authority to administer public and private broadcasting. The Conservative DIEFENBAKER government did not accept all the recommendations, and in 1965 Fowler headed a new investigative committee. Widely reported was his comment that in broadcasting all that matters is program content; all the rest is housekeeping. Fowler again recommended changes to the regulatory authority, and this led eventually to the creation of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION. J.L. GRANATSTEIN

Fox, small, carnivorous MAMMAL of the DOG family. Four species inhabit Canada: red or coloured, grey, arctic and swift foxes (*Vulpes vulpes, Urocyon cinereoargenteus, Alopex lagopus, V. velox,* respectively). Red and arctic foxes have circum-



The red fox *(Vulpes vulpes)* is common in farming and wooded areas across Canada, from the US border to the tundra *(photo by Stephen J. Krasemann/DRK Photo).*

polar distribution; grey foxes are New World foxes; swift foxes are common in the US. Red foxes are largest (2.5-6.5 kg) and may be reddish with a "cross" on the back or, rarely, black or may have silver-tipped hairs. Feet and ear tips are black; tail tip, white. Common in farming and wooded areas, they extend from the US border to the tundra in all provinces, but are absent from coastal BC and southern Alberta-Saskatchewan. They eat rodents, insects, frogs, seeds, fruit, eggs and some poultry. They breed in Jan-Feb; usually 4-5 cubs (1-10) are born 52-54 days later in a den or earth. Both parents feed them. They become independent at about 6 months and breed in their second year. Arctic foxes are smaller, with rounded ears and heavy, white winter fur and dark brownish summer fur. They are normally restricted to the tundra and northern coasts. Diet is similar to that of red foxes, and they scavenge other carnivore kills. Mating is in Feb, with 5-6 (maximum 14) cubs born 50-57 days later. Red and arctic foxes were farmed for their pelts, but artificial furs have destroyed the market. Grey foxes, similar in food habits and size to red foxes, are slimmer, with slightly rounded ears, a black back stripe and speckled, grey sides. Undersides are off-white; neck, back of ears and legs are yellowish buff. They are found in southernmost Manitoba, Ontario and Québec. They prefer wooded or broken country, live in hollow logs or overhangs, often climb trees, enjoy sunning themselves, and are not strictly nocturnal. Mating is in Feb-Mar with litters averaging 4 cubs (1-7), born about 63 days later. Young become independent in autumn and breed the following season. Swift fox, the smallest Canadian fox, may be a subspecies of kit fox (*V. macrotis*). It occurred from southern Alberta to SW Manitoba, but is now considered extinct. A program to reintroduce it is underway. Its habits are essentially the same as those of red foxes. *See* FUR FARMING.

C.S. CHURCHER

Fox, Gail, poet (b at Willimantic, Ct 5 Feb 1942). Fox immigrated to Canada in 1963 and came to public attention in the late 1960s and early 1970s as part of a group of writers centred at Queen's and led by poets Tom Marshall and David Helwig and associated with the journal *Quarry*, which she later edited. Her collections of intense yet often lyrical poetry have included *Dangerous Season* (1969), *The Royal Collector of Dreams* (1970), *Flight of the Pterodactyl* (1973), *The Ringmaster's Circus* (1973), *God's Odd Look* (1976) and *Houses of God* (1983).

Fox, Irving Kingsbury, professor, resource planner, conservationist (b at Bolton, Mich 7 Dec 1916). After obtaining a U of Mich MA, Fox served with the US government and in 1955 joined Resources for the Future Inc, as VP, devoting himself to water resources. A period as director of the Water Resources Center at U of Wis preceded his joining UBC as director of Westwater Research and professor of community and regional planning. There, through teaching, research and public activity, he pioneered river basin studies in Canada, integrating social and environmental considerations. In his many publications, which include a monograph on the Yukon and the organization of studies related to the Fraser R estuary, and other ways, he has made a remarkable impact upon resource use in Canada. IAN MCTAGGART COWAN

Fox, John Richard, painter (b at Montréal 26 July 1927). Trained by Goodridge ROBERTS, Fox also worked under John LYMAN at McGill. In 1952 he entered the Slade School of Art, London, Eng, and later spent 2 years in Italy and France before finally returning to Montréal in 1957. In 1964 he completed a mural for Charlottetown's Confederation Centre. Fox was well known for his intimist figure and landscape paintings when in 1972 he began to paint large abstract works influenced more by European and American modernism than by a Québec sensibility. Without the distraction of recognizable imagery, Fox pursued his preoccupation with figure-ground ambiguity in his manipulation of colour, texture and structure, and moved through abstract impressionism to collage-inspired symbolic abstraction. He has been shown widely in Canada, including a recent retrospective exhibition. SANDRA PAIKOWSKY

Fox, Luke, also spelled Foxe, explorer (b at Kingston-upon-Hull, Eng 20 Oct 1586; d *c*15 July 1635). He left for the Arctic in 1631, 2 days after Thomas JAMES left on a rival voyage. He explored the W shore of Hudson Bay and met James by chance near Cape Henrietta Maria, turned N and was the first to sail beyond Foxe Channel (named for him later by W.E. PARRY), into Foxe Basin, and along the Foxe Peninsula. His report of impenetrable barriers cancelled the last hope of a NORTHWEST PASSAGE and abated the zeal for arctic exploration for almost 200 years. Fox answered criticism that he had given up too easily with a remarkable book, *North-West Fox* (1635), a rare document of arctic exploration. JAMES MARSH

Fox, Terrance Stanley, "Marathon of Hope" runner (b at Winnipeg 28 July 1958; d at New Westminster, BC 28 June 1981). Terry Fox was a good athlete studying kinesiology when, in 1977, it was discovered he had osteogenic sarcoma, a rare form of bone cancer. It was necessary to amputate most of one leg. While recovering, he developed the idea for a "Marathon of Hope" — a run across Canada to raise money and generate publicity for cancer research. After extensive training, he began his run at St John's on 12 Apr 1980, and ended it on 1 Sept in Thunder Bay, Ont, after cancer was discovered in his lungs. During that period, he had run 5373 km at a pace of nearly 40 km per day. Inspiring millions of people around the world, he drew nationwide attention and raised $1.7 million. Gripped by an outpouring of emotion, Canadians donated an additional $23 million to the fund. For his effort, he was named a companion of the Order of Canada. Thousands annually participate in a fund-raising run named after him. J. THOMAS WEST

Foxe Basin, NWT, is bordered on its eastern and northern sides by the coast of BAFFIN I and in the W by the MELVILLE PEN. Named for 17th-century arctic explorer Luke FOX, it is a smaller version of HUDSON BAY, being an enclosed depression in the Canadian SHIELD, with an ancient land surface preserved under limestone sediments beneath its shallow waters. Maximum depths in Foxe Basin only reach 90 m, but much of the basin is shallower, with long, gently shelving shorelines, making navigation hazardous. The basin's shallowness keeps it ice covered for long periods. Grounding of sea ice on the bottom disturbs silt, which is incorporated into the ice, turning it a distinctive brown colour. The basin's shape acts to confine the movement of water, and some of the greatest tidal ranges in arctic waters are found at its outlets, reaching 3.5 m at Fury and Hecla Str and 7 m through Foxe Channel. Because of its shallowness, ice and tidal ranges, Foxe Basin has been bypassed as a route to the Arctic. D. FINLAYSON

Franca, Celia, stage name of Celia Franks, dancer, choreographer, director, teacher (b at London, Eng 25 Jun 1921). As founder of the NATIONAL BALLET OF CANADA, Franca — a strong-willed, dynamic woman — has played a central role in the development of BALLET in Canada. She was trained in England at London's Guildhall School of Music and at the Royal Academy of Dancing. She performed there with various companies, among them the Ballet Rambert and Sadler's Wells Ballet. Her earliest CHOREOGRAPHY



Celia Franca, dancer, choreographer and founder of the National Ballet of Canada *(courtesy National Ballet Archives).*

was also created in England. Her artistic and marked organizational gifts caused Franca to be recommended to a group of Toronto balletlovers who in 1950 wanted to establish a classical ballet company in Canada. Franca agreed to become founding artistic director of the National Ballet of Canada in 1951 and remained its head until 1974. Despite a lack of adequate financial support and the short supply of well-trained classical dancers, Franca succeeded in developing a well-schooled repertory ballet company that by the early 1970s had gained an international reputation.

Franca continued to dance leading roles until 1959 (she continues to appear in character parts as a guest artist) and choreographed or staged from memory established works in the classical repertory as well as a number of her own works. Sometimes accused of trying to produce a copy of Sadler's Wells (later the Royal) Ballet and of failing to develop Canadian choreographers, Franca did offer opportunities to a number of Canadian choreographers, but more importantly she provided emerging dancers an opportunity to dance the established classical repertoire. Franca, who moved to Ottawa on leaving the National Ballet, remains active as a teacher and lecturer. Appointed to the Order of Canada in 1967, she became a member of the Canada Council in 1983. Among her many other honours is the Molson Prize 1974. MICHAEL CRABB

Franchère, Joseph-Charles, painter, illustrator, church decorator (b at Montréal 4 Mar 1866; d there 12 May 1921). After studies at the Conseil des arts et manufactures, at the school run by Abbé Chabert, and a period in the studio of painter-decorator F.-X.-E. Meloche, Franchère left for Paris in 1888 to complete his training. For 2 years he worked at the Colarossi studio and the Académie Julian. Returning to Montréal in 1890, he was commissioned to do 3 large paintings for the Sacré-Coeur chapel of Notre-Dame. He returned to Paris to paint *La Vierge de l'Apocalypse* (1892), *La Multiplication des pains* (1893) and *Le Christ consolateur des affligés* (1895). During this stay, he was admitted to the École des Beaux-Arts and began sending works to the annual exhibitions of the Art Assn of Montréal and the Royal Canadian Academy. Franchère's work was exhibited at the world fairs in Chicago (1893), Buffalo (1901) and St Louis (1904). As well as doing church murals in Québec during these years, he taught at the Conseil des arts et manufactures and the Monument National, and illustrated several books, including P.E. Prévost's *Chansons canadiennes* (1907) and Abbé Lionel GROULX's *Les Rapaillages* (1916). Trained in the academic tradition, Franchère specialized in subject pictures idealizing country life, and in works inspired by symbolism. L. LACROIX

Franchise, the right to vote in public elections for members of Parliament, provincial legislatures and municipal councils. The Canadian franchise dates from the mid-18th-century colonial period when, as a general rule, restrictions

effectively limited the vote to male property holders. Since then the particular voting qualifications and the pace of expanding the categories of eligible voters have differed according to jurisdiction and have reflected changing social values. For the first 50 years after Confederation the federal franchise was manipulated in a blatantly partisan fashion by both national parties. At various times up to 1920 the Dominion franchise was based either on the electoral lists drawn up by the provinces for provincial elections (thereby ensuring that the "national" franchise differed from one province to another) or on a federal list compiled by enumerators appointed by the governing party in Ottawa. From 1867 to 1884 it was based on provincial laws and included a property qualification. The resulting "staggered vote" benefited the Conservative Party. Canada's most controversial franchise legislation was adopted by Parliament during WWI. The Wartime Elections Act and the Military Voters Act of 1917 enfranchised female relatives of men serving with the Canadian or British armed forces as well as all servicemen (including minors and Indians); it disenfranchised conscientious objectors and British subjects naturalized after 1902 who were born in an enemy country or who habitually spoke an enemy language. Not surprisingly, the government of the time openly admitted that the legislation was biased in its favour and the 1917 election results proved it right. Such abuses and shifts in the policies governing the right to vote ended in 1920 with the adoption by Parliament of an Act establishing a standard Dominion-wide franchise.

Although occasional instances were recorded of women voting in pre-Confederation Nova Scotia and Lower Canada, between 1809 and 1834, Canadian women were systematically and universally disenfranchised. Apart from their temporary and selective enfranchisement under the Wartime Elections Act, women were first granted the right to vote federally in 1918. Not until 1940 were all Canadian women guaranteed the right to vote provincially. In 1916, Manitoba became the first province to enfranchise women for provincial elections; in 1940, Québec was the last. From the time they first began arriving in the 19th century through much of the first half of the 20th century, most Canadians of oriental ancestry were denied the right to vote in federal and provincial elections. With the extension of the federal franchise to Japanese Canadians in 1948, the last statutory disenfranchisement of Asians was removed. Non-status Indians received full voting rights at the provincial level, starting in BC in 1949 and ending with Québec in 1969. The federal franchise was extended to the Inuit in 1950 and to status Indians in 1960.

Canada now has a virtually universal franchise at both the provincial and federal levels. In federal elections all Canadian citizens 18 years of age and older (from 1920 to 1970 the minimum age had been 21) are eligible to vote, except those barred by the provisions of the Canada Elections Act — federal judges, inmates of prisons and mental institutions, and any person disqualified for corrupt or illegal electoral practices. These restrictions may be challenged under the Constitution Act, 1982, which stipulates "every citizen of Canada has the right to vote in an election of members of the House of Commons or of a legislative assembly and to be qualified for membership therein."

JOHN C. COURTNEY

Franck, Albert Jacques, Albie, painter (b at Middelburg, Holland 2 Apr 1899; d at Toronto 28 Feb 1973). He was long-distance swimming champion of Belgium in 1924, worked as a swimming coach at the central YMCA in Montréal after immigrating to Canada, and then held various jobs in Toronto and Montréal. The turning point in Franck's career came after WWII when he rented a shop on Toronto's Gerrard St, the city's "Greenwich Village" and he restored pictures, designed Christmas cards and displayed his paintings. Franck, generous with food and advice, became *paterfamilias* to a considerable group of younger artists.

Franck tried to paint all the seasons of the year, but winter became his subject, and he found his true *mêtier* in the tumbled houses and the acrid lanes of Toronto neighbourhoods. His work took on a new plastic power, the colour deepened, and detail was reduced in a design that gave freedom to heightened feeling. Franck gradually received critical and financial success as his love of old brick, dirty snow and lane fences spread into the larger texture of Canadian life. He made people see the ordinary that is home. His vision of Toronto was a fulcrum for the simple idea that cities become great by what they preserve. HAROLD TOWN

Reading: Harold Town, *Albert Franck* (1974).

Francks, Don Harvey, or Iron Buffalo, actor, jazz musician, environmental activist (b at Burnaby, BC 28 Feb 1932). Talented, international entertainer and honorary Cree, he achieved "failed Broadway star" status 16 Feb 1964 when the musical *Kelly* folded after one night. Other New York stage excursions included *The Flip Side* and *On a Clear Day*. Frequently on CBC radio and TV including *Nero Wolfe* (1982) and *This Land* (from 1979), he won 2 successive ACTRA Awards for performances in *Drying Up the Streets* (1980) and *The Phoenix Team* (1981). His American TV series appearances include *Jericho, The Man from U.N.C.L.E.* and *Mission Impossible,* and he was also featured in such films as *Finian's Rainbow, The Drylanders, Ivy League Killers, The Tomorrow Man* and *Old Fish Hawk.*

DAVID GARDNER

Franco-Americans From the mid-19th century to around 1930, over 900 000 francophone Québecois emigrated to the US. They migrated in waves, especially after the AMERICAN CIVIL WAR and around 1890, managed to feel at home and, in a few generations, adopted the habits and customs of their new surroundings. Their descendants are known as Franco-Americans, though the term did not appear in New England until the end of the 19th century and even today is unknown to the majority, who instead talk about "French Canadians." The approximately 5 million Franco-Americans constitute the largest element within the Québec diaspora in all N America.

The magnitude of the huge migration ("La Grande Hémorragie") shook Québec society and led to a renewal of nativism in New England, where almost half the emigrants settled. Most of the emigrants came from underdeveloped rural areas of Québec. They were looking for financial and job security, especially in textile and shoe factories. Franco-Americans' job skills diversified over time, however, and they gained access to commercial positions and to the liberal professions. Around 1930, when the GREAT DEPRESSION put a stop to emigration, the New England states had gained a significant Franco-American population, most of it in industrial cities like Lowell, Lawrence and New Bedford (Mass), Woonsocket (RI), Manchester and Nashua (NH), and Biddeford and Lewiston (Me).

These French, Catholic Franco-Americans created "little Canadas" in some districts in the major American cities, faithfully reproducing their cultural life and Québecois religious institutions. Until WWII, and despite their Americanization, the descendants of the Québecois emigrants probably managed better than other ethnic groups to preserve their identity. Several major figures in Québec history had Franco-American roots, including journalist Olivar Asselin, writer Honoré Beaugrand, essayist Edmond de Nevers and ultramontane Jules-Paul TARDIVEL. Some Franco-Americans were repatriated to Canada around the beginning of the 20th century, and formed the core of numerous francophone settlements in the West (*see* FRENCH IN THE WEST). With time, however, most Franco-Americans succumbed to the attractions of the American way of life and the English language, especially since they lived primarily in heavily urbanized surroundings. Nevertheless, today some Franco-Americans continue — though primarily in English — to take an interest in their historical roots, and preserve their network of ethnic relations and certain folkloric or gastronomic traditions. This mixture of the modern and the conservative has not prevented some Franco-Americans, eg, writer Jack Kerouac and athlete Napoleon Lajoie, from having a major impact in the US. However, the secularization of Québec society and its profound changes since the QUIET REVOLUTION have caused Franco-Americans and Québecois to have less in common than they once had. PIERRE ANCTIL

Franco-Ontarians are those Canadians whose mother tongue is French and who live in Ontario. In the 1981 census, 467 885 Ontarians (5.5% of the total population) indicated that French is their mother tongue, and an estimated 75% of these use French at home. Four out of 10 Franco-Ontarians live in the eastern part of the province between Ottawa and the Québec border; 33% are spread throughout the cities and towns of northern Ontario, and more than 25% live in major industrial centres and in long-established rural communities to the south.

French have lived in Ontario since the beginning of the French regime. In 1610 Étienne BRÛLÉ, on a reconnaissance mission for Samuel de CHAMPLAIN, was the first white man to set foot in what is now Ontario. French soldiers were later garrisoned in Fort Pontchartrain [Detroit] and FORT FRONTENAC [Kingston], while settlers lived near the forts, and COUREURS DES BOIS, missionaries and VOYAGEURS roamed the province.

The first agricultural settlement was established in the Detroit region in 1710, but French officers and colonial administrators returned to France after the territory was ceded to England. There was no further reinforcement of the small francophone communities until after 1840 when the rapidly growing population of Québec began to spill over into eastern Ontario, then (after 1880) into the Sudbury region, and finally at the turn of the century, into the "clay belts" of the north (Haileybury-Hearst). The industrial cities of the south have been attracting both Québecois and northern Franco-Ontarians for more than 100 years. ACADIANS, as well as Francophones from Belgium, France, Switzerland and North Africa joined many of these communities.

The great majority of Franco-Ontarians sought to recreate in Ontario their traditional cultural institutions — francophone Catholic parishes and French schools, co-operatives, and CAISSES POPULAIRES (a form of credit union developed in Québec). In 1910 they founded the Association canadienne-française de l'Ontario (ACFO) and, 3 years later, the Ottawa daily newspaper, *Le Droit*. Since 1910 Franco-Ontarians have battled, sometimes bitterly, to maintain and encourage school programs taught in French, particularly during the crisis caused by Regulation XVII (*see also* LANGUAGE POLICY; ONTARIO SCHOOLS QUESTION).

Because of their small numbers, Franco-Ontarians do not play a significant collective role in provincial or federal politics, but they wield considerable influence in a few ridings in the north and the east, and can therefore make their voices heard in Toronto and Ottawa. Their political energies are focused on defending their language and affirming their culture through

such instruments as the ACFO and various provincial, regional and community-based volunteer organizations.

As a group, they are strongly represented in the primary sector (forestry, agriculture, mining), the public sector, and education.

Many Franco-Ontarians still center their lives around the more than 200 active French Catholic parishes in the province. Dozens of "centres culturels" bring together Franco-Ontarian craftspeople and artists. The 2 cultural areas in which Francophones are most productive are theatre, both amateur and professional, and poetry. French radio and television, primarily Radio-Canada and to some extent the Ontario educational television network, serve the Franco-Ontarian community.

Increasingly, Franco-Ontarians are migrating to the large anglophone cities and losing touch with the religion that has constituted a strong bulwark of French culture. Anglo-francophone marriages are now more common than in the past and the home language of such families is usually English. However, a significant number of Franco-Ontarians seem determined to preserve their distinctive culture in a province that is developing its multicultural identity. The OFFICIAL LANGUAGES ACT of 1969 and the policy of the Ontario government to provide bilingual services to Francophones have provided some support for these efforts.

PIERRE SAVARD

Francophone-Anglophone Relations "Two nations warring in the bosom of a single state," was Lord DURHAM's assessment of the relationship between Lower Canada's 2 cultural and linguistic communities during the 1830s. Observers of the continuing debate over Québec's role within Confederation might be tempted to believe that Durham's assessment can be applied as a general principle to the entirety of the Canadian experience, but in fact the quality of francophone-anglophone relations over the past 200 years has ebbed and flowed in response to changing socioeconomic, political and ideological factors as well as in response to the unremitting commitment of French Canadians to survival and equality.

Any search for a theme to francophone-anglophone relations must take into account the fact that the francophone community constitutes a cultural minority; today, Francophones comprise only 27% of the Canadian population. Only in Québec do Francophones constitute a majority, yet even in Québec many contemporary Québecois nationalists feel that their majority position is threatened by an English-speaking minority that is concentrated predominantly in metropolitan Montréal. Furthermore, when the intellectual and political elites of both communities have proposed and then attempted to reach divergent rather than co-operative social and political goals, the relationship between Francophones and Anglophones has been severely strained.

From 1763 to 1800, the relationship between the British colonial rulers and the traditional clerical and seigneurial leaders of French Canada was tense yet cordial. They shared the same commitment to Ancien Régime values and institutions. Both the QUEBEC ACT of 1774 and the CONSTITUTIONAL ACT, 1791, were deliberate attempts to reinforce the existing colonial social and political structures. However, this social contract began to break down after 1800 when Québec's economy and social structure were altered in fundamental ways. By 1820 Montréal was no longer the centre of the fur trade and the wheat economy of Lower Canada was in a serious crisis.

The seigneurial class, lacking its traditional access to wealth in the army, in the bureaucracy and in commerce, declined very rapidly after 1800, and the Catholic Church was unprepared at this time to assert control over Québec society (*see* SEIGNEURIAL SYSTEM). It was into this unstable context that a new francophone professional middle class emerged. This ambitious new class used the ideologies of nationalism and political liberalism to gain control over the Assembly of Lower Canada by 1810, and then began to push for full control over the office of governor and the legislative and executive councils. When successive governors, with the support of the Anglo-Scottish merchants, refused to share power in any meaningful way, the francophone middle class, under the banner of the Parti patriote, advocated political reforms that would grant it full control over the appointed councils. When British colonial officials rejected these reform proposals, the Parti patriote attempted (1837-38) to seize power through a resort to arms. They intended to create an independent French Canadian republic under the presidency of Louis-Joseph PAPINEAU. The revolt failed because it lacked widespread popular support, strong and courageous leadership, and because of the quick and harsh counteroffensive of well-armed British troops (*see* REBELLION OF 1837). The Parti patriote was left in total disarray and the separatist option was discredited for several generations.

In the aftermath of the rebellions, the DURHAM REPORT and the ACT OF UNION of 1840, which united Upper and Lower Canada in the PROVINCE OF CANADA and placed French Canadian society firmly under the control of an anglophone-controlled assembly and executive and executive councils, the francophone professional middle class divided into 2 groups. One group, under the leadership of L.H. LAFONTAINE and E. PARENT, pursued a strategy of maximizing the autonomy of French Canada's cultural, social and religious institutions, hoping thereby to undermine the assimilationist intentions of Lord Durham and the British colonial officials. In order to achieve their goal they co-operated with Upper Canadian reformers in the struggle for and achievement of RESPONSIBLE GOVERNMENT. The second group, comprising remnants of the Parti patriote and a younger generation of nationalists in the Institut Canadien and the PARTI ROUGE, rejected the Act of Union and campaigned for its repeal. As committed political nationalists they fought for the creation of a politically autonomous, secular and democratic Québec nation-state. After the achievement of responsible government in 1848, the reform party of La Fontaine and Parent evolved into the PARTI BLEU, which under the leadership of Joseph-Édouard CAUCHON and George-Étienne CARTIER became part of the Conservative Party.

The Conservative Party, with the full support of a reinvigorated Catholic Church, sought further to enhance the autonomy of French Canada's cultural, social and religious institutions. The party also co-operated with the Anglo-Scottish bourgeoisie, represented by the Liberal-Conservative Party of J.A. MACDONALD, in the pursuit of economic development through the building of railways and the expansion of trade with the US and Great Britain. By 1865 a political deadlock developed in the Assembly because an increasing majority of Upper Canadians, led by George BROWN and his CLEAR GRIT faction, wanted out from under the yoke of a Union dominated by anglophone Montréalers and Cartier's blues. The deadlock was broken when all members of the Assembly, except those belonging to the *rouge* movement, agreed to pursue the implementation of a federal system for Upper and Lower Canada or for all the British N American colonies.

After a lengthy and at times heated debate in the Assembly of the Canadas in 1865, the Québec resolutions, which called for the creation of a central government and a number of provinces, including Québec, were passed. Members of the *rouge* movement objected to the new constitution because, they claimed, it was too centralist and did not guarantee the survival of the francophone community. A slight majority of francophones, convinced by the Conservative Party and a very cautious Catholic Church that the new constitution did offer certain guarantees, were willing to face the new risks primarily because of the increased political and cultural autonomy of the new province of Québec. During the 1867 federal and provincial elections the Conservative Party gained 45 of the 65 seats, a clear demonstration of the general support for the new constitutional arrangement. French Canadian secular and clerical leaders were beginning to participate in a small way in the commercial and industrial development of Québec. The modernization of the agricultural sector as well as the INDUSTRIALIZATION of the province in the last quarter of the century helped the francophone community pursue and achieve some of its cultural, social and political aspirations.

Within 30 years of Confederation, Québec's French Canadian majority developed a new attitude toward the Canadian federal system, for 2 reasons. First, there was a growing sense of confidence based on economic, cultural and religious renewal and expansion of the French Canadian society in Québec. Second, there was the increasingly difficult plight of the francophone minorities outside the province as evidenced by the 1871 abolition of the informal separate schools used by New Brunswick's Acadians; the RED RIVER REBELLION of 1869-70 and the NORTHWEST REBELLION of 1885 (which both English- and French-speaking central Canadians interpreted as a struggle between French Catholics and English Protestants over who would determine the character of the West); the 1890 decision of the Manitoba Liberal government to abolish funding for Catholic schools recognized under the MANITOBA ACT of 1870 (*see* MANITOBA SCHOOLS QUESTION); the curtailment of separate schools in the 1905 Act creating the provinces of Alberta and Saskatchewan; and finally, Ontario's Regulation XVII, which undermined an informal system of bilingual separate schools by outlawing the use of French as a language of instruction until the late 1920s (*see* ONTARIO SCHOOLS QUESTION). As a result of these crises, Québec's French Canadian majority increasingly identified with the beleaguered francophone minorities as they came under attack from an aggressive and vocal English-speaking Canadian society determined to create a strong and homogeneous British Canadian national state.

In fact, many French Canadians felt their society was being forced to choose between provincial rights and minority rights, a choice that was simply not acceptable because provincial autonomy was considered the very root of the survival of the French Canadian nationality in Canada. In order to resolve this dilemma, a number of prominent French Canadians, led by Judge LORANGER and the journalist and politician Henri BOURASSA, began to supplement the "compact of provinces" theory with a "compact of nationalities" theory. It was argued that the concept of 2 nations, or 2 founding peoples, constituted the heart of Confederation. Consequently, francophone leaders responded to the minority-rights crises by appealing to the federal government to enforce the Constitution; only the full acceptance of a bilingual and bicultural country could prevent renewed and politically divisive attacks on francophone minorities. PM Wilfrid LAURIER attempted to apply the "two-nation" concept in his 1897 agreement with Premier GREENWAY of Manitoba. The agreement, which provided some restitution for Manitoba's Catholics, was abolished in 1916 by the Roblin administration in Manitoba.

There was even less agreement between French- and English-speaking Canadians over foreign policy, especially the issue of Canada's role in the British Empire. From 1900 to 1920, French Canadian and British Canadian nationalists clashed repeatedly. French Canadian nationalists, led by Henri Bourassa, objected vociferously to Canada's increased participation in Imperial schemes, whether economic, political or (especially) military. Bourassa strongly opposed the participation of Canadian troops in the SOUTH AFRICAN WAR on the grounds that all forms of IMPERIALISM were immoral and that the incident would serve as a precedent for future participation in other British imperial wars. Laurier tried to hold the moderates of both communities together by avoiding commitments and by creating, in 1910, a Canadian navy that could be put at the disposal of the Royal Navy in times of war, but this strategy merely aroused the ire of the nationalists on both sides and contributed to Laurier's downfall in the 1911 election (*see* NAVAL AID BILL). The inevitable clash between the 2 sides reached its climax in the 1917 CONSCRIPTION crisis and was symbolized by the formation of Borden's UNION GOVERNMENT that same year. The conscription issue divided the political parties along ethnic lines, as the vast majority of English-speaking MPs supported conscription and the Union government, while all French Canadian MPs were re-elected as anti-conscriptionist Liberals.

The impact of this crisis on anglophone-francophone relations was devastating, especially for the intellectual and political elites of both communities. For the federal Conservative Party it proved a long-term disaster. French Canada's nationalists turned inward, away from Bourassa's laudable goal of achieving a bilingual and bicultural country. Abbé Lionel GROULX and his nationalist colleagues in *l'Action française* focused their attention on protecting the French Canadian society of Québec from the onslaught of rapid industrialization and urbanization. They began to think seriously about the growing economic inferiority of French Canadians as individuals and as a collectivity. The French Canadian professional and commercial middle classes encountered increased competition from English Canadian and American conglomerates. On occasion, out of desperation, Groulx and his colleagues dreamed of an independent, traditional and rural French Canadian nation. Much of their desperation stemmed from the fact that the majority of French Canadians supported the Liberal government's policy of economic expansion through the development of Québec's abundant natural resources, particularly its forests and hydroelectric potential.

With the GREAT DEPRESSION, the serious economic disadvantages of French Canadians as a community and as individuals were made clear to the public. Middle-class French Canadians reacted by advocating socioeconomic and political reforms, eg, the creation of co-operatives, state support for francophone entrepreneurs, nationalization of the anglophone hydroelectric companies, regulation of large corporations and "buy-French-Canadian-made-products" campaigns. These measures, they claimed, would shore up traditional French Canadian society while giving middle-class French Canadians greater control over the economic development of Québec.

The UNION NATIONALE under Maurice DUPLESSIS made up of old-line Conservatives, disenchanted Liberals and traditional nationalists, took advantage of the nationalist reawakening created by the Depression to defeat the Liberal Party in 1936. Despite English-speaking Canadians' fears, Duplessis, who was essentially a constitutional nationalist, refused to proceed with the economic nationalist reforms championed by the nationalists inside and outside of the party. His party was defeated in the 1939 provincial election, which he chose to contest on the use of conscription, by the direct intervention of the Liberal Party of Mackenzie KING and Ernest LAPOINTE, King's French Canadian lieutenant. Lapointe and his francophone colleagues had threatened to resign and allow the conscriptionist Conservative party to take over the federal reins if French Canadians refused to turf out the troublesome Duplessis. In return for a promise of no conscription for overseas service, French Canadians reluctantly agreed to Canadian participation in WWII.

With the fall of France in the 1940s, the demand for conscription from parts of English-speaking Canada intensified. PM King hoped to undermine the conscriptionist movement, especially its Tory leader Arthur MEIGHEN, by holding a plebiscite in which all Canadians would be asked to relieve the federal government of its pledge of no conscription for overseas service. Haunted once again by the threat of conscription, various French Canadian nationalist movements came together in the League for the Defence of Canada to campaign vigorously and successfully for a NO vote in the April 1942 plebiscite. Canada was again a country divided between the 2 communities.

King heeded the message and declared that there would be "conscription if necessary, but not necessarily conscription." His government was able to delay the implementation of conscription until late in 1944, when a vocal Cabinet minority and rebellious military officers forced King to consent to conscript 16 000 of the home-defence forces. French Canadian nationalists were incensed, but the decision had come too late to help their movement, the BLOC POPULAIRE CANADIEN, during the 1944 provincial election. In the 1945 election, French Canadians helped re-elect the Liberal government.

Relations between Anglophones and Francophones had weathered both the depression and the war. Both communities had continued to play by the rules established in 1867, while nevertheless continuing to challenge the interpretation of those rules, especially in the area of social policy. Between 1945 and 1975 this situation changed dramatically as a result of several factors. The most important political factor was Ottawa's postwar decision (which was supported by a new generation of English Canadian nationalists) to forge ahead with the creation of a centralized WELFARE STATE. Ottawa's predominantly anglophone politicians and bureaucrats argued that the federal government needed full control over all forms of direct TAXATION to ensure stable economic development and to defray the cost of programs such as unemployment insurance, family allowances, old-age pensions, and hospital and medical-insurance schemes.

While the provinces rejected Ottawa's arguments they were slow to make counter-proposals. In Québec, however, the French Canadian nationalist movement exerted sufficient pressure on the Duplessis government to ensure that it would reject Ottawa's tax-rental scheme and its more audacious measures, such as federal grants to universities. For a younger generation of French Canadian nationalists this defensive strategy was insufficient. These "neo-nationalists," as they came to be called, led by André LAURENDEAU, Gérard FILION and Jean-Marc LÉGER and supported by a new francophone middle class educated in the sciences and social sciences, advocated the creation in Québec of a secular, interventionist, francophone-controlled state which would undertake the development of natural resources by French Canadians for French Canadians. Only an active nationalist state could help create an appropriate environment for the emergence of a strong francophone industrial and financial bourgeoisie. In order to ensure that a sufficient number of French Canadians were prepared to assume control of a modern secular society, the state would proceed with comprehensive modernization of education at all levels, and to ensure that the welfare-state apparatus as it affected Québec was controlled by Francophones, neo-nationalists proposed that all social programs be taken over by the Québec government. This exercise of Québec's constitutional prerogatives, both established and new, would require a significant increase in the province's ability to collect taxes.

The socioeconomic changes in Canada that were caused by growing industrialization and urbanization and the influx into Canada of thousands of immigrants who spoke neither English nor French created new strains on the French Canadian society; at the heart of the tension lay the realization by Francophones that their economic and social future was urban and industrial. The francophone community's search for survival and equality clashed with the postwar national aspirations of English-speaking Canadians, and the stage was set for conflict over available resources and jobs. Moreover, with the rapid secularization of French Canadian society, Catholicism no longer distinguished French Canada from the rest of N America. With the increased assimilation of Francophones outside Québec and the overwhelming integration of Québec's neo-Canadians into Québec's anglophone community (which comprised nearly 50% of metropolitan Montréal's population), it was inevitable that language would become a dominant issue in contemporary Québec.

The defeat (1960) of the Union Nationale by the Liberal party of Jean LESAGE ushered in the QUIET REVOLUTION, which signalled the beginning of a dual struggle: one involving the new middle class' political and socioeconomic battle for greater control over Québec's economic resources, and another involving a bitter and divisive attempt to redefine the role of the francophone society within Canada. Since the early 1960s successive Québec governments have tried to change the socieconomic relationship between that province's francophone majority and its English-speaking minorities. In the first stage of the Quiet Revolution, the Lesage government modernized and expanded the public and para-public sectors to provide employment for the postwar BABY BOOM generation of highly educated Francophones. For example, private hydroelectric companies were nationalized. As a result, HYDRO-QUÉBEC (est 1944) became one of the largest CROWN CORPORATIONS in Canada. Francophones were able to work entirely in French and to demonstrate their technical, scientific and managerial skills, a process which also occurred in the fields of education, social welfare and health services, and in the government bureaucracy in all departments and at all levels.

French Canada's attempt to redefine its role within Canada has produced vigorous public debates during the past 20 years. In their 1965 royal commission preliminary report on BILINGUALISM AND BICULTURALISM, the commissioners stated that Canada was in the midst of its most serious political crisis since Confederation. Beginning in 1963, several bombs had been set off in Montréal's mail boxes, and 2 separatist parties were successfully recruiting francophone university students. By the mid-1960s a wide variety of proposals for restructuring, renewing and even dismantling the Canadian Constitution were forthcoming.

Drawing upon the recommendations of the Tremblay Commission Report of 1956, many Québec neo-nationalists advocated the entrenchment, in a renewed Constitution, of "special status" for the province of Québec, while others demanded a form of "associate-state" status. In fact, by 1966 the political parties were

leapfrogging one another in a desperate attempt to keep pace with the nationalist momentum sweeping Québec. Daniel JOHNSON, the leader of the Union Nationale, issued an ultimatum to Ottawa entitled *Equality or Independence*. Special or associate-state status would entail very extensive decentralization of what was considered by many Canadians already a far too decentralized federal system. Yet there were also a number of neo-nationalists who argued for the complete political independence of Québec.

By the mid-1960s, the neo-nationalists encountered opposition from all national parties and a number of prominent Francophones such as Jean MARCHAND, Pierre Elliott TRUDEAU and Gérard PELLETIER. These men had been recruited by the Liberal Party of Prime Minister PEARSON to enhance francophone participation in the national government and help Ottawa head off potentially dangerous political clashes with Québec's increasingly separatist-oriented neo-nationalist movement.

The federal forces, under PM Pierre Trudeau, proposed a twofold strategy: to enhance the full participation of Francophones in all national institutions through a policy of official bilingualism and to insert into a renewed Constitution guarantees for all minorities via an entrenched Charter of Rights. While the first goal was met in 1969 with the passing of the OFFICIAL LANGUAGES ACT, the second was not accomplished until 1982 (*see* CONSTITUTION, PATRIATION OF).

Québec presented the major obstacle in the path of a renewed Constitution. The new liberal leader and premier of Québec by 1970, Robert BOURASSA, attempted to secure increased provincial powers in the area of social policy in return for his government's consent to patriate the Constitution and entrench a Charter of Rights. When Bourassa failed to accomplish his goal, neo-nationalist pressures forced him to reject the 1971 Victoria Charter.

In 1976 the PARTI QUÉBÉCOIS, committed to the achievement of political independence for Québec, was elected. The PQ government moved quickly to accomplish its election promises, especially in the highly sensitive area of language legislation. When it had become apparent by the late 1950s that room for expansion in the public sector was not infinite, pressure had begun to build in nationalist circles for language legislation making French the dominant language of work in the private sector. By 1975 the Liberal government of Robert Bourassa had implemented BILL 22, under which French became the official language of Québec and enrolment in English-language schools was restricted. While this legislation was too drastic for Québec's anglophone and allophone communities, it did not go far enough for an increasing majority of French Canadians, who felt Bill 22 did little to ensure that French would become the effective language of work for all Québec's citizens. In response to strong and widespread nationalist pressure inside and outside the party, the PQ government passed BILL 101, known as the Charter of the French Language, which made French the only official language of Québec, established a schedule for making French the dominant language of work and stipulated that all immigrants entering Québec from other parts of Canada and the world must enrol their children in French-language schools.

These developments heightened considerably the tension in anglophone-francophone relations, not only in Québec but throughout Canada. The federal Liberal Party, after its re-election to office in 1980, campaigned hard to ensure a defeat of the PQ-sponsored referendum requesting that Quebeckers grant the PQ government a mandate to negotiate SOVEREIGNTY-ASSOCIATION.

The Trudeau government's decision to pursue the patriation of the Constitution with an amendment formula and an entrenched Charter of Rights was prompted by the victory of the federalist forces in the QUÉBEC REFERENDUM campaign. The constitutional agreement was approved by Ottawa and all the provinces except Québec. The tragedy was that, in the process of political maneuvering, Québec had agreed with several other provinces to relinquish its traditional veto over constitutional changes crucial to the survival of the French Canadian nationality. A process of constitutional renewal set in motion largely in response to the new needs of Québec resulted in an agreement which could, under the appropriate set of circumstances, create new tensions and even overt hostility between Canada's 2 linguistic communities.

Since the early 1980s a greater degree of cordiality has characterized francophone-anglophone relations, although it remains to be seen what impact the entrenched CANADIAN CHARTER OF RIGHTS AND FREEDOMS will have on the minorities inside and outside the province of Québec. The serious economic recession that plagued the country in the early 1980s and the reduced power of the Quiet Revolution brought about a lull in tensions between the 2 communities. The achievement of some of the goals of the new francophone middle class, such as increased occupational mobility and the Québec Charter of the French Language, coupled with the defeat of the independence option, undermined the thrust towards an independent Québec. FRENCH CANADIAN NATIONALISM has not ceased to be an important element in Québec society and politics but appears to be taking on, once again, a more conservative role of consolidating and defending gains that have been achieved. How this will affect francophone-anglophone relations in the future is unclear. *See* OCTOBER CRISIS; QUÉBEC SINCE CONFEDERATION.

MICHAEL D. BEHIELS

Francophonie is a term that emerged in the 1950s and has 2 main meanings. The primary one designates the grouping of peoples and communities throughout the world with French as their maternal or customary language. Of the approximately 100 million people who speak French worldwide, the major groups outside France are found in Africa, Canada, Belgium, Switzerland, the West Indies and Vietnam. In its second sense, the term has come to mean an increasingly large and complex network of private and public organizations promoting special ties among all Francophones. The term "International Francophonie" will be used in this article to refer to this relatively new, rapidly evolving phenomenon.

Except for international institutions created and run by France, such as Alliance française (1883), International Francophonie is relatively young. Truly multilateral associations devoted to closer ties between francophone groups began to appear shortly after WWII, eg, la Fédération internationale de la presse de langue française (Paris, 1948), l'Association des universités partiellement ou entièrement de langue française (Montréal, 1961) and l'Institut international de droit d'expression française (1964). These are all private bodies, although they often benefit from government subsidies. The private sector of International Francophonie continues to develop rapidly. In 1984 there were some 50 international French-language federations, communities, academies, associations and institutes working to increase co-operation in many different fields, and each year new bodies join.

In 1967, elected members of some 20 national parliaments met as delegates in Luxembourg to set up the Association internationale des parlementaires de langue française. Two years later, an international conference in Zaire brought together an equal number of ministers of education, this time officially representing their governments. However, a permanent body was not formed until 1970, when ministerial delegates from 21 countries met in Niamey, Niger, to found l'Agence de coopération culturelle et technique (ACCT), an international organization devoted to multilateral governmental cooperation. The *Annuaire de la francophonie* (1980 edition) describes ACCT this way: "These States come together largely because of their use of French . . . ; their goal is to develop the education, culture, sciences and technologies of each member-state, fully respecting the sovereignty of the States and in a spirit of strict equality and complementarity of activities with those carried out by governments, international organizations, etc." In 1984 ACCT's member-states were Belgium, Benin, Burundi, Canada, Central African Republic, Comoros, Congo, Djibouti, Dominica, France, Gabon, Guinea, Haiti, Ivory Coast, Upper Volta, Lebanon, Luxembourg, Mali, Mauritius, Monaco, Niger, Rwanda, Senegal, Guinea-Bissau, Laos, Morocco, Mauritania and St Lucia. Two Canadian provinces, Québec and New Brunswick, have the status of participating governments.

The comparison is often drawn between Francophonie and the COMMONWEALTH. The similarities are evident: each includes developing and developed countries; each consists largely of former colonies, most of which achieved independence after WWII; finally, each has the same general objectives of mutual assistance, co-operation and development in all fields. But Commonwealth structures are very different from those adopted by Francophonie. Despite much discussion of the idea, for example, there is no equivalent in Francophonie of the biannual summit meetings held by the heads of state of Commonwealth countries.

Canada has been active in International Francophonie since its beginnings, in both public and private sectors. In a speech in Paris in the fall of 1982, PM Pierre Trudeau summed up why Canada participates in the worldwide francophone community: "We cannot remain indifferent to anything that contributes to unity or that builds bridges between peoples. Although much ground must still be covered, the francophone community is a unique entity and an eminently favourable influence which can bring about the cohesiveness we are all seeking and the co-operation that must exist if there is to be harmony among nations. Founded on undeniable natural affinities, on mutual respect and negotiation, the francophone community is not an intruder amidst the institutions that have preceded it. It is a member of regional organizations and of the United Nations, but it does not duplicate the work of any. It has a position and characteristics of its own; it is important for the world that it exist, that it develop and that it expand."

GÉRARD PELLETIER

Francq, Gustave, typographer, labour leader (b at Brussels, Belgium Mar 1871; d 5 Jan 1952). Sometimes considered the father of international unionism in Québec, Francq immigrated to Québec C in 1889 and learned typography. In Montréal, he became an official in the Union typographique Jacques Cartier and in the Conseil des métiers et du travail de Montréal and was VP of the Trades and Labor Congress of Canada 1909-11. In *Le Monde ouvrier/The Labour World*, the journal he founded in 1916, he defended the international union movement against criticism by clergy and Catholic unions. In 1908 Francq ran in the provincial election on behalf of the Parti ouvrier. From WWI he grew closer to the Liberal Party. In 1926 he was appointed the first president of Québec's Minimum Wage Commission. He became honorary life president in the Fédération provinciale du travail du Québec for his outstanding contributions to international unionism in Québec.

JACQUES ROUILLARD

Frank Slide At 4:10 AM on 29 Apr 1903, 74 million t of rock crashed down from Turtle Mtn in the CROWSNEST PASS, obliterating a mine entrance and wiping out the eastern outskirts of Frank, NWT (Alta). It swept 1.6 km across the valley, covering roads, railways, houses and farms. After 13 hours of heroic effort, 17 men entombed in the mine, fighting a dwindling air supply, dug a new shaft and emerged to freedom. Rescuers found in the rubble 23 men, women and children who had miraculously escaped death, but at least 70 others died in the sudden disaster. The town was evacuated as a precaution against further slides. When none occurred the residents returned and reopened the mine. The slide was caused by mine shafts weakening the mountain; in 1911 the mine was closed to prevent further undermining. Turtle Mtn is monitored regularly for signs of another massive slide. *See* DISASTERS.

FRANK W. ANDERSON

Reading: Frank W. Anderson, *The Frank Slide Story* (1968).



Some 74 million tonnes of rock crashed down Turtle Mountain in the disastrous 1903 Frank Slide that killed at least 70 people *(courtesy Elliott and Nicole Bernshaw/Bernshaw Photography)*.

Franklin, Sir John, naval officer, arctic explorer (b at Spilsby, Eng 16 Apr 1786; d 11 June 1847 aboard HMS *Erebus*, in Victoria Str, NWT). From 1801 to 1804 Franklin developed surveying skills and an interest in natural science, which determined his future as the best-known and perhaps greatest explorer in the British-American Arctic. He owes his fame to the long and much publicized search for him and his lost vessels; he earned it by charting Canada's arctic seaboard. He has been called discoverer of the NORTHWEST PASSAGE, but not one man lived to report his success, which only became known 9 years after its discovery by Robert MCCLURE had been announced.

Sir John Franklin, arctic explorer, best remembered for the long and much-publicized search for him and his lost vessels. He perished in his icebound ship off King William Island *(courtesy Public Archives of Canada/C-1352)*.



In 1818 Franklin was second in command of an abortive voyage into the Spitsbergen ice. In 1819 the British ADMIRALTY appointed him to map N America's unknown arctic seaboard. He was to descend the turbulent and supposedly unnavigable COPPERMINE R and explore eastward by canoe. In 1821 he surveyed about 340 km of intricate, ice-infested shoreline, but through cold and hunger lost about 10 men on the overland homeward trek owing to the inadequacy of canoes in ice pack and his unfamiliarity with traders, VOYAGEURS and northern conditions. In his well-organized second expedition (1825-27), he made the approach in seaworthy boats by the Mackenzie R, and from its mouth sent 2 boats east to map as far as the Coppermine R while he headed west. Hindered by ice and fog he surveyed 640 km of shoreline before turning back from an inlet he named Prudhoe Bay. The eastern detachment completed its assignment and, as prudently arranged by Franklin, made a quick, safe return overland.

Thomas Simpson of the HBC extended these surveys, and to the N ships explored among the islands. In 1845 Franklin was sent with 2 vessels, *Erebus* and *Terror*, to join these discoveries together and sail through the Northwest Passage. He never returned, and after a 12-year search by numerous vessels it was learned that on the brink of success his ships had been frozen in W of King William I. Franklin had died 11 June 1847, and command devolved on Capt Francis Crozier who abandoned ship and with 105 surviving crew trekked southward toward the Back R. All perished, most of them near Victory Point. The fame of Franklin's "mystery" and the many voyages made to solve it have obscured the explorer's solid merits. He had shown boldness and resource in pioneering a new method of discovery in the Arctic and had added more to the coastal map of Canada than any other explorer except George VANCOUVER. *See also* ARCTIC EXPLORATION; FRANKLIN SEARCH.

L.H. NEATBY

Franklin, Ursula Martius, physicist, educator (b at Munich, Germany 16 Sept 1921). A specialist in the structure of metals and alloys, she pioneered the development of archaeometry, which applies the modern techniques of materials analysis to ARCHAEOLOGY. She was educated at the Technical U of Berlin and did postdoctoral studies at U of T. After working for the ONTARIO RESEARCH FOUNDATION 1952-67, she joined U of T's dept of metallurgy and materials science in 1967. Franklin has helped develop SCIENCE POLICY through the SCIENCE COUNCIL OF CANADA and the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL OF CANADA. She worked on gathering and analysing data on the strontium 90 accumulation in the teeth of children in Canada as a result of fallout from tests of nuclear weapons; the dating of copper, bronze, metal and ceramic artefacts of prehistoric cultures in Canada and elsewhere; and she has tried to educate society and scientists to the impact of science and technology on human survival and quality of life. She is a tireless advocate for Science for Peace. Her work has received world-wide recognition.

ROSE SHEININ

Franklin Search The disappearance of Sir John FRANKLIN and his crew in what is now the Canadian Arctic set off one of the greatest rescue operations in the history of EXPLORATION. Franklin's 2 ships had sailed from England on 19 May 1845 and were last sighted in late July heading for Lancaster Sd. A 3-way search was organized in 1848, with Sir James Clark ROSS proceeding through Lancaster Sd, Capt Henry Kellet via Bering Str, and John RAE and Sir John Richardson trekking overland from the Mackenzie R. No trace of the expedition was found and in 1850 more search parties were sent out. The Admiralty sent Richard Collinson and Robert MCCLURE via Bering Str, and Horatio Austin and



Abandoning Ships, Sir John Franklin's Last Expedition (*c*1860). This watercolour by an anonymous artist depicts the final drama in Franklin's last expedition *(courtesy Royal Ontario Museum)*.

William Penny from the E. The HBC sent its own expedition under Sir John Ross, and the first American expedition to the North was led by E.J. De Haven. Lady Franklin financed an expedition under Charles Forsyth.

Franklin's winter quarters on Beechey I were found, but his fate remained unknown and Lady Franklin sent another search party out in 1851. The Admiralty sent its last and greatest expedition in 1852 under Sir Edward BELCHER, as concern mounted not only for Franklin but for McClure and Collinson, who had not been heard from. Belcher returned ignominiously in 1854, having lost the supply ship BREADALBANE. The expedition had managed to rescue McClure, who with his crew was awarded the Admiralty prize for completing the NORTHWEST PASSAGE. It was John Rae who in 1854 was given the £10 000 reward for settling Franklin's fate: on the basis of Inuit reports and evidence of personal effects belonging to the crew, he concluded that all had perished. Lady Franklin was not convinced, and sent Leopold MCCLINTOCK in 1857. This expedition explored KING WILLIAM I, and in 1859 found further relics and the only written record of the tragedy.

Searches for other evidence, notably for Franklin's diaries, continued into the 20th century. In 1930 a party sponsored by the Canadian government and flown by bush pilot Walter Gilbert found some artifacts on the N side of King William I, but too few to be of great significance. The Franklin searches resulted in a great expansion in the knowledge of the Canadian Arctic, including the discovery of numerous islands and of Bellot Str — the much-sought opening to the west.

JAMES MARSH

Reading: L.H. Neatby, *The Search for Franklin* (1970).

Franquelin, Jean-Baptiste-Louis, cartographer, royal hydrographer, teacher of navigation (b at Saint-Michel de Villebernin, France 1651; d in France after 1712). The first official cartographer in Canada, Franquelin drew some 50 richly illustrated manuscript maps of NEW FRANCE between 1674 and 1708. Although not published, his maps were important sources for French mapmakers, especially Guillaume Delisle (*Carte du Canada, 1703)*. Franquelin came to Canada as a trader in 1671. Recognizing his talents Governor Frontenac recruited him to draw maps (*see* CARTOGRAPHY). Between 1674 and 1684 he recorded the explorations of Louis JOLLIET and Cavalier de LA SALLE, and in 1686 Franquelin was appointed king's hydrographer. In 1692 he went to France to complete a series of maps on the New England coast. His wife and 10 of 13 children were to join him the following year but were drowned in a shipwreck. Although he held his Canadian appointment from 1686 to 1697 and again from 1701 to 1703 he never returned and from 1694 to 1707 he seems to have been working for Louis XIV's military engineer, Vauban.

C.E. HEIDENREICH



Armand Frappier, founder of the first French-language school of hygiene in the world (1945) and pioneer in the use of vaccine for infant leukemia (*photo by André Larose, Portraitiste/Montréal*).

Frappier, Armand, physician, microbiologist (b at Salaberry-de-Valleyfield, Qué 26 Nov 1904). After receiving his MD (1930) and MSc (1931) from U de M, Frappier won a scholarship from the Rockefeller Foundation (1931-32). He studied tuberculosis and BCG (bacille Calmette-Guérin) vaccine in the US and at the Institut Pasteur in Paris, working in the Calmette, Guérin and Nègre laboratories. He returned to the Institut in 1937 to study applications of immunology and anatoxins.

In 1933 Frappier became chief of the laboratories at Hôpital Saint-Luc and professor of bacteriology at U de M. In 1938 he founded the Institut de microbiologie et d'hygiène de Montréal (renamed INSTITUT ARMAND-FRAPPIER in 1975), with the complementary goals of research, post-academic teaching, certain health services, and services to industry in the production of biological products. In 1945 he founded the first French-language school of hygiene in the world at U de M, and was its dean 1945-65.

Frappier was one of the first N Americans to confirm the safety and efficacy of BCG and to develop original study and utilization methods for the vaccine. With his colleague Paul Lemonde and his daughter, Lise Davignon, he showed for the first time a nonspecific preventative effect of this vaccine in cases of infant leukemia. For years he studied the mechanisms of infection and of resistance (specific or nonspecific) to certain infections. He has encouraged the international study of leprosy at the Institut and helped bring about the establishment there of one of the few laboratories devoted to this work. Frappier, who retired in 1974, remains a consultant and is professor emeritus of U de M. Foreign associate of the Académie nationale de médecine de France, he was president of the BCG committee of the International Union Against Tuberculosis and a member of the experts' panel of TB for the World Health Organization. Among other honours, he is a companion of the Order of Canada and officer of the Order of the British Empire, and holds honorary doctorates from Laval and the universities of Paris, Montréal, Québec and Krakow. CLAUDE VÉZINA

Fraser, Blair, journalist (b at Sydney, NS 17 Apr 1909; d on the Petawawa R, Ont 12 May 1968). Fraser was one of the leading journalists of the 1950s and 1960s, and as Ottawa editor of *Maclean's* 1943-60 he had a unique opportunity to influence a national audience. Educated at Acadia, Fraser worked on Montréal's English dailies 1929-43, and went to *Maclean's* to cover wartime politics. His success was based on his close friendships with politicians and officials; he had unrivalled access to government secrets when the Liberals were in power and only slightly less when the Conservatives were at the helm. When he left Ottawa in 1960, he became editor of *Maclean's* for 2 years and was then the magazine's London correspondent, before returning to Ottawa in 1963. He drowned in a canoeing accident. J.L. GRANATSTEIN

Fraser, Frank Clarke, physician, medical geneticist (b at Norwich, Conn 29 Mar 1920). After graduating from Acadia in biology in 1940, Fraser received an MSc in 1941 and a PhD in 1945 from McGill. Interested in genetics as applied to human conditions as well as the genetics of malformations in mice, he entered medical school at McGill and graduated in 1950. He started the first medical genetics clinic in a Canadian hospital at Montréal Children's, was president of the American Soc of Human Genetics (1961-62), of the Teratological Soc (1962-63) and of the Canadian Coll of Medical Geneticists (1980-83), and has served on numerous human-genetics committees. A prolific and valuable contributor to the literature, he has published more than 200 works dealing with the genetics of congenital malformations in mice and humans and has greatly influenced a generation of physicians and geneticists. P.A. BAIRD

Fraser, Graham, industrialist, community leader (b at New Glasgow, NS 12 Aug 1846; d there 25 Dec 1915). Following training in the US, Fraser returned to New Glasgow in 1867 to work in J.W. CARMICHAEL's shipyards. In 1872 he and George Forrest Mackay formed the Hope Iron Works, which became the Nova Scotia Forge Co in 1874. In 1882 Fraser organized the Nova Scotia Steel Co at Trenton. At nearby Ferrona, Fraser built North America's first coal-washing and retort ovens for making coke. Fraser led Scotia's development of iron-ore deposits at BELL ISLAND, Nfld, and coal at SYDNEY MINES, Cape Breton. He resigned in 1903, however, over questions of financial management, and for a short time was director of works for Dominion Iron and Steel. Fraser served New Glasgow variously as town councilor, water commissioner, mayor and director of the Aberdeen Hospital. L.D. MCCANN

Reading: J.M. Cameron, "The Steelmakers," NS Historical Soc *Collections* 40 (1980), and *Political Pictonians* (1967).

Fraser, John Arthur, artist, illustrator, teacher (b at London, Eng 9 Jan 1838; d at New York C, NY 1 Jan 1898). Soon after emigrating from England in 1858, Fraser joined the firm of William NOTMAN in Montréal as a tinter of photographs, and in 1868 he moved to Toronto to establish the partnership of Notman and Fraser. He was the prime mover behind the formation of the Ontario Soc of Artists in 1872 and he taught in its School of Art, founded in 1878. He was also involved in the Royal Canadian Academy (est 1880). A belligerent man of strong opinions, Fraser was frequently embroiled in bitter disputes with fellow artists. During the last 14 years of his life, Fraser lived in the US. His landscapes were praised by reviewers for the artist's photographic realism, observation of detail and use of light and colour. MARY F. WILLIAMSON

John Arthur Fraser was instrumental in the founding of the Ontario Soc of Artists and taught at its School of Art. He was a belligerent man, often embroiled in disputes with fellow artists (*courtesy Ontario Archives*).



Fraser, John James, lawyer, premier and lt-gov of NB (b at Miramichi, NB 1 Aug 1829; d in Italy 24 Nov 1896). An outstanding lawyer, in 1865 Fraser won a seat in the provincial legislature as an anti-Confederation candidate. From 1871 to 1872 he was president of the executive council and from 1872 to 1878 provincial secretary. He was premier and attorney general 1878-82. He was appointed to the Supreme Court of NB in 1882 and from 1893 to 1896 was lt-gov. He was a mild-mannered, popular man who was liked even by his opponents. His colleagues apparently ran his government, however, and his administration did not produce much significant legislation. ARTHUR T. DOYLE

Fraser, Simon, fur trader, explorer (b at Mapletown near Bennington, Vt 1776; d at St Andrews, Canada W 18 Aug 1862). Fraser was the youngest son of a Loyalist officer, who was captured by revolutionaries and died in prison. His widow brought Simon to Montréal, where his uncle, Judge John Fraser, educated him. In 1792 he joined the NORTH WEST CO as a clerk; in 1799 he was serving in the Athabaska Dept and he became a partner in 1801. Fraser's main achievements occurred between 1805 and 1808. In 1805 he was placed in charge of the company's operations beyond the Rockies, and he founded the earliest settlements in the area he named NEW CALEDONIA (central BC). He established Ft McLeod in 1805, Ft St James and Ft Fraser in 1806, and Ft George (at present Prince George) in 1807. In 1808, he set out to explore the river he thought was the Columbia. Following the stretch explored by Alexander MACKENZIE in 1793, he entered territory unknown to white men and struggled through the perilous stretch now known as the FRASER RIVER CANYON. At the hostile village of Musqueam at the river's mouth, he took bearings and realized he could not be on the Columbia. Greatly disappointed, he turned back. David THOMPSON, who explored the real Columbia, named Simon's river the FRASER R; Simon had already named the THOMPSON R in David's honour.

Fraser wearied of the FUR TRADE and in 1815 sought retirement, but was persuaded to go back to Athabaska. He was one of the NWC officers arrested by Lord SELKIRK at FT WILLIAM in 1816 and charged with complicity in the SEVEN OAKS INCIDENT. Fraser was eventually acquitted; meanwhile he had retired to St Andrews among the Scots of Glengarry County, where he spent the rest of his life uneventfully. The documents relating to his great journey, *The Letters and Journals of Simon Fraser, 1806-08*, were edited by W. Kaye Lamb and finally published in 1960.

GEORGE WOODCOCK

Fraser Institute, a nonprofit group established in 1974 under federal charter and headquartered in Vancouver. The institute, which has been noted for its conservative views, operates as a research and educational organization that supports free enterprise and attempts to influence public policy through publication of studies by staff economists and academics; representations to governments; placement of materials in schools, universities and churches; media inter-

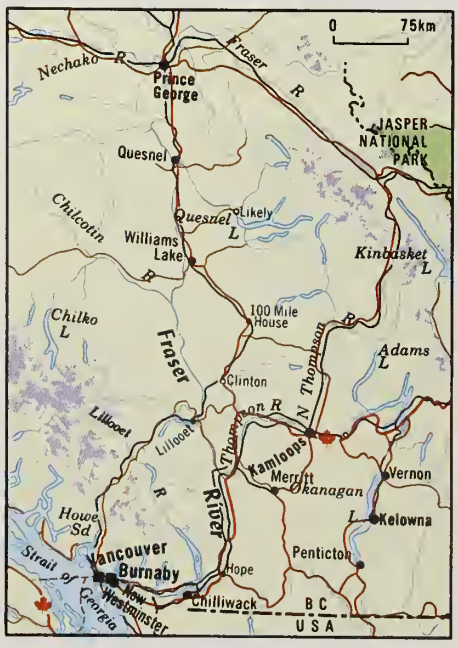
views; and speeches and symposia. It is funded by private donations, fees and sales of publications. GORDON W. STEAD

Fraser River, 1368 km long, with a drainage basin of 238 000 km², rises in the western slopes of the ROCKY MTS near Jasper National Park at an elevation of 1109 m, and flows slowly NW in meandering channels along the flat valley floor of the ROCKY MTN TRENCH to PRINCE GEORGE, BC, where it bends to a southward course. The gravel banks of the Fraser then increase in height to 50-100 m where the river has cut down into the glacial deposits of the central Interior Plateau; the river's velocity of flow increases S of Prince George as it is joined by several tributaries, the largest being the NECHAKO R from the NW.

The Fraser enters FRASER RIVER CANYON S of QUESNEL, and where it is joined by the Chilcotin R from the W, the river has cut down 300-600 m into the bedrock of the Interior Plateau. At the southern end of the canyon, near Yale, the river flows between the N end of the CASCADE MTS to its E and the COAST MTS on the W. In this middle section the Fraser is joined by large tributaries such as the Quesnel and THOMPSON rivers from the E and the West Road and Chilcotin rivers from the W. At HOPE the Fraser is only about 5 m above sea level, though this height varies seasonally. Its average annual flow here of 269 000 m³/s varies between an average low of 70 800 m³/s in March and an average peak flow of 850 000 m³/s in June. The Lower Fraser R bends westward at Hope and its valley broadens into a delta that is about 50 km wide where the river empties into the Str of GEORGIA. The southwestern part of the Fraser delta is in Washington state, USA.

The river was named by David THOMPSON after Simon FRASER of the NWC, the first European to follow its course to its mouth in 1808. Little use was made of its central portion, because of its turbulent currents, until the discovery of gold on sandbars N of Yale in 1857. The Cariboo gold rush which followed to the N brought the first narrow road (CARIBOO ROAD), carved into the canyon walls, and later the CPR followed the gash of the Thompson-Fraser rivers as the only low-level route through the Coast-Cascade mountain barrier to southwestern BC.

The Fraser R basin is well forested in its central sections, but has grassland vegetation and cattle ranching in the SW along the Chilcotin R and in its dry lower altitudes, as near ASHCROFT. Numerous large sawmills and pulp and paper





The spectacular Fraser River Canyon was formed some 20 million years ago when the river cut down into the uplifting southern part of the Interior Plateau (*photo by Michel Marengere/Reflexion*).

mills are the basis of the urban economies in the largest cities of KAMLOOPS, Prince George and Quesnel. Mining of gold, copper, molybdenum and mercury has flourished at various times and places throughout the basin. The headwaters of the river's many tributaries are the spawning grounds of PACIFIC SALMON, which are caught later off the mouth of the Fraser.

J. LEWIS ROBINSON

Fraser River Canyon was formed during the Miocene geological period (about 20 million years ago) when the river cut down into the uplifting southern part of the Interior Plateau of British Columbia. The canyon characteristics of this middle section of the FRASER R extend about 270 km N of Yale. At HELL'S GATE, S of LYTTON, the canyon walls rise about 1000 m above the narrow, rushing river; 2 transcontinental railways and the Trans-Canada Hwy have been carved into the rocky canyon sides. Fish ladders were built along the river's side to permit migrating PACIFIC SALMON to pass a former rock slide that partially blocked the river. J. LEWIS ROBINSON

Fraser River Lowland is a triangular area in southwestern BC at the mouth of that river. The eastern apex of the triangle is at HOPE, about 160 km inland from the Str of GEORGIA, and the lowland broadens to the W to a width of about 50 km. The international boundary between BC and Washington state crosses the southwestern part of the lowland. The COAST MTS form the northern boundary of the delta-lowland. The lowland is the largest area of level land with suitable agricultural soils in coastal BC.

The lowland is formed from both glacial and alluvial deposits laid down more than 10 000 years ago as a delta at the mouth of a much larger postglacial Fraser R. Following postglacial uplift of the land and erosion into the deposits by the modern FRASER R, the older delta deposits are now about 100 m above sea level. Lower-level lowlands, almost at sea level, are the result of recent alluvial deposition along the floodplain of present Fraser R channels and are protected from flooding by dikes. Dairy farming is typical on the alluvial soils of the lowest areas; the poorer soils of the postglacial, raised delta are used for small fruits, berries, poultry farming and forests.

Known locally as the Lower Fraser Valley or the Lower Mainland, the lowland holds more than half of the population of BC, including on its NW edge the city of VANCOUVER. Much of the western section of the delta-lowland has been occupied by the outward spread of residential, commercial and industrial land uses of Metropolitan Vancouver; in other parts of the lowland, agricultural land is protected from urban encroachment by zoning regulations. Indians occupied fishing sites near the mouth of the Fraser for a few thousand years before the establishment of FORT LANGLEY in 1827. Agricultural settlement came after the Fraser and Cariboo GOLD RUSHES 1856-62, but the full agricultural use of the lower lands with better soils had to await improvements in drainage and diking early in the 20th century. J. LEWIS ROBINSON

Fraud The criminal law of fraud has developed relatively recently. According to traditional English common law, it was generally no offence to defraud someone, particularly if the victim failed to exercise common prudence. Under the Canadian CRIMINAL CODE everyone who by deceit, falsehood or other fraudulent means defrauds the public or any person of any property, money or valuable security is liable to either 10 years imprisonment, if the value of the subject matter is over $200, or up to 2 years if it is not. In addition, the Criminal Code sets out a number of offences involving fraud in special circumstances, eg, in the use of the mails, concerning precious metals, etc. In *Theft and Fraud,* the federal Law Reform Commission recommended that the law of fraud be simplified but that its substance remain essentially unchanged.

LEE PAIKIN

Fréchette, Louis-Honoré, poet, playwright (b near Lévis, Qué 16 Nov 1839; d at Montréal 31 May 1908). Fréchette was the most important man of letters in 19th-century Québec. The son of an illiterate contractor, he studied first under the Brothers of the Christian Schools and then in 3 classical colleges: the Petit Séminaire de Québec, Ste-Anne-de-la-Pocatière, and Nicolet. After graduation he studied law at Laval. He was already writing poems and his first play, *Félix Poutré* (1862); his first collection of verse, *Mes loisirs,* appeared in 1863.

After unsuccessful attempts at practising law and founding Liberal newspapers, Fréchette emigrated to Chicago, where he remained for 5 years (1866-71) working for the Illinois Central Ry. While there he launched other newspapers and wrote for the stage, but his manuscripts perished in the Chicago fire of 1871. His only surviving work from this period is a violent verse polemic, *La Voix d'un exilé* (1866-69), denouncing the Canadian Confederation of 1867 and its Conservative sponsors.

Returning to Canada, Fréchette threw himself into politics, sitting as federal member for Lévis from 1874 to 1878. After marrying into a wealthy family in 1876, Fréchette devoted himself increasingly to literature, and his second verse collection, *Pêle-mêle* (1877), was well received. By distributing complimentary copies in France, Fréchette paved the way for his recognition by the French Academy, which awarded him a Prix Montyon in 1880. Henceforth Fréchette was the unofficial poet laureate of French Canada, composing odes for public occasions, issuing collections of his poetry and adapting the works of others for the stage. His best-known volume of verse is *La Légende d'un peuple* (1887), a series of historical tableaux tracing the history of Québec from Jacques Cartier to Louis RIEL. Subsequently Fréchette wrote chiefly in prose, polemical letters on Québec education (1893), replies to the attacks of his rival William Chapman (1894), and Christmas stories in English (1899) and French (1900). Decorated in France and England, honorary doctor of 4 Canadian universities, and president of the RSC (1900-01), Fréchette was the most widely honoured literary figure of his time in Canada. DAVID M. HAYNE

Fredeen, Howard, agricultural research scientist (b at Macrorie, Sask 10 Dec 1921). He received an MSc from U Sask in 1947 and joined the staff of the Lacombe RESEARCH STATION, Alta, subsequently obtaining a PhD in ANIMAL BREEDING and GENETICS from Iowa State College (1952). Fredeen spent his entire career with Agriculture Canada's Research Branch, retiring 6 July 1984. With the late J.G. Stothart he was the co-developer of the Lacombe breed of HOGS, still renowned for its excellence. Fredeen played a major role in developing Canadian livestock breeding policies and in introducing innovative breeding practices and new techniques for carcass evaluation. As well as writing more than 300 scientific and technical papers, he has established an international reputation by frequently representing Agriculture Canada abroad. He has received numerous honours, including a fellowship in the Agricultural Institute of Canada, the Public Service of Canada Merit Award and the Genetics Society of Canada Award for excellence. Fredeen has edited a history of Lacombe district and has received a Lacombe Citizen of the Year Award. ADRIANA A. DAVIES

Fredericton, NB, City, pop 43 723 (1981c), inc 1848, provincial capital, is located in central New Brunswick, just below the head of tide on the SAINT JOHN R, 135 km inland from the Bay of FUNDY.

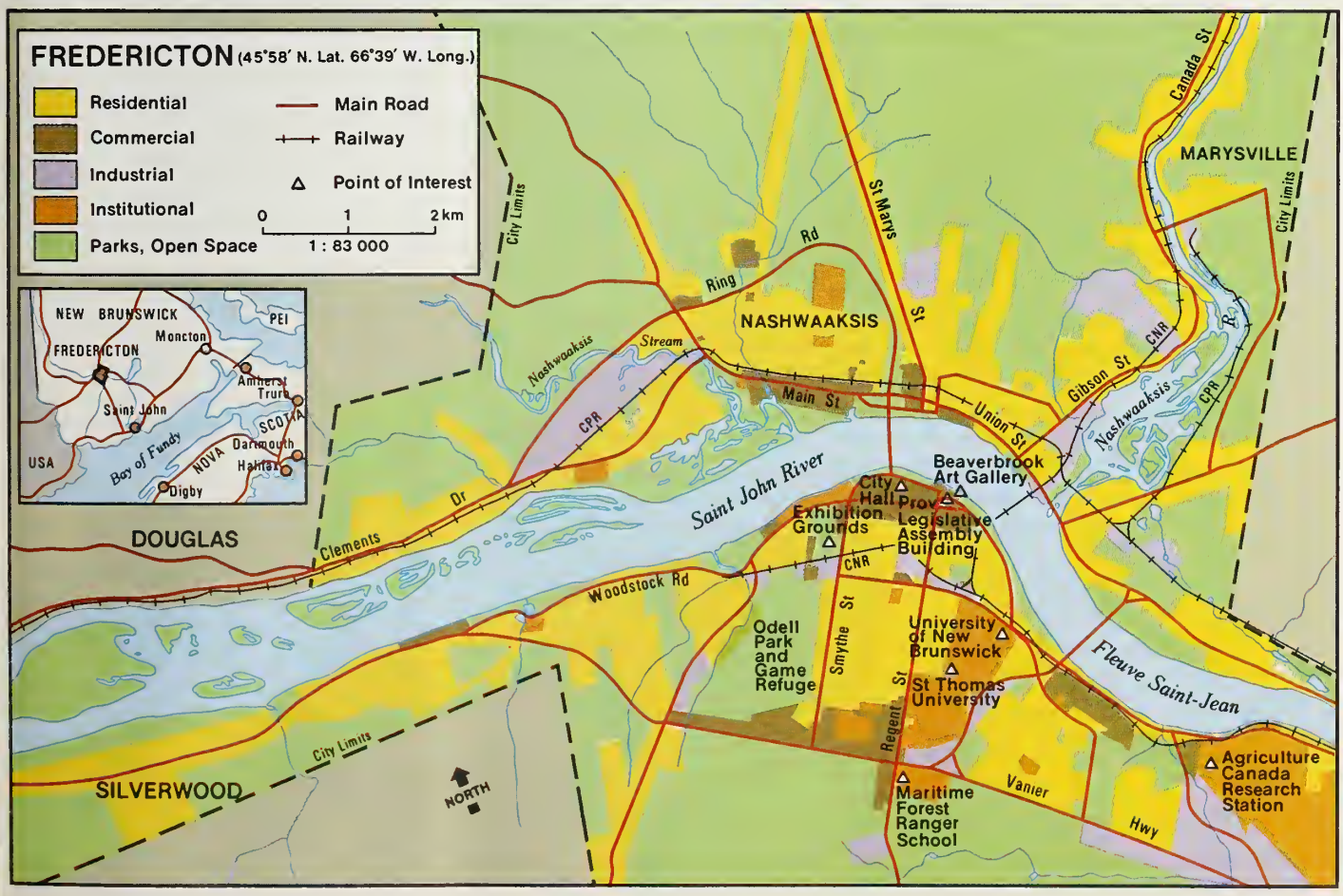
Settlement The founding of Frederick's Town between 1783 and 1785 was inextricably interwoven with the attempts of the LOYALISTS and their sympathizers to create a new province and a "haven for the King's friends" in British North America. Carefully planned ahead of any permanent settlement, Fredericton (named after Prince Frederick of Osnaburg) was to be their capital and the centrepiece of their new society. Besides assuming the seat of government with the creation of NEW BRUNSWICK in 1784, Fredericton was to become a British military headquarters, a centre of education and culture, and a stronghold for the Anglican Church. The capital was to take on an appropriately "aristocratic flavour" in contrast to the fledgling commercial entrepôt of SAINT JOHN, already distastefully dominated by "men in trade."

Prior to the arrival of the Loyalists, both the advantages and disadvantages of the future site of Frederick's Town had been realized by Indians and Acadians. The MALISEET recognized the value of the scenic alluvial plain that had formed at this central, inland river junction. It marked the terminus of an important portage route from the MIRAMICHI R and for several generations was the site of Maliseet camps and a burial ground. The strategic advantages of St Anne's Point (as it became known) were not fully recognized, however, until 1691 when Gov Joseph Robinau de Villebon decided to establish the capital of ACADIA at the mouth of the Nashwaak R, opposite the alluvial plain. The site afforded a fine deepwater anchorage on the main artery into the region, and it could be defended more easily from the attacks of the British or New Englanders than a location closer to the Bay of Fundy. Yet by 1698 de Villebon abandoned Fort Nachouac. Eminently secure in wartime, in times of peace the site was too isolated from the main routes of trade, commerce and communication to do well economically. In the 1730s Acadian farmers established a settlement on the rich soils of the plain at St Anne's; but less than 20 years later they were described as "exceeding poor" and had "become half savage from neglect." The final remnants of the settlement were violently swept aside in 1759 as part of the British Conquest of Canada, clearing the way for the Loyalists and their "design."

Development In the 200 years following 1783, Fredericton unfolded very much as its founders had hoped. In addition to its role as provincial capital, it became the shiretown of York County (1785). Substantial pieces of land on the town plot were set aside for government, for a university, for the Anglican Church and for the military. The university was chartered as the Anglican King's College and began to grow "Up the Hill," especially after the construction of a fine stone building in 1828. Equally grand stone barracks and a military compound grew up in the centre of the town; and Bishop John Medley's selection of the community as the site for Christ Church in the newly created Anglican see of NB in 1845 was directly responsible for the elevation of Fredericton to city status in 1848, despite its meagre population of 4400. A magnificent cathedral was constructed from 1846 to 1853, close to the government buildings and the university.

In time, modifications were made to the Loyalist design. King's College was reorganized into the nondenominational UNIVERSITY OF NEW BRUNSWICK in 1859, as Methodists and other nonconformists from Saint John and all corners of the province assailed Fredericton and its Anglican "establishment." The British garrison left in 1869 with the coming of the Canadian Confederation, by which time Irish, Presbyterians and Catholics had altered the demographic and religious base. Lumbering, and to a lesser extent agriculture, plus Fredericton's role as a point of transshipment between the lower and upper Saint John R, brought some prosperity throughout the century.

Population The city grew slowly — to only 7117 by 1901. In 1941 it still contained only 10 062 inhabitants. The immigrants brought diversity, divisions and community tensions; an Irish Catholic was killed in "Orange-Green" riots in 1847, and there were less violent political conflicts between the poorer Upper Towners and the more affluent, "established" Lower Towners over town-clock, marketplace and wharf sites.





View of Fredericton from River (1830), watercolour by an anonymous artist. As a Loyalist haven and capital town, Fredericton took on an appropriately aristocratic and genteel flavour (*courtesy Beaverbrook Art Gallery*).

Yet a "gentlemanlike" atmosphere prevailed in the city. Fredericton's genteel society was responsible for producing such literary figures as Bliss CARMAN and Sir Charles G.D. ROBERTS. In the 20th century, Max AITKEN donated a fine art gallery (Beaverbrook Art Gallery) and a playhouse was built, both in the Lower Town nexus adjacent to the cathedral and provincial assembly.

Cityscape A different kind of society emerged on the N side of the river during the 19th century. In 1862 Alexander "Boss" Gibson began the construction of his industrial empire at Marysville with a lumber mill on the Nashwaak. Before he was done he had constructed one of the largest cotton mills in Canada (1883-85) and an entire community to go with it. He built brick row houses for his workers, detached homes for management, a boarding house, a company store, a magnificent Methodist church and a railway to Chatham, though Gibson was forced to sell out in 1908 under pressure from a central Canadian cotton consortium that he refused to join, the mill limped on until 1973, and Marysville added another very different, industrial working-class community to the Fredericton area.

Overall though, Fredericton continued to be dominated by its government and university functions, and has retained its air of gentility. Industry has come and gone, yet politics and education have expanded substantially since WWII, stimulating the city's largest-ever surge forward in physical and population growth. In the last 30 years it has expanded to an area of 130 km^2 and a population of over 43 000, annexing the north-side communities of Marysville, Devon and Nashwaaksis in the process. As before, this growth has added further complexities to the city's society and created major tensions over such issues as a highway bridge across the Saint John R, largely for the benefit of the people on the N side, which threatened to level half of the gentility's south-side downtown in the process. Still, Fredericton remains much as its founders would have wished: small, intimate and personal, cultured, refined and with an air of prosperity and importance in the midst of a relatively poor province more influenced by "men in trade" and rugged, coarser woodsmen.

ALAN BROOKES

Freedman, Harry, composer, English-horn player (b at Lodz, Poland 5 Apr 1922). He is one of the first nationally known composers to have trained almost entirely in Canada. Initially disposed to a career as an artist, Freedman attended the Winnipeg School of Art at age 13. After an interest in big band jazz led to clarinet lessons at age 18, he was introduced to the symphonic repertoire by teacher Arthur Hart. This early experience with painting and jazz has influenced much of his subsequent work. Continuing his musical education in Toronto, Freedman took up the oboe and studied composition with John WEINZWEIG 1945-51. He was with the Toronto Symphony playing the English horn 1946-71. In 1971 Freedman was appointed the orchestra's first composer-in-residence and thereafter dedicated most of his time to composing. Weinzweig's influence is manifest in Freedman's use of various aspects of the 12-tone technique: strictly in *The Tokaido* (1964) for chamber ensemble, more informally in *Tangents* (1967) for orchestra. Several important compositions were inspired by Canadian paintings: *Tableau* (1952), *Images* (1958), *Klee Wyck* (1970). Freedman first won critical acclaim for his superb orchestration, a legacy of his symphonic experience, with *Symphony No 1* (premiered 1961). Wit and humour are displayed *The Explainer* (1976), a satire on the jargon of the music-appreciation lecturer. Freedman has also written music for theatre, television and film, notably Paul ALMOND's *Act of the Heart*. He collaborated with Brian MACDONALD on *Rose Latulippe*, a ROYAL WINNIPEG BALLET commission, and on several other Royal Winnipeg ballets.

ANN SCHAU

Freedom of Information During the 1960s and 1970s citizens, as users of government services, began to feel entitled to certain rights arising out of their relationship with government. Initially, this was manifested in the growth throughout Canada of the institution of the OMBUDSMAN, generally designed as a mechanism to redress government wrongs and reduce the "red tape" characteristic of government bureaucracy, but later extended largely to the issue of access to government information.

Government information and its accessibility may be divided into categories, first, that concerned with access to government information concerning oneself stored in government data banks. Federally, this information became accessible to individuals in 1978, with the enactment of so-called PRIVACY legislation. Essentially, the federal government established an index of federal government data banks; individuals could apply to a given data bank contained in the index for access to information concerning themselves. The enabling legislation did, however, provide for a series of exemptions in categories such as national security, federal-provincial relations, ongoing law-enforcement investigations and others. If the government invoked a "blanket" exemption, universally eliminating specified data banks from access, or an exemption in respect to an individual application, part or all of the information might be withheld, but individuals did have recourse to a privacy commissioner who could represent the interest of a dissatisfied applicant. If the decision of the particular government department remained unchanged, no further recourse was available. If information was provided and applicants believed it to be erroneous, the privacy commissioner could again come to their assistance; and if there was a refusal to change the information, at the very least it would be noted in the data bank that a request for a change in the information had been made and denied. The legislation was amended in 1982, effective 1 July 1983, to allow a further recourse in the event of either a denial of information through the invocation of an exemption or a refusal to change allegedly incorrect information. If the privacy commissioner does not succeed in convincing the appropriate government department of either or both an entitlement or a change of allegedly erroneous information, there is now a right to have the matter reviewed, *in camera*, by a justice of the Trial Division of the Federal Court of Canada. A decision by this judge is binding on all parties and must be followed.

The second kind of government information is what might be described as policy information, eg, anything contained in government files that contributes to the making of a government decision, including any decision relating to the enactment of either legislation or regulation or both (*see* OFFICIAL SECRETS ACT). This information may take the form of consultants' reports, internal studies, etc. Following a complex legislative history — which included private members' bills, a federal government Green Paper, draft legislation by one government and subsequent legislation enacted by another government — the Access to Information Act was finally passed in 1982 and took effect on 1 July 1983, chiefly as a result of strenuous lobbying by the Canadian Bar Association. This "freedom of information" law entitles an individual to examine this kind of government information and it provides for the speedy provision of the information at reasonable cost. It establishes an information commissioner, with a role and function similar to that of the privacy commissioner and also provides for certain exemptions under which some or all of the information may be withheld. Again, an applicant may apply to the Trial Division of the Federal Court of Canada for a review, *in camera*, of the decision by government to invoke an exemption and withhold the

Cartoon by Duncan Macpherson (Oct 1978) mocks the attitude of government in preventing access to information. The rationale for freedom-of-information laws is that an informed citizenry has a right to evaluate its government in an enlightened way (*Public Archives Canada/C-112688/Toronto Star Syndicate*).



information. One of the controversial features of the 1982 law is a section which provides that Cabinet documents, and in effect any other document referring to or flowing from Cabinet documents, fall outside the law. Such documents are not only unavailable, but are also not subject to the review procedure.

Some provinces have freedom-of-information laws and others have conducted studies on the subject, but generally most provinces have not entered this field as deeply as has the federal government.

The main rationale for the enactment of freedom-of-information laws is that an informed citizenry must have access to government information in order to assess, evaluate and select government in an enlightened way. Secondly, presuming that knowledge is power, it is argued that citizens are entitled to share that power with government and are best able to do so with access to government data. The users of freedom-of-information laws, judging from the American experience, have tended to be investigative journalists, academics (particularly historians) and defence counsels. G. GALL

French, Sir George Arthur, soldier (b at Roscommon, Ire 19 June 1841; d at London, Eng 7 July 1921). A Royal Artillery officer, French established the Canadian Militia gunnery school at Kingston in 1871. As commissioner of the NWMP (1873-76), he organized the force and gave it its military character. A.B. MCCULLOUGH

French Canadian Nationalism, a wide variety of manifestations of the collective will of much of Canada's French-speaking population to live as a distinct cultural community. Its innumerable ramifications have been not only cultural, but also political, economic and social. Historians disagree about its beginnings. Guy Frégault suggests that the inhabitants of colonial NEW FRANCE in the early 18th century were sufficiently different from those of France for a distinct national sentiment to exist. Michel Brunet argues that the CONQUEST of 1760, by transforming the French in Canada into a conquered people, sharpened a defence mechanism that has endured. Others, such as Fernand Ouellet, are convinced that NATIONALISM had its origin soon after 1800 when social strains and economic crises increased animosity between French and English inhabitants of LOWER CANADA. Political scientist Léon Dion distinguishes 4 types of French Canadian nationalism: conservative (dominant until 1960), liberal (post-1960), social-democrat and socialist (both "challengers" since 1960). Wherever the debate may lead, it is clear that French Canadian nationalism has been present for at least 150 years and that, because of its nature, it will probably endure as long as there are French-speaking Canadians (*see* HISTORIOGRAPHY IN FRENCH).

For over a century, French Canadian nationalism was generally linked to conservative causes and to the perpetuation of a traditional society. For the clerical and professional elite, fidelity to language, culture and religion implied respect for the acceptance of the established social order in which the Roman CATHOLIC Church dominated, agriculture was lauded as society's material and moral foundation, parish and family were the basic social institutions, commercial and industrial pursuits were disdained, and foreign influences were shunned. To what extent was this concept of nationalism shared by the common man? The very insistence with which the clerical elite defended its concept of society betrayed the existence of challenges to social orthodoxy, especially when nationalist credos seemed to conflict with conditions for individual material betterment. An agricultural way of life was vigorously defended by the nationalists, but by 1921 half of Québec's population was urban and migration to the cities showed no signs of abating, except during the GREAT DEPRESSION, when industrial jobs were scarce.

Nationalism between the 1840s and the 1940s also had important political aspects. It meant refuting the death sentence pronounced, in the celebrated DURHAM REPORT, on the "inferior" French Canadian nationality, and struggling against the conditions imposed by the 1840 ACT OF UNION which in 1841 joined Upper and Lower Canada into a single colony. It signified fighting for recognition of French and Catholic rights at CONFEDERATION, notably within Québec, and later in the English-speaking provinces in the face of attempts to abolish French or Roman Catholic schools (*see* MANITOBA SCHOOLS QUESTION). It encompassed Jules-Paul TARDIVEL's efforts to promote an independent French state in N America, a sort of reconstituted New France. It also meant an unrelenting campaign, with considerable popular support, against what was regarded as British imperialism — political, economic and especially military. Henri BOURASSA's nationalist group led this battle, which culminated in the 1917 CONSCRIPTION crisis when French Canada massively refused compulsory military service overseas. This crisis was replayed during WWII, though with somewhat less dramatic political consequences.

After 1900 some nationalists became increasingly preoccupied with economic questions. Errol Bouchette argued that French Canadians must take hold of their industry and avoid yielding the province's natural resources cheaply to foreign control. In the 1930s, members of ACTION LIBÉRALE NATIONALE proposed nationalization of certain foreign-owned (ie, non-French Canadian) monopolies, such as the electricity trust. Others, in an effort to promote French Canadian commerce, led "Buy French Canada" campaigns and warned against patronizing Jewish establishments.

Following WWII, rapid changes in French Canadian society, characterized by increasing diversity, led to new expressions of nationalism (*see* QUIET REVOLUTION). Economic and political themes became central and, particularly after 1960, the province of Québec became principal supporter of the French Canadian collectivity, or at least of those French Canadians (about 80% of the Canadian total) living within Québec. For example, after the 1962 provincial election, in which nationalist themes predominated, the government nationalized private electric power companies, integrating them with the existing HYDRO-QUÉBEC; in 1982 it ranked as Canada's largest crown corporation as judged by assets.

But the major debate centered on the place of Québec and French Canada in Canada. Daniel JOHNSON, Québec premier 1966-68, Claude RYAN, editor of the daily newspaper *Le Devoir*, and others favoured a new Canadian constitution that would expand Québec's area of legislative jurisdiction and establish a bilingual and bicultural Canada, ensuring the equality of the 2 founding peoples (*see* DEUX NATIONS). Still others attacked the so-called Canadian dream as unrealistic; for them the solution was political independence. In the early 1960s several parties and movements sprang up, preaching independence within a variety of social frameworks ranging from the extreme left to the extreme right. Of these, the Rassemblement pour l'indépendance nationale and the Ralliement national participated actively in the 1966 provincial election. In 1967 René LÉVESQUE, a former member of Jean LESAGE's Liberal Cabinet, founded the Mouvement Souveraineté-Association, transformed the following year into the PARTI QUÉBÉCOIS, which was elected in 1976 and again in 1981. In 1977 that government adopted a French Language Charter (*see* BILL 101) which generally responded to nationalist language desires. In May 1980 the government held a provincial referendum in which it asked for a mandate to negotiate sovereignty-association with the rest of Canada. Nearly 60% voted "No," although French-speaking Québecois were split almost evenly.

Canada's new CONSTITUTION, adopted Apr 1982, was welcomed rather coldly by most French Canadian nationalists, regardless of political affiliation, since it seemed to end, at least temporarily, their hopes to gain greater power for Québec. Political events since 1980 as well as difficult economic and social conditions within Québec seem to render necessary a redefinition of nationalist goals, as well as signalling upheavals within the nationalist camp itself.

RICHARD JONES

Reading: R. Cook, *French Canadian Nationalism* (1969); D.B. Miquelon, *Society and Conquest* (1977); S.M. Trofimenkoff, *The Dream of Nation* (1983) and ed, *Abbé Groulx* (1973).

French in the West In the 17th century Frenchmen travelled west from Montréal as COUREURS DE BOIS and explorers, searching for furs and an overland route to the MER DE L'OUEST. Pierre RADISSON and Médard Chouart DES GROSEILLIERS, who journeyed to Lk Superior 1659-60, persuaded the English to establish posts on Hudson Bay (*see* HUDSON'S BAY CO), and in 1682 Radisson explored 300 km inland from the bay. In the 1730s Pierre LA VÉRENDRYE and his sons extended the French fur routes westward, establishing a chain of forts in the Winnipeg Basin. After the Conquest (1760), French traders in the West worked for the NORTH WEST CO and the HBC, aiding in the expansion of the FUR TRADE to the shores of the Arctic and Pacific. The first white woman to live in the West was Marie-Anne Lagemodière, the wife of a fur trader.

From the earliest times, many French traders married native women. Their children, the MÉTIS, lived throughout the Prairies. Seminomadic, many of them worked as guides and interpreters for the fur-trading companies. At the request of Lord SELKIRK, missionaries were sent from Québec to the North-West; Fathers Provencher and Dumoulin reached the RED RIVER COLONY in 1818. In 1844 the diocese of the Red River became the Apostolic Vicariate of the North-West under Father (later Bishop) Provencher's guidance. Schools were established by the Grey Nuns and the Christian Brothers. The Métis were encouraged to settle on the land. By 1845 Bishop Provencher had persuaded the Oblate Order in France to send missionaries; one of the first to arrive was Alexandre TACHÉ, who later recruited Father GRANDIN. Grandin, with Father Albert LACOMBE, helped found the Catholic Church in what is now Alberta.

Taché was a witness to the events leading to the formation of Louis RIEL's provisional government in 1870 and he pleaded with John A. Macdonald for a general amnesty (*see* RED RIVER REBELLION). The Métis rebellion led by Riel was quashed at BATOCHE in 1885, and Riel was hanged for treason in Nov 1885 (*see* NORTH-WEST REBELLION). Riel's execution further divided the new Dominion along ethnic and religious lines.

Under the 1870 MANITOBA ACT both French and English had been granted equal rights, but by 1890 the large influx of English-speaking immigrants had altered the ethnic structure of Manitoba. The Manitoba legislature passed an Act depriving French and Catholics of certain rights (see MANITOBA SCHOOLS QUESTION). By 1892 the same situation had developed in the North-West Territories. The French Canadians in Québec, who until that time had considered the West part of their heritage, were now given to understand that a French-speaking western province would not be tolerated and that the constitutional rights of French Canadians regarding religion and language would be disregarded.

In 1976 a French Canadian, Georges Forest of St Boniface, Man, refused to pay a parking ticket

written in English only. The county judge ruled in his favour and after a series of appeals that went to the Supreme Court of Canada, Manitoba was once more declared a bilingual province. Further attempts to entrench French services for the French-speaking population, made by the Pawley government in 1984 met with strong opposition in the legislature and throughout the province. Conservative Opposition tactics prevented a vote from being taken in the House and the Pawley government was forced to withdraw its amendment. The Conservative tactics were severely censured by the federal representatives of all parties, and the French Canadians have once more taken their case to the Supreme Court.

Over the years the western provinces have attracted a variety of French-speaking immigrants. Some have been from Québec, although in the last decades of the 19th century Québec discouraged its inhabitants from moving west; too many people were already leaving the province for the New England states. Nevertheless, French Canadian missionaries promoted francophone settlement in the West, especially between 1880 and 1912. Many of the settlers came from France, while others were from Québec, New England and Belgium (though WWI ended immigration from Belgium and France). Most of them settled in the Prairie provinces. During the GREAT DEPRESSION another group of French-speaking settlers established themselves in the PEACE RIVER LOWLAND. The oil boom in Alberta and the development of the pulp and paper industry in BC have attracted the most recent migrants from Québec to the West. There are now some 320 000 persons of French extraction living in the 4 western provinces, some 180 000 of whom claim French as their mother tongue. The 1981 census gives the following statistics by province: Manitoba 74 050; Saskatchewan 46 915; Alberta 111 865; BC 92 310.

French Canadians have contributed to the economic and political structures of western Canada from earliest times. They sat in the Council of the North-West Territories and in the first legislatures of the Western provinces. Men such as Lessard, Gariépy, Côté, Blais, Giroux, Déchêne, Joly, Beaudry, Tremblay, Villeneuve, Tellier, Maynard, etc, were actively involved in the Albertan and federal political scene, either as senators or members of Parliament. The list is much longer for Manitoba. Québec established banking institutions in the West; the Banque canadienne nationale (or Banque D'Hochelega as it was earlier known) helped fund new settlers of all ethnic groups. Hospitals, colleges and convents were founded and financed by Québec religious institutions. Insurance companies such as La Sauvegarde and La Familiale in Saskatchewan offered their services to French Canadians in the West; CAISSES POPULAIRES, founded during the Depression, still prosper.

In business, French Canadians participated in the development of the West and as doctors, lawyers, judges, engineers, architects, etc, have been strongly represented in the professions. French-speaking western Canadians have included outstanding writers in the fields of journalism, history and literature (*see* Gabrielle ROY, Georges BUGNET). A recent publication, *Répertoire littéraire de l'ouest canadien*, lists 84 literary authors who wrote and published in French in western Canada. This anthology is published by CEFCO in St Boniface, Man. ROGER MOTUT

French Language In the early 17th century France founded 2 colonies in N America: ACADIA and NEW FRANCE. In 1755 the English deported over 10 000 of the approximately 14 000 Acadians. Many of the exiles subsequently returned to settle in New Brunswick, Nova Scotia and PEI. Today their descendants number more than 350 000, and three-quarters of them still speak French. New France developed slowly; it had a population of less than 13 000 in 1695 and approximately 70 000 in 1763, when it became a British colony. Today over 5 million descendants of these early French settlers live in the province of Québec, and almost a million more are scattered W of Québec from Ontario to British Columbia (*see also* FRANCO-AMERICANS).

The early settlers of Acadia and New France came from various localities in Europe (mostly from France), and the forms of language they spoke reflected their different regions of origin. In Acadia, according to records for 1707, 51% of the population came from Poitou, Aunis and Saintonge; 3% from Guyenne and Pays Basque; 11% from Brie, Orléans, Paris, Normandy, Maine and Brittany; 1% from Champagne and Burgundy; in addition, 26% were of unknown French origin, 5% were of English and 4% of other origins. In New France in 1700, 29% had originated in Poitou, Aunis, Saintonge and Angoumois; 5% in Limousin, Périgord and Guyenne; 22% in Normandy and Perche; 15% in Paris and Île-de-France; 13% in Anjou, Touraine, Beauce and Maine; 9% in Brittany, Picardy and Champagne; and 7% in other regions. This distribution reveals that over half of the Acadians came from western France, between the Loire R and the Pyrénées, and that about one-eighth came from N of the Loire. In Canada the reverse was true: well over half came from N of the Loire and about one-third from S of that river. This difference in origins is at the root of the difference between today's 2 closely related dialects, *Acadian* and *Franco-Canadian*.

The colonists who settled in Canada simply reflected the linguistic situation prevailing in France in the 17th and 18th centuries, when dialects flourished. French was spoken only by those from Paris and Île-de-France (administrators, functionaries, members of the church and army officers). Those from elsewhere spoke various *patois*, and true French speakers were rare. Upon arrival in the New World, the patois speakers did not establish linguistically distinct communities; French dominated, and this resulted in the creation of a common Canadian tongue, very close to French, by the end of the 17th century. By mid-18th century the various patois no longer existed in Canada, although their influence on Canadian French could still be heard in isolated words, morphological forms, pronunciation and intonation.

Canadian French Today The 1981 census reported over 6 million Canadians claiming French as their mother tongue. Dialectologists and sociolinguists have conducted many studies of French, particularly since the 1960s, in the Maritimes, Québec and Ontario, in both rural and urban areas; the 4 western provinces have been virtually neglected.

Acadian and Franco-Canadian speakers understand one another easily. Acadian, spoken in the Maritimes and in parts of Québec (Magdalen Is, southern Gaspé and certain villages on the N Shore of the St Lawrence, including Havre-St-Pierre and Natashquan), is characterized by certain distinctive phonetic features. It is also characterized by numerous words originating from regions S of the Loire, eg, *éparer* (Fr *étendre*, "to hang out [fishing nets] to dry"), *charrette* (*tombereau*, "cart"), *remeuil* (*pis*, "cow's udder"), *coquemar* (*bouilloire de cuisinière*, "kettle"), *lisse* (*perche de clôture*, "fence post"), *amoureux* (*capitules de bardane*, "burdock flowerhead"), *barge* (*meule de foin*, "haystack") and *bargou* (*gruau*, "gruel").

Franco-Canadian, although spoken throughout an extensive region and having certain regional differences in vocabulary (Montréal, Québec City, central Québec, Saguenay-Lac Saint-Jean) is characterized by archaisms, dialectalisms, borrowings from N American Indian languages, and anglicisms. The many archaisms (a feature common to emigrant languages) include such expressions as *mitan* (modern Fr *milieu*, "middle"), *serrer* (*ranger*, "to tidy"), *gager* and *gageure* (*parier* and *pari*, "to bet" and "a bet"), *noirceur* (*obscurité*, "darkness"), *dalle* (*gouttière d'un toit*, "eavestrough") and *menterie* (*mensonge*, "lie"). The several hundred Indian borrowings, which are proof of a long history of contact between Francophones and Canada's indigenous peoples, include *babiche* (*mince lanière de cuir*, "thin strip of leather"), *nigog* ([*variété de*] *harpon*, "[type of] harpoon"), *boucane* (*fumée*, "smoke"), *atoca* (*canneberge*, "cranberry"), *micouenne* (*cuiller en bois*, "wooden spoon"), *sagamité* (*bouillie de maïs*, "cornmeal"), *pimbina* (*viorne trilobée*, "vibernum"), *achigan* ("black bass") and *manitou* ("God").

Canadian French has also been much influenced by English. Anglicisms are used in the language of general administration, justice, business and industry where, not long ago, borrowed English words were very numerous. For example, unilingual francophone forest workers had only English technical words, eg, "cull" (*bois de rebut*), "boom" (*estacade*), "skid" (*longeron*), "skidder" (*débusqueur*) and "cant-hook" (*sapi* or *levier; see* PEAVEY). Since the 1960s the pressure exerted by the English language has been weaker, because of an increased general awareness of French vocabulary on the part of workers and as a result of legislation designed to make French the language of work in Québec.

Spoken and written Canadian French is used at many different levels: the written language of a theatrical play set in a working-class quarter of a large city (*see* JOUAL), for example, is different from the language of a philosophical treatise. In the early 1980s English words were used less than 1% of the time in working-class areas.

Since the early 1960s, and in step with the QUIET REVOLUTION, the general level of college and university education among Francophones has risen greatly, particularly in scientific fields. This fact, together with federal and provincial legislation and pride on the part of French speakers, indicates that the French language in Canada, particularly in Québec, New Brunswick and Ontario, is assured not only of survival but of continued change and growth. *See* LANGUAGE POLICY. GASTON DULONG

Reading: M.M. Orkin, *Speaking Canadian French* (1967); S. Robinson and D. Smith, *Practical Handbook of Quebec and Acadian French* (1984).

French River, 290 km long (to head of Sturgeon R), rises in Lake NIPISSING, splits into 2 branches around Eighteen Mile I, reunites and plunges through a narrow channel towards GEORGIAN BAY. Its rocky shores are a maze of channels and bays, and its course follows a complex of natural fissures and faults in the Canadian SHIELD. The river was a swift, one-day run for the VOYAGEURS, and played a part in the fur trade as early as 1615, when it was travelled by CHAMPLAIN. It is still a popular canoe route, and muskellunge, walleye, bass and pike are plentiful. Fur-trade artifacts have been recovered, and Indian rock paintings are visible near Keso Point. JAMES MARSH

French Shore was an area of coastal Newfoundland where French fishermen enjoyed treaty rights granted by the British from 1713 to 1904. Anglo-French rivalry in Newfoundland began in the 1500s, intensified in the 1600s over the establishment of fishing stations and colonies, and was ultimately decided by European wars. In 1713 the TREATY OF UTRECHT recognized British sovereignty over all French colonies and fishing territories in Newfoundland, except for the right to use for fishing, but not settlement, the coast westward from CAPE BONAVISTA, around BONAVISTA B, NOTRE DAME B, White Bay and the Great Northern Pen, S to Point Riche, near PORT AU CHOIX. In peace negotiations between Britain and France 1713-1814 the French Shore was usually an issue. The TREATY OF PARIS (1763) confirmed the 1713 boundaries but ceded SAINT-

PIERRE AND MIQUELON to France. The Treaty of Versailles (1783) altered the French Shore boundaries to the coast between Cape St John on the W side of Notre Dame B, around the Great Northern Pen, and southward along the entire W coast of Newfoundland to Cape Ray, NW of CHANNEL-PORT AUX BASQUES. These terms were confirmed by the 1814 Treaty of Paris.

Between 1815 and 1904 the French Shore ceased to be a wholly Anglo-French issue as Newfoundland gained representative (1832) and responsible (1855) government and began to challenge France's claim to exclusive use of the shore. Settlement radiated W in the 1800s and the colony pressed its claims to a concurrent fishery. Despite numerous conventions and commissions, it was not until the Anglo-French Convention of 1904 that France ceded all fishing rights, except for an equal summer fishery and the islands of Saint-Pierre and Miquelon. Though the French Shore disappeared, its influence is still felt in some areas, in the language, music and folk culture as well as in modern place-names. JANET E.M. PITT

Reading: F.W. Rowe, *A History of Newfoundland and Labrador* (1980); F.F. Thompson, *The French Shore Problem in Newfoundland* (1961).

Frenkel, Vera, artist, independent film and video producer, writer (b at Bratislava, Czech 10 Nov 1938). Recognized internationally as a printmaker and sculptor, Frenkel, since 1974, has been in the forefront of the visual, spatial and narrative uses of video. Her first video work, *String Games: Improvisations for Inter-City Video* (1974), a live-to-tape telecast between Montréal and Toronto, dealt with questions of language, codes and signs, and the invention of meaning. The video installation, *Signs of a Plot: A Text, True Story and Work of Art (1978)* and *The Secret Life of Cornelia Lumsden* (1979), a trilogy written, directed and performed by the artist, is located at the boundary between documentary and fiction. *The Last Screening Room: A Valentine* (1984) continues her work with the mythic properties of popular and narrative structures. At U of T, 1970-72, and York U since 1972 Frenkel has gained a reputation as an innovative teacher. Her fiction and poetry have appeared in *Descant, Impressions* and *C Magazine,* and a collection of her poetry and drawings, *Image Spaces,* was published in 1972. JOYCE ZEMANS

Frezenberg Ridge Princess Patricia's Canadian Light Infantry, composed largely of British-born former regular soldiers, had gone to Flanders in Dec 1914 in advance of 1st Canadian Division, as part of the British 27th Division. When the Germans launched a major attack into the YPRES Salient, over Frezenberg Ridge, on 8 May 1915, the PPCLI held the S shoulder of the breach. Despite incurring 392 casualties out of an initial strength of 546, the battalion held on and prevented the Germans from rolling up the British line S towards Armentières, France. *See* WORLD WAR I. BRERETON GREENHOUS

Friedman, Sydney Murray, scientist, scholar, physician (b at Montréal 17 Feb 1916). A 1940 medical graduate of McGill, Friedman served in the RCAF during WWII. He returned to McGill and earned his PhD in anatomy (1946) and thereafter began a distinguished career in academic medicine. He was appointed the first professor and head of the Dept of Anatomy at UBC (1950-81). His scientific research on the effects of sodium and hormones on blood vessels in hypertension has spanned 40 years. He is known internationally as a scientific author and lecturer. Friedman's many honours include RSC membership, the J.C.B. Grant Award and outstanding service awards from the Heart Foundation and the Ciba Foundation. He is also a founding member of the BC Heart Foundation. C.E. SLONECKER

Friendship Centres, are nongovernment native agencies, funded primarily by the Dept of the Secretary of State but autonomous in running their own affairs. These voluntary associations sponsor activities such as cultural events, dances, sports and recreation, job-training and educational services, and economic co-operatives, and are often located in urban areas. Regardless of their explicit functions, they are small and intimate enough to provide a social environment that is psychologically comfortable, and so function as friendship centres. Individuals help each other cope with the problems and anxieties of racial discrimination, poverty and alienation experienced in urban areas. Friendship and support networks can be established. RENÉ R. GADACZ

Reading: J.A. Price, *Native Studies* (1978).

Fripp, Thomas William, painter (b at London, Eng 23 Mar 1864; d at Vancouver 30 May 1931). Grandson of the founder of the Royal Watercolor Soc (Nicholas Pocock) and son of George Arthur Fripp, under whom he studied, he also studied at St John's Wood Art School, the Royal Academy Schools (1887), and in France and Italy. Fripp immigrated to BC in 1893. He farmed at first then moved to Vancouver in 1904 where he worked in a photography studio for 2 years before turning to painting full time. He gained acclaim for his watercolours of the Rocky Mts and Pacific coast landscapes and painted some oils and portraits. A member of the BC Art League, he was founder and first president of the BC Society of Fine Arts (1909). PATRICIA E. BOVEY

Fritz, Madeleine Alberta, paleontologist (b at Saint John 3 Nov 1896). She was educated at McGill and U of T and, while a student of William Arthur PARKS (and later as associate director of the Royal Ontario Museum of Paleontology), was a leader in the N American study of Ordovician bryozoa. For many years a professor of geology at U of T, she was the second woman in Canada to be elected a fellow in the Royal Soc of Canada. Her studies on the paleontology and stratigraphy of Toronto and vicinity stand as a definitive work. JOAN BURKE

Frobisher, Benjamin, fur trader (b in Yorkshire, Eng, *c*1742; d at Montréal 14 Apr 1787), brother of Joseph and Thomas FROBISHER. After coming to Québec about 1763, he and his brothers entered the fur trade of the North-West. For the most part he managed business affairs in Montréal and England while his brothers traded in the field. The family was original shareholder in the NORTH WEST CO. DANIEL FRANCIS

Frobisher, Joseph, fur trader, merchant (b at Halifax, Eng 15 Apr 1740; d at Montréal 12 Sept 1810). In partnership with brothers Benjamin and Thomas FROBISHER he was one of the "pedlars from Quebec" engaged in the fur trade in western Canada after 1770. In 1774-75 he wintered on the Churchill R in an attempt to intercept furs coming downriver to the HBC. This pioneering excursion led a few years later to the penetration by Québec traders into Athabasca Lk country. In 1776 Frobisher settled in Montréal where he became one of the great fur merchants. He was an original partner in the NORTH WEST CO and in 1787 joined Simon MCTAVISH to form McTavish, Frobisher and Co, the NWC's principal outfitter and sales agent. After his retirement in 1798, he lived at his stately home, Beaver Hall. DANIEL FRANCIS

Frobisher, Sir Martin, mariner (b near Wakefield, Eng 1539; d at Plymouth, Eng 22 Nov 1594). In 1576 he searched W of Greenland for a passage to Asia, discovered FROBISHER BAY, and returned with ore thought to contain gold. He made a second voyage (1577), hauling back more earth. On his last expedition (1578), he commanded a flotilla of 15 vessels. Driven by storms across the entrance to HUDSON STR, he landed at Kodlunarn I, in Warwick's Sound, where his men excavated tonnes of ore which proved worthless. Depressions in the rock where the miners dug and the ruins of a stone house are still visible. His patron, Michael Lok, was ruined, but Frobisher's seafaring career continued. He accompanied DRAKE to the West Indies and was knighted for his heroism against the Spanish Armada (1588). He died of wounds sustained in action against the Spanish at Crozon. JAMES MARSH



Sir Martin Frobisher, Elizabethan mariner, who in his search for a Northwest Passage to Asia ended up in remote Frobisher Bay on SE Baffin I (*courtesy Public Archives of Canada/C-11413*).

Frobisher, Thomas, fur trader (b in Yorkshire, Eng 1744; d at Montréal 12 Sept 1788). After arriving in Québec in 1769, he joined his brothers Joseph and Benjamin FROBISHER in the western fur trade. In 1776 he founded the first trading post at ÎLE-À-LA-CROSSE, a stepping stone to the Athabasca Lk country. DANIEL FRANCIS

Frobisher Bay, NWT, Town, pop 2333 (1981c), inc 1980, is located near the NE head of FROBISHER BAY on southern BAFFIN I, 1944 air km N of MONTRÉAL. The town is near the site of a traditional South Baffin Inuit fishing camp. The first European contact was made by Sir Martin FROBISHER on his search for the NORTHWEST PASSAGE in 1576. Today there is a mixed population of white and Inuit. It is the government administrative, communications and transportation centre of the eastern Arctic. Many in the community still subsist on fishing, sealing, trapping and carving. ANNELIES POOL

Frobisher Bay is a deep indentation in the extreme SE coastline of BAFFIN I, over 230 km long and 40 km wide at the mouth, narrowing to 20 km towards its head. The configuration of the bay has a funnelling effect, so that the harbour of the settlement of FROBISHER BAY at the bay's head experiences a twice-daily tidal range of 7-11 m. The bay's general physiography is the result of tectonic events associated with the rifting of the N Atlantic in the early Tertiary, during which time that part of the Precambrian SHIELD in the Frobisher Bay area was downfaulted and the blocks on either side were uplifted and tilted up to the NE. An abrupt contact between these units is marked by the high cliffs rising from the bay, which because of the tilting are 330 m high on the N shore and twice that height on the S shore. Overdeepening occurred during the Pleistocene glaciation, when the Frobisher Bay trough was filled by a major outlet

glacier from ice centered over FOXE BASIN. The bay is named for Sir Martin FROBISHER, who discovered it in 1576. He believed the bay was a strait, and it first appeared on maps as Frobisher Strait. DOUG FINLAYSON

Frog, AMPHIBIAN belonging to order Anura. The adult, typically, has no tail or ribs, longer hindlimbs than forelimbs, well-developed eyes and skin equipped with mucus and venom glands. Frog eggs are usually fertilized externally and develop into the free-swimming larval stage (tadpole or polliwog). The tadpole is transformed into its adult state through metamorphosis. This process involves numerous morphological and physiological changes: loss of tail and gills, limb and lung development, restructuring of the digestive system from vegetarian to carnivore and alteration of sensory receptors to suit a terrestrial life-style. Frogs, the largest group of amphibians (about 2700 living species), are found on all continents except Antarctica. They are grouped into about 20 families but this varies according to classification methods. The frogs of the large Bufonidae family, known as TOADS, generally have relatively drier skin and reduced webbing between their toes. Other frogs commonly called toads include the N American spade-foot toad (family Pelobatidae), the Mexican burrowing toad (Rhinophrynidae) and the European midwife toad (Discoglossidae).

Frogs appeared very early in the FOSSIL record. *Triadobatrachus*, found in Triassic deposits (230 million years old) in Madagascar, is the earliest known frog. Jurassic deposits (160 million years old) in S America contain frogs having a general body plan similar to some present species. Truly amazing adaptations permit frogs to exploit habitats ranging from rain forests to deserts and from the tropics to the Arctic Circle.

Only 21 or 22 species of frogs live in Canada; most are restricted by climatic limitations to extreme southern Canada. The western mountains form an effective east-west barrier restricting such species as red-legged frog to coastal BC, Pacific tree frog and tailed frog to low and high elevations in BC, and western spotted frog to BC and the foothills in western Alberta. The tailed frog lives in mountainous streams in southern BC and has some interesting specializations. Adapted to fast-flowing streams, male tailed frogs use the tail for internal fertilization of eggs. Tadpoles have expanded mouthparts for adhering to rocks. The western toad is cold tolerant enough to live at high altitudes in BC and Alberta. The wood frog ranges above the Arctic Circle in the Yukon, where forest extends along river valleys. This species has an extensive Canadian range occurring from coast to coast except in arid areas and on the SW coast. The bullfrog is the largest Canadian frog and, although originally an eastern species, has been introduced in BC. Green frogs have been introduced to the Vancouver area and leopard frogs to Vancouver I. Newfoundland has no native frogs, but green, leopard, wood and chorus frogs, as well as toads, have been introduced and have become established.

Canadian Frogs and Toads

Common Name	*Scientific Name*	*Range*
bullfrog	*Rana catesbeiana*	Ont to NS; introduced BC
green frog	*R. clamitans*	Ont to NS; introduced Nfld, BC
mink frog	*R. septentrionalis*	E Man to NS
pickerel frog	*R. palustris*	Ont to NS
northern leopard frog	*R. pipiens*	coast to coast, N to NWT
wood frog	*R. sylvatica*	coast to coast, N to NWT, YT
western spotted frog	*R. pretiosa*	Alta, BC
red-legged frog	*R. aurora*	Vancouver I and SW mainland
cricket frog	*Acris crepitans*	extreme SW Ont
striped chorus frog	*Pseudacris triseriata*	Ont, SW Qué to northeastern BC, N to NWT
spring peeper	*Hyla crucifer*	Man to NS
tetraploid grey tree frog	*H. versicolor*	E Man to SW Qué, NB
diploid grey tree frog	*H. chrysoscelis*	southern Man
Pacific treefrog	*H. regilla*	southern BC
tailed frog	*Ascaphus truei*	southern BC
American toad	*Bufo americanus*	NWT to NS
Great Plains toad	*B. cognatus*	BC to Ont
western toad	*B. boreas*	BC & W Alta, N to YT
Fowler's toad	*B. fowleri*	SW Ont
plains spadefoot	*Scaphiopus bombifrons*	S Alta to Man
Great Basin spadefoot	*S. intermontanus*	southern BC

Frogs are ecologically important, in that as vegetarian tadpoles they are primary consumers in the food chain and later serve as food for various invertebrates and vertebrates. The carnivorous adults consume insects and are in turn consumed by fish, birds and mammals. Although frogs are a relatively minor food item for humans, they are useful in the biological control of INSECT PESTS and certain large species have been introduced to various parts of the world. Frogs are also used in many fields of research and for anatomical studies in educational institutions. Collection for teaching and research purposes, and harvesting for frogs' legs and fish bait, may be factors in the reduction of natural populations of commonly used species, but yearly climatic fluctuations and the increasing drainage of habitat are equally important.

Frogs are frequent subjects of folklore and ritual. In dry regions they are associated with life-giving rain and symbolize fertility. European folklore often features frogs and toads as evil. The nocturnal vocalizations of frogs, usually associated with storms or rains, are considered by some American native peoples to be spiritual outcries. In fact, male vocalizations serve to attract females to favourable breeding sites. In some species, the female perceives only a narrow frequency range, hearing only her own species. The call in some species may also delineate a male's breeding territory. JAMES P. BOGART

Most of the 21 or 22 species of frog native to Canada — such as the leopard frog seen here — live in the extreme southern regions (*photo by Mary W. Ferguson*).



Front de libération du Québec (FLQ), a revolutionary movement that used propaganda and TERRORISM to promote the emergence of an independent, socialist Québec. The movement was founded in March 1963, when Québec was undergoing a period of remarkable change (industrial expansion, modernization of the state), but it was also stimulated by international factors such as the decolonization of Algeria. Pierre Vallières, the author of the book NÈGRES BLANCS D'AMÉRIQUE, joined the FLQ in 1965 and is generally considered the "philosopher" behind the organization.

In 1963 underground FLQ activists (some of whom were arrested) placed bombs in mailboxes in 3 federal armories and in Westmount, a wealthy upper-middle-class anglophone area of Montréal. In 1964 another group of FLQ members stole approximately $50 000 in cash and military equipment, and at a holdup at International Firearms the company vice-president was killed by the FLQ and another employee was killed by the police, who mistook him for one of the thieves. From 1965 to 1967, the FLQ associated itself with the activities of striking workers. It was involved in over 200 bombings between 1963 and 1970, and in 1968 it began using larger and more powerful bombs, setting them off at a federal government bookstore, at McGill University, at the residence of Jean DRAPEAU and the provincial Department of Labour, and at the Montréal Stock Exchange, where 27 people were injured. In the fall of 1969, the movement split into 2 distinct cells: the south shore gang (which became the Chenier cell) led by Paul Rose, and the liberation cell, under Jacques Lanctôt. Both cells, Montréal-based, claimed about 12 members.

In the fall of 1970 (*see* OCTOBER CRISIS) the FLQ kidnapped Pierre LAPORTE and British trade commissioner James Cross. Laporte was later murdered. Under the WAR MEASURES ACT, more than 450 people were arrested, including 150 "suspected" FLQ members. Paul Rose and Francis Simard were eventually sentenced to life imprisonment for the murder of Laporte. Bernard Lortie was convicted of kidnapping Laporte and Jacques Rose was convicted as an accessory. Of the Cross kidnappers, 5 fled to Cuba and then to France, and eventually returned to Canada. One had remained in Montréal but was arrested in 1980 and sentenced in 1981. The movement had ceased activities in 1971. MARC LAURENDEAU

Frontenac, Louis de Buade, Comte de, gov gen of New France (b at St-Germain, France 22 May 1622; d at Québec C 28 Nov 1698). This imperious count had been an officer in the French and Venetian armies. In 1672 he obtained the governorship of Canada, in part to put off his creditors. With the INTENDANT absent 1672-75, he extended his viceregal and military authority to civil matters. His pretensions, such as being the Conseil Souverain's chairman, were resisted by other officials, whom he sometimes exiled or placed in confinement. The clergy were offended by his approval of selling brandy to the Indians. After 1675 he conflicted with Intendant Jacques DUCHESNEAU who had his own faction in the FUR TRADE. The quarrels led to the recall of both officials to France in 1682.

Frontenac gave France a territorial empire acquired in defiance of his instructions. The king and the minister for the colonies told administrators in Canada to confine French settlement to areas with direct maritime links with France, to gather colonists into defensible communities and to occupy settlers in farming and manual trades. The fur trade was blamed for the dispersal of manpower and for the military and economic weakness of New France. Frontenac used his authority to send out exploratory parties and to establish forts — trading posts really — to benefit his confederates in the fur trade. A network of forts appeared on the Great Lks and along the tributaries of the Mississippi. Denial of this territory to the expanding British colonies led inevitably to war and the eventual end of France's N American empire.

Frontenac was reinstated as governor in 1689, when nations of the Iroquois Confederacy were attacking New France. He had orders to seize the Iroquois supply base, the colony of New York. Instead, he sent raiding parties against frontier

settlements there and in New England. As a riposte, a seaborne expedition under Sir William PHIPS besieged Québec. When summoned to surrender, Frontenac responded, "I have no reply . . . other than from the mouths of my cannon and muskets." Sickness and cold weather forced the invaders to withdraw. Frontenac wrongly believed he could end Iroquois hostility with diplomacy. In 1696, under ministerial orders, he commanded a punitive expedition that destroyed Oneida and Onondaga villages and crops (*see* IROQUOIS WARS). Though less quarrelsome in his second administration, Frontenac still used his powers to profit from the fur trade, which he was accused of underwriting with military funds. Frontenac might have been dismissed had he not died in 1698. PETER N. MOOGK

Frontier Thesis was formulated 1893, when American historian Frederick Jackson Turner theorized that the availability of unsettled land throughout much of American history was the most important factor determining national development. Frontier experiences and new opportunities forced old traditions to change, institutions to adapt and society to become more democratic as class distinctions collapsed. The result was a unique American society, distinct from the European societies from which it originated. In Canada the frontier thesis was popular between the world wars with historians such as A.R.M. LOWER and Frank UNDERHILL and sociologist S.D. CLARK, partly because of a new sense of Canada's N American character (*see* CANADIAN-AMERICAN RELATIONS).

Since WWII the frontier thesis has declined in popularity because of recognition of important social and cultural distinctions between Canada and the US. In its place a "metropolitan school" has developed, emphasizing Canada's much closer historical ties with Europe. Moreover, centres such as Montréal, Toronto and Ottawa had a profound influence on the settlement of the Canadian frontier. Whichever argument is emphasized, however, any realistic conclusion cannot deny that both the frontier and the ties to established centres were formative in Canada's development. *See also* METROPOLITAN-HINTERLAND THESIS. DOUG OWRAM

Frost, Leslie Miscampbell, lawyer, politician, premier of Ontario (b at Orillia, Ont 20 Sept 1895; d at Lindsay, Ont 4 May 1973). After service in WWI and convalescence from a severe wound, he graduated from Osgoode Hall in 1921. With his brother he purchased a law practice in Lindsay and became an active member of the Conservative Party. Elected to the legislature in 1937, he was appointed provincial treasurer and minister of mines in the Cabinet of George DREW in 1943. Six years later he became Conservative leader, inheriting the premiership. A genial master of pragmatic politics who personified the values of small-town Ontario, he led his party to 3 sweeping electoral victories. His governments initiated progressive legislation in health, education and human rights, and encouraged growth in the private economic sector through fiscal policy and public investment. He resigned as leader and premier in 1961. ROGER GRAHAM

Fruit and Vegetable Industry This important sector of Canada's FOOD AND BEVERAGE INDUSTRIES is made up of companies that process fruits and VEGETABLES. Their primary products are canned, frozen or otherwise preserved fruits and vegetables, vegetable and fruit juices, soups, pickles, jams, jellies and marmalades, cider, sauces and vinegar. The industry employs more than 13 500 permanent workers; during the harvesting and processing seasons temporary help expands the work force considerably. In 1981 the industry spent more than $1.1 billion on the purchase of raw agricultural products, packaging and other necessary materials and supplies. It shipped finished products valued at more than $1.9 billion.

The industry began in the late 1880s when George Dunning established the country's first fruit and vegetable canning factory in Prince Edward County, southeastern Ontario. By 1900, 8 canning plants were in production in the county, half of the total in Canada at the time. During the early 1900s, the industry became firmly established in all the major fruit- and vegetable-growing regions of Canada. By 1980, as a result of plant consolidation and reorganization, only 232 fruit and vegetable factories remained in production; this number should change little in coming years. Of the 232 plants in operation in 1984, PEI had 3; NS, 11; NB, 5; Qué, 59; Ont, 108; Man, 6; Sask, 2; Alta, 5; and BC, 33.

Prior to the mid-1940s, the primary food-preservation techniques were drying, pickling and high-temperature canning. The last procedure, by far the most important, involves filling metal or glass containers with a partially cooked product, then sealing the container and heating it to high temperature for varying lengths of time. This method completely sterilizes the contents and permits storage at room temperatures for long periods. The first Canadian frozen fruit and vegetable operation was established by William H. Heeney. In 1932 his company, Heeney Frosted Foods Ltd of Ottawa and Montréal, produced the country's first commercial frozen food, a strawberry pack. From a slow beginning the market for frozen fruit and vegetable products has grown strongly in the last 10-15 years. By 1980 there were 34 frozen fruit and vegetable operations in Canada distributed as follows: PEI, 2; NS, 3; NB, 2; Qué, 2; Ont, 11; Man, 2; Alta, 3; and BC, 9. In that year, the value of factory shipments of finished frozen fruits and vegetables was $348 million. Canned fruit and vegetable production still far outweighs frozen, but future production of frozen goods will increase at the expense of canned products.

The industry is subject to many federal, provincial and municipal regulations, but the primary governing body is Agriculture Canada (*see* FOOD LEGISLATION). All Canadian fruit and vegetable processors are federally licensed and must conform to regulations enforced by inspectors from Agriculture Canada's fruit and vegetable inspection branch. It is mandatory for food plants that ship products across provincial or international borders to be federally inspected.

Unlike the processing industries of some other countries, the Canadian industry does not own an extensive amount of land for agricultural production. It does, however, exert considerable control over what crop varieties are grown. In most cases, Canadian farmers contract to grow certain crops for a specific processor or group of processors. Most vegetables destined for canning or freezing are picked by mechanical harvesters, usually owned by the processing companies. Increasingly, fruit crops (eg, Ontario's grape crop) are being harvested mechanically, also with harvesters owned by processing companies. Canned and frozen fruits and vegetables are graded to meet federal government regulations as follows: fancy (top quality), choice (good quality) and standard (bottom quality). Most Canadian canned and frozen fruit and vegetables are of "fancy" or "choice" quality.

The processing sector is represented by 2 Ottawa-based national associations and their provincial counterparts: the Canadian Food Processors' Assn and the Canadian Frozen Food Assn. ROBERT F. BARRATT

Fruit Cultivation Most of the fruit species cultivated in Canada belong to the ROSE family, the most important genera being *Malus* (APPLE), *Pyrus* (PEAR), *Prunus* (PEACH, nectarine, PLUM and prune, CHERRY, APRICOT), *Fragaria* (strawberry), *Rubus* (raspberry) and *Vaccinium* (cranberry, blueberry). Other major families having cultivated fruit species are Saxifragaceae, with *Ribes* (currant and gooseberry), and Vitaceae, with *Vitis* (GRAPE). Each fruit species has many cultivars (commercial varieties), developed for various characteristics. For example, in Canada adaptation to a specific climatic factor (eg, cold winters) is important. Breeding and selection programs give priority to these requirements; crop research programs have developed many cultivars.

The FRUIT AND VEGETABLE INDUSTRY is an important part of the AGRICULTURE AND FOOD distribution sectors of the economy. More than 40% of all foods consumed in Canada are fresh and processed fruits and vegetables. About 30 major fruit and vegetable crops are grown commercially, with an annual farm-gate value of about $650 million. About 40% of this figure is for fruits (*see* BERRIES).

Canadian-grown fruit is marketed fresh or is processed in various ways; eg, 56% of apples are sold fresh (at harvest or later), the remainder being processed into juice, sauce, pie filling, frozen slices and other products. Similarly, about 66% of the "tender" fruit (cherries, peaches, pears, plums, prunes) are sold fresh and the remainder processed. Sweet cherries are processed for brining (for maraschino cherries) or frozen (for ice cream and baking use). Tart cherries are frozen or canned (pie filling, jams, jellies, juices). Most Canadian-grown grapes are processed into WINE and juice. The perishable fruits (strawberry, raspberry, blueberry) are preserved by freezing or canning. Some fruits, particularly apples and pears, are stored at harvest rather than being processed or immediately sold fresh. The fruit continues to live after harvest, using oxygen, giving off carbon dioxide and generating heat (ie, by respiration). This process eventually leads to breakdown of fruit tissues. Refrigeration and controlled-atmosphere storage allow orderly marketing of fresh fruit almost year round.

Fruit growing is usually restricted to areas where winter temperatures do not go much below -20°C. Commercial fruit growing in Canada occurs in NS, NB, southwestern Québec, southwestern Ontario and BC.

Nova Scotia Production is confined to the ANNAPOLIS VALLEY, where SOIL type and CLIMATE are well suited to production of apples, blueberries and strawberries. Winter temperatures often dip to -24°C; hence, peach and cherry growing are marginal.

New Brunswick Severe winter temperatures restrict production to the Saint John R valley. Only apples can withstand the severe winter temperatures (commonly -24°C, but reaching -34°C). Some blueberries and strawberries are also grown.

Québec Orchards are located mainly on light soils around the bases of old volcanic hills that rise above the dry loams of the plains, and in the foothills of the Appalachian Mts, near the US border. Low winter temperatures can cause extensive tree damage. For example, in the winter of 1917-18 temperatures of -37°C to -40°C resulted in losses estimated at 50%. In the 1980-81 winter, temperatures fell to -33°C and an unusual warm spell followed. The result was a reduction of production from an average of 5.3 to 2.4 million bushels (192 to 87 million L).

Ontario The moderating influence of lakes Huron, Erie and Ontario, coupled with suitable soils, allows the growing of a complete range of fruit crops in southwestern Ontario. The more tender fruits (eg, peach, cherry, grape, plum, pear) are limited to the Niagara Fruit Belt on the SW shore of Lk Ontario. Apples are grown over much of the southern part of the province, including the S shore of Georgian Bay.

British Columbia Strawberries, raspberries, loganberries and grapes are cultivated in the Lower Mainland area but the fruit-growing region is the OKANAGAN VALLEY. The valley is in the rain-shadow area of the interior; hence, fruit growing is dependent on irrigation. The complete range of fruit crops is grown, but the major crop, apples, accounts for two-thirds of the area. Most orchards are located on the top and sides of terraces along the sides of lakes. Deep, dividing gullies, running from the high slopes down to the water, provide necessary air drainage to prevent frost damage. Winter damage to trees is a recurring problem; eg, low temperatures in the 1949-50 winter caused an estimated loss of 20% of all trees. J.T.A. PROCTOR

Reading: W.H. Upshall, ed, *History of Fruit Growing and Handling in the United States of America and Canada, 1860-1972* (1976).

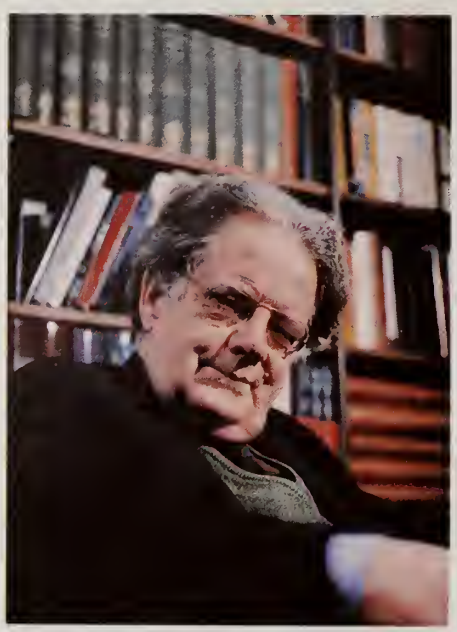
Fruits of the Earth, novel by Frederick Philip GROVE, was published 1933 in Toronto. To dramatize the tragedy of the pioneer, Grove charts the life of Abe Spalding, a man imbued with an indomitable drive to impose his will on the prairie. Spalding leaves Ontario for Manitoba, where, through years of unrelenting work, he masters his land, builds a mansion and becomes a power in the community. But Spalding's triumphs are fleeting: in time he becomes alienated from his family, and the natural world begins to prove itself impervious to human designs. In the end, the pioneer's great dream — to conquer raw nature — does violence to his own human nature. NEIL BESNER

Frum, Barbara, née Rosberg, radio and TV journalist (b at Niagara Falls, NY 8 Sept 1937). Educated at U of T, she wrote for numerous magazines, performed on TV and radio in the late 1960s, and did thoughtful, incisive and often acerbic interviews with international figures on CBC Radio's popular phone-out show "As It Happens," 1971-81. Probably Canada's most respected and best-known interviewer, she has won many journalism awards. In Jan 1982 she became the co-host of "The Journal," CBC TV's nightly current-affairs program.

ALLAN M. GOULD

Fry, Frederick Ernest Joseph, aquatic ecologist (b at Woking, Eng 17 Apr 1908). From 1936 to 1956, including 4 years (1941-45) with the RCAF doing research in aviation medicine, Fry was professor of zoology at U of T. Since 1974 he has been professor emeritus and an associate of the Institute for Environmental Studies. A brilliant writer and influential teacher, he is best known internationally for his work on aquatic physiology and demographic analysis. He was awarded an MBE in 1944 and elected to the RSC in 1948. He has been president of the American Soc of Limnology and Oceanography (1951), the American Fisheries Soc (1966), the Canadian Soc of Zoologists (1966) and the American Inst of Fishery Research Biologists (1972), and he received the Canada Centennial Medal in 1968. In 1974 the Canadian Soc of Zoologists established the Fry medal. S.R. KERR

Frye, Herman Northrop, literary critic, university professor, editor (b at Sherbrooke, Qué 14 July 1912). A professor of English at Victoria Coll, U of Toronto, since 1939, Frye has achieved international recognition for his literary theories, expounded in his study of William Blake's prophecies, *Fearful Symmetry* (1947), his grammar of mythic form, *ANATOMY OF CRITICISM* (1957), and his study of the Bible's symbolism, *The Great Code* (1982). These works, particularly the often translated *Anatomy,* have made Frye one of this century's leading literary theorists. Although noted for clarity of style, his writing for the average reader is conceptually difficult and is best approached through *The Educated Imagination* (1963).



Northrop Frye, literary critic internationally recognized for his study of William Blake and his works on mythic form and biblical symbolism (*photo by Roy Nicholls*).

Raised in Moncton, Frye first came to Toronto to compete in a national typing contest in 1929, in which he won second place in the novice class. Soon after, he enrolled at Victoria Coll and, except for 2 years of study in the late 1930s at Merton Coll, Oxford, he has remained associated with the college, and became chancellor in 1978. While still a graduate student, Frye decided to write a definitive study of Blake's prophetic poems, then considered incoherent, even aberrant. In *Fearful Symmetry,* Frye showed that Blake deliberately used a regular pattern of symbolism based on earlier writers such as Milton and ultimately on the Bible. In *Anatomy of Criticism,* Frye expanded this notion by outlining a verbal universe of repeated archetypes and symbolism and rhetoric that binds all literature together. This universe consists of desired and abhorred worlds, the former expressed by comedy and romance, the latter by tragedy and irony. Frye's own evangelical Methodist upbringing influences his view that there is in human culture an inherent impulse towards affirming the sunnier vision and implementing it in the world. Ironically his own view of Canadian literature, which he has never much admired, is notoriously sunk in gloom. Frye contends that like the poetry of his own mentor, E.J. PRATT, it is the product of a "garrison mentality" of beleaguered settlers who huddled against the glowering, all-consuming nothingness of the wilderness. Its birth lay in a blighted winter, rather than vibrant spring, mentality.

Despite his insistence on the ultimate visionary process of literary studies, Frye has demanded the kind of discipline in study he experienced himself in music, which has an intensely integrated theory. He teaches that literature is not a grab bag of thousands of individual works but an integrated universe of recognizable forms. He has always seen a close association of a disciplined recognition of form with major literary talent, such as that of his own preferred subjects, Spenser, Shakespeare, Milton, Blake, Yeats and Eliot. He has spurned a predominantly evaluative approach to literature because evaluation tends to say more about the critic than the work studied. This has led him into endless international controversy, which has obscured his fundamental purpose in trying to establish an objective and universally accepted terminology for literature studies.

Frye's enormous influence peaked in the mid-1960s when a new generation of scholars, influenced by the ideas of the *Anatomy,* were attracted by his insistence that literary criticism was not a poor cousin of philosophy, psychology, linguistics or aesthetics but a symbolically co-ordinated discipline that outlines the shape of the human imagination itself. As such, it has its own authority, which can be useful in the study of other arts and social sciences. JOHN AYRE

Fuca, Juan de, pilot, apocryphal explorer of the NORTHWEST COAST (b at Valeriano, Cephalonia I, Greece; d there *c*1602). Other than what Michael Lok, an English promoter of geographical discovery, reported in 1596, little is known about Fuca. According to his own story, he was a pilot in Spain's Pacific maritime service. He claimed to have led a 1592 voyage of discovery N from Mexico that encountered a passage leading to the "North Sea" (possibly the Arctic Ocean) between 47° and 48° lat. Fuca told Lok that he sailed through the broad passage before retracing his course to Mexico. The discovery much later of the strait now bearing Fuca's name at 48°30′ lat gave credence to his story and suggested the possibility of a 16th-century Spanish voyage to the NW Coast. More likely, Fuca told Lok an exciting tale in order to obtain financial compensation. Spanish archival sources and published works offer no evidence of such an expedition. CHRISTON I. ARCHER

Fuel Cell, device that directly converts the energy contained in chemical reactants (fuels), delivered from outside the cell, into direct current (DC) electrical power and, typically, heat and water as waste products. "Directly" means by a single-step process, ie, without first converting the energy of the chemical reactants to heat. This absence of a heat-production step distinguishes the fuel cell from conventional energy conversion devices that first burn fuel to produce heat, then convert a relatively small fraction of that heat to mechanical work (eg, by turning a steam turbine), which is subsequently used to turn an electic generator to produce electricity. Fuel cells remove large inefficiencies associated with these heat-to-work steps; thus, they can be significantly more efficient than conventional "heat" engines.

The concept of a fuel cell has been known for over a century; however, modern fuel-cell development dates back to the late 1930s when F.T. Bacon developed an alkaline fuel cell that operated on hydrogen and oxygen. Bacon's work formed the basis for the fuel cell that generated electrical power (and drinking water) for the US Apollo spacecraft. This same type of fuel cell is now used aboard the US space shuttle.

Several countries, including Canada, have active fuel-cell programs aimed at terrestrial applications. The US and Japan have concentrated their efforts on development of acid fuel-cell technology because they anticipate using impure hydrogen derived from fossil fuels (initially natural gas and eventually coal). In other programs, including a major thrust in Canada, the development has focused on the more efficient alkaline technology where the applications allow the use of pure hydrogen and are targeted at providing standby power for hospitals, telephone or computer systems, and mobile power plants for transportation vehicles such as ships, trains and fleet vans. Fuel-cell research in Canada is taking place mainly in government or university laboratories, eg, the NATIONAL RESEARCH COUNCIL and University of Toronto.

DAVID SCOTT

Fulford, Robert Marshall Blount, editor, essayist, critic (b at Ottawa 13 Feb 1932). Editor of *Saturday Night* magazine since 1968, Fulford has been a champion of liberalism in somewhat the same tradition as J.W. DAFOE and Frank UNDER-

HILL. Self-educated, he joined the Toronto *Globe and Mail* as a copyboy in 1949 and held reportorial jobs until 1953. He was then an editor and writer on various magazines, notably *Maclean's*, but it was at the *Toronto Star*, which he joined 1958, that he became an influential critic, first of books, art and jazz, and finally of ideas. Over his tenure at *Saturday Night* he has switched from continentalism to nationalism and in the 1980s has drifted towards the more conservative end of the liberal spectrum. His attitudes towards popular culture, which he once relished as a sort of democratic kaleidoscope, have also changed, though his books on the subject, including *This was Expo* (1968), *Marshall Delaney at the Movies* (1974) and *An Introduction to the Arts in Canada* (1977), remain valuable and enjoyable for their subtle, even style, informed wit and ability to deal lucidly with elusive notions.

DOUG FETHERLING

Fuller, Thomas, architect (b at Bath, Eng 8 Mar 1823; d at Ottawa 28 Sept 1898). In 1857 Fuller left England to set up practice in Toronto with Chilion Jones. The firm, with Fuller responsible for design, specialized in Anglican church architecture in a Gothic revival style and won 2 important competitions, the first for the PARLIAMENT BUILDINGS in Ottawa in 1859, and the second for the New York State Capitol in Albany in 1867. In 1881 Fuller was appointed Dominion chief architect and during his 15-year tenure supervised the design of over 140 buildings across the country. Perhaps more than any other architect, he was responsible for defining the character of federal architecture in Canada. His small post offices, executed in a blend of Gothic and Romanesque forms and characterized by their picturesque massing, and accented by stone gables and tall clock towers, provided immediately recognizable symbols of the federal government and established a design that endured into the 1930s. JANET WRIGHT

Fuller, William Albert, ecologist, conservationist (b at Moosomin, Sask 10 May 1924). He is best known in academic circles for his long-term studies on population fluctuations of small mammals, especially in taiga. After 12 years with the CANADIAN WILDLIFE SERVICE (1947-59), when he studied larger mammals and surveyed several northern areas, he joined U of A's zoology department (1959). During his wildlife-service career, he was the first biologist to see the last remaining natural nesting grounds of the WHOOPING CRANE. Fuller applies ecological principles to conservation problems; he has chaired a subcommittee of the International Biological Program and the National Research Council of Canada's Associate Committee on Ecological Reserves, and serves on the board of the International Union for the Conservation of Nature and Natural Resources. MARTIN K. MCNICHOLL

Fullerton, Douglas H., economist, financial consultant (b at St John's 3 Sept 1917). As investment manager for the Canada Council (1957-68) he placed the council on a sound financial footing, and as chairman of the NATIONAL CAPITAL COMMISSION (1969-73) he led the government's program to redevelop the central area of HULL. He has advised governments on diverse matters, including pension reform, public transit systems, the coal and steel industries in Atlantic Canada, and the nationalization of Québec hydro companies and Saskatchewan potash mines. Fullerton is noted for his populist approach to urban planning, emphasizing that people come first, and he has written a newspaper column on urban affairs. He is author of *The Bond Market in Canada* (1962), *The Capital of Canada: How Should It Be Governed?* (1974) and *The Dangerous Delusion: Quebec's Independence Obsession* (1978). In 1979 he was appointed honorary professor of urbanism at U of Calgary. WILLIAM T. PERKS

Fulmar, Northern (*Fulmarus glacialis,* family Procellariidae, order Procellariiformes), medium-sized, tube-nosed SEABIRD, about 50 cm long, related to the albatrosses. Birds from warmer parts of the Atlantic are usually white with greyish wings, while those from colder parts are brown all over; the opposite holds in the Pacific. Originally, the northern fulmar was an arctic bird, but around 1820 it began to spread southward into the eastern Atlantic, perhaps scavenging from the fisheries. It reached Atlantic Canada around 1970, and a few pairs now nest in Newfoundland. Most Canadian fulmars, about 400 000 pairs, breed in the eastern Arctic, above 67° N. Alaskan migrants visit BC waters; birds from Greenland and the eastern Atlantic winter off Newfoundland. Fulmars breed on steep cliffs, laying a single, whitish egg on bare ledges. They defend their nests by vomiting a stinking oil over any intruder.

R.G.B. BROWN

Fulton, Edmund Davie, lawyer, politician, judge (b at Kamloops, BC 10 Mar 1916). Son of an MP and grandson of a former BC premier, he distinguished himself as a Rhodes scholar, MP, Cabinet minister and judge. First elected to the House in 1945, he ran for the Progressive Conservative Party leadership in 1956; in June 1957 was appointed minister of justice; he was highly regarded in that position. Fulton was involved with patriation of the CONSTITUTION (the Fulton-Favreau formula reflects his views on federal-provincial relations) and the COLUMBIA R TREATY negotiations during this period. In 1963 he was elected leader of the BC Tories, but in 1965 returned to federal politics. He was a justice of the BC Supreme Court from 1973 to 1981.

PATRICIA WILLIAMS

Functionalism, a concept of world order developed in the early 20th century by such writers as Leonard Woolf and David Mitrany, who argued that if nations joined in economic and social interdependence, and if national well-being depended upon the maintenance of peace, then war would be less likely. This theory influenced the founders of the UNITED NATIONS, with its specialized functional agencies and its particular organs for security and for economic and social questions. Canadians extended the concept into the theory of functional representation, where membership and influence in the various UN bodies would be accorded to those countries with special interests in, and contributions to make to, the specific subject for which the body was responsible. JOHN W. HOLMES

Fundy, Bay of, and Gulf of Maine, with a total area of about 1.8×10^5 km^2 and depths generally less than 200 m, are a part of the continental shelf off eastern Canada and New England. The area of the Bay of Fundy alone is about 1.6×10^4 km^2. Its name is likely a corruption of the French *fendu* ("split"). It was known for a time as La Baie Françoise.

Between about 15 000 and 10 000 years ago, as the glaciers retreated from the last ice age, parts of GEORGES BANK and other shallow areas were dry land; fragments of trees and mammoth teeth from this era are still found occasionally in fishing trawls. A rising sea level since then not only submerged these offshore banks, but also



led to the development of the present tidal regime. The tides of the Bay of Fundy are the world's largest, with a range from low to high tide that can exceed 15 m in MINAS BASIN at the head of the bay. At peak flood tide the flow of water across the edge of the continental shelf into the Gulf of Maine is 25×10^6 m^3/s, 2000 times the average discharge of the ST LAWRENCE R. The flow past Cape Split into Minas Basin is 40 times that of the St Lawrence.

The main reason for these large tides is that because of its shape, size and depth, the Bay of Fundy-Gulf of Maine system has a natural period of oscillation of about 13.3 hrs. As a result, its waters respond vigorously to the push they get every 12.4 hours from the N Atlantic tides — a phenomenon known technically as a near-resonant response. The Reversing Falls at SAINT JOHN, NB, and the tidal bores in rivers near the head of the bay are well-known natural phenomena associated with the tides. The large tides also have dramatic effects on oceanographic conditions throughout the region. Large areas, such as Georges Bank, much of the Bay of Fundy, and the area off SW Nova Scotia, are kept well mixed vertically by the strong tidal currents (with resulting cold surface waters and frequent fog), rather than developing the warm surface layer that occurs in less-well-mixed waters in summer. The tides also contribute to the average circulation patterns in the region.

These effects influence biological productivity, generally favourably, by returning nutrients to surface layers where they can be utilized. Thus the waters off southwestern NS form the summer feeding ground of the Nova Scotia herring, a major stock of several hundred thousand tonnes. Off BRIER and GRAND MANAN islands, where tidal currents interact with the sharp topographic relief, swarms of copepods and euphausiids (or krill) are often found at the surface. This condition attracts fin and humpback whales, along with large flocks of plankton-feeding birds, such as phalaropes, shearwaters and gulls. In the bay's upper reaches the strong tidal currents keep so much mud in suspension that light penetration, and hence biological productivity in the water, are greatly reduced. Most of the biological productivity occurs on the mud flats, which are important feeding grounds in late summer for vast flocks of migrating shorebirds, particularly semipalmated sandpipers.

The region's fisheries, particularly for scallops and groundfish on Georges Bank, for herring and lobster off southwestern NS and for herring in the Bay of Fundy, are of great importance to many small communities, and indeed to the general economy of NS, NB and Maine. New developments are largely centered around fisheries and energy. Considerable effort is being devoted to research and international diplomatic activity to permit sensible regulation of the fisheries. The problem is particularly acute on Georges Bank, where the US and Canada dispute the location of the international boundary and the setting and sharing of quotas for the various fisheries, and where exploratory drilling for oil and gas, with attendant risks to the fisheries, has commenced. A proposed superport and oil refinery at Eastport, Maine, has been strongly opposed by Canada, as the area's strong tidal currents and narrow channels make navigation hazardous and would make it very hard to prevent any oil spill from contaminating large sections of coastline.

One major possible development in the upper reaches of the Bay of Fundy is of tidal power. Schemes with a power output equal to that of several nuclear-power stations are technically feasible; a small pilot plant has been built in NS's Annapolis Basin (*see* TIDAL ENERGY). Surprisingly, these large schemes may lead to a slight increase in the tidal range over much of

the Bay of Fundy-Gulf of Maine outside the barrage. In the head pond behind the barrage the operation of the plant would lead to a substantial change in low-tide level and to a reduction of the tidal range, and hence of currents, by a factor of about 3. The possible effects of such a change on the extent and biological productivity of the mud flats, and hence on migrating shorebirds, are not yet fully understood.

CHRIS GARRETT AND TONY KOSLOW

Fundy National Park (est 1947), renowned for its high tides averaging 10 m, stretches for 17 km along the Bay of FUNDY and extends inland to cover a 207 km^2 area of wooded hills cut by deep valleys and tumbling streams. The PARK's seaward edge features wave-pounded cliffs and cobble beaches. At low tide sea anemones, barnacles and a host of other marine INVERTEBRATES can be found sheltering in small tidal pools or among seaweed. In late summer, flocks of migrating SHOREBIRDS congregate on the tidal flats. Inland, the budworm-ravaged forests of spruce and fir are home for white-tailed deer, moose, red fox, black bear, bobcat and, possibly, the rare eastern cougar. Coyote are recent immigrants to the park. In presettlement days Micmac lived here. More recently, lumbering and shipbuilding were major activities of Irish and English settlers. The park has 5 serviced facilities for outdoor recreation. LILLIAN STEWART

Funeral Practices consist of customary observances for the dead and arrangements made for disposition of the body. There is a network of social and legal requirements to be met that usually involve the services of various professionals (*see* DEATH AND DYING).

Predeath Protocols Many arrangements can be made prior to death, from wills to donation of body parts, but Canadian laws and customs restrict how a person's wishes are implemented after death. There is a growing tendency, supported by memorial societies and the medical fraternity, to donate body parts for transplant or for research, but an individual's wish to donate may be countermanded if the family has strong views about dismembering the deceased. Religious attitudes and traditions influence these decisions. A person may dictate the nature and type of funeral, the final disposition of the remains, and even arrange the newspaper announcement ahead of time. Prearranged funerals are much more common than they were 30 years ago. Memorial Societies are volunteer, nonprofit consumer-information organizations that are found in most major cities. Their function is to encourage preplanning and to ensure that simple, low-cost funeral options are available from the funeral industry.

For highly placed individuals, or for a member of the armed forces or the police, public protocols regarding funeral arrangements may take precedence over individual or family customs and wishes. In all arrangements, both group values and professional organizations play a significant role.

Preburial Procedures An individual may be pronounced dead if the vital signs are missing or if brain waves are no longer detected. If sudden death is involved or if there is no clear reason for death, the provincial coroner or medical examiner requires an autopsy to be performed. Since health care is a provincial responsibility, the legal requirements are specified in provincial legislation. In all cases, legal requirements take precedence over religious views. Unwritten codes are also observed in announcing a death. Immediate next of kin take precedence over relatives who may be nearer to the scene of death, and it is a breach of etiquette not to notify a close relative about a death. Since nothing can be done until the physician signs the death certificate, hospital protocol requires this step. With Orthodox Jews, there may be a delay in announcing a death (especially just before the beginning of the sabbath) and arrangements for interment have to wait until after the sabbath.

Deaths caused by highly infectious diseases are treated differently from others; for instance, if death is from hepatitis, the body must be sealed in a casket immediately and no embalming can take place. If a body is to be shipped out of the country, the local Board of Health must certify that the body is not the carrier of a communicable disease.

Funeral homes are a service industry in Canada. Some provinces, such as Ontario, require a funeral director, though in most provinces these services are optional. Most funerals in remote places take place in funeral homes. Provincial licensing is required for embalmers, and though embalming the body is not a legal requirement in Canada, it is an accepted practice. Provincial legislation requires embalming or sealing only for bodies that will not reach their place of burial within 72 hours of the death. Educational requirements for embalmers differ across Canada, the minimum being a 2-week vocational course, a correspondence course and on-the-job apprenticeship.

Some religious groups, such as Hindus and Sikhs, may require preparation of the body to be done by the eldest son or by a designated individual, but for the majority of Canadians the funeral director prepares the body: washes it, ejects blood from the veins and substitutes embalming fluid (thus removing the discoloration of the skin), cleans and disinfects the chest and abdominal cavity, applies makeup, fixes the hair and dresses the body in clothes provided by the next of kin. Restorative work, if the face has been damaged, may also be done. Muslims are an exception to this practice, since they traditionally bury the dead in a shroud.

Funeral directors have several options regarding cost and services. Some provide a casket and all essential services for a fixed price. This unit pricing system is popular with prearranged funerals and requires less time and decision making for the bereaved. Another option is the functional pricing system, in which the price of the chosen casket and the desired services are added to the basic price. Despite widespread criticism of the industry's costs, little has changed. Elaborate caskets may be purchased and expensive services chosen, sometimes from guilt on the part of survivors, sometimes for the public image of the family. Funeral costs can vary from region to region or from urban to rural areas.

The wake, a vigil held over the body prior to burial, commonly took place at the home of the family of the deceased. Although this custom still occurs, especially in families that have recently come from Europe, wakes are now usually replaced by viewing times at the funeral home, when members of the family will be present to respond to the condolences of visitors. For many years it was customary for close friends and relatives to buy flowers, the size of the floral spray varying according to closeness with the deceased. In recent years a marked trend to request gifts to charities in lieu of flowers has taken place.

Funeral services differ according to religious and cultural practices. For Roman Catholics, Anglicans and Eastern Christians of Orthodox persuasion, as well as for those who were closely connected to a church during their lives, the norm is to have the service at the church with the body present. For some of these faiths, the church is the only sanctified locale in which a mass may be held, but in many communities the church is regarded as the proper place for funerals, no matter what the denomination. In urban settings, the funeral chapel plays a much larger role. Fewer than 5% of the population have no funeral service at all.

A common scene in Canada is the funeral procession, headed by cars containing the chief mourners and followed by the hearse and friends of the family. The lights on the motorcade were traditionally the signal for bystanders to pause in respect to the departed, a custom that has been eroded in contemporary Canada.

Interment Cremation (to reduce to ashes by burning) is becoming more common; in 1977 14.8% of bodies were cremated, in 1979, 17.8%. Western Canada leads with 26.2% in 1977. More recent statistics are not available. Even among Roman Catholics the trend toward cremation is growing, and in 1983 the Pope lifted any prohibition against it. Funeral directors suggest that the mode of disposal is defined culturally, not religiously. Lack of space available for burial use has also encouraged the trend to cremation.

CEMETERIES may be either private or public, though there are legislated restrictions on private cemeteries. A gravesite is regarded by the law as a piece of real estate and a deed is issued for the lot. The "deed" is frequently a form of rental and not a complete transfer of title. Most cemeteries have regulations regarding TOMBSTONES, markers and even flowers. Ethnic and sectarian cemeteries are common in Canada and have restrictions based on memberships. Cemeteries may impose time limits on the use of plots or may reuse a plot for a relative after a specified period of time. The trend away from ostentatious monuments continues, sometimes at cemetery insistence, but also because of high prices for marble. Some memorial parks with special theme areas or ethnic gardens have been established across the country, and costs for their plots include a percentage for perpetual care.

The graveside service with the committal to earth, usually with a symbolic toss of earth on the lowered casket, is the last act of the mourners. Closing the grave is left to the cemetery workers. Disposal of ashes from cremation is left to the family of the deceased, and since there are no laws requiring specific places of deposit, the ashes may be spread anywhere. Some people arrange for them to be placed in an urn, and some cemeteries sell niches in a vault for this purpose.

Postburial Rites No set period is allocated for the bereavement; traditional Jewish law specifies one week of mourning, after which reintegration with the community is enjoined. Widows in some traditions, such as Coptic Christian, are required to wear black clothing for a year, at the end of which a memorial service is held. Some Catholics adhere to the practice of holding a mass on the first anniversary of the death and some have masses said for the deceased, but Protestants have eschewed this remembrance of the dead. Mormons often initiate special rituals designed to elevate to a state of grace the souls of those who have died without being initiated into the faith. Various Orthodox believers have an annual day for remembering the dead, when the names of all the dead from the community are read, and prayers said, after which the family will have a picnic at the gravesite. For most Canadians, the funeral service is the last public occasion for relating to the dead. For those who leave a will, an executor will call the beneficiaries together for its reading, and the memory of the deceased lives on in the disposal of the inheritance. Private grave visitation may serve to bolster the memory but, except for those who follow ancestral traditions, there is little overt link with the dead. EARLE WAUGH

Fung, Donna Lori, gymnast (b at Vancouver 21 Feb 1963). She was western Canadian all-around champion of rhythmic gymnastics in 1981 and finished sixteenth in rope in the world championships that year. She was Canadian national all-around champion 1982 and 1983 and first all-round in the pre-world championships at Lausanne, Switz, and ninth in the ribbon at the



Lori Fung in action at the 1984 Los Angeles Olympics, at which she won a gold medal in rhythmic gymnastics (*courtesy Athlete Information Bureau/Service Information*

world championships at Strasbourg, France, in 1983. She won the first Olympic gold medal in all-around rhythmic gymnastics, at Los Angeles in 1984. JAMES MARSH

Fungus, common name for any member of the kingdom Mycota. Fungi share some features with the lower PLANTS and share others with the simpler ANIMALS, but are independent of either group. Like plants and animals, they evolved from the protistans. Vegetatively, fungi usually consist of slender filaments (hyphae) massed together in a mycelium which carries on the functions of metabolism and reproduction, but their fruit bodies are often complex. Since all fungi lack chlorophyll and cannot feed themselves through photosynthesis, they are heterotrophs and must use complex organic compounds of nitrogen and carbon for metabolism. Therefore, they commonly exist as parasites, drawing nutrients directly from a host plant or animal which they may injure; or as saprophytes, living on dead or decaying matter. Fungi were long treated as plants and, because of their intimate associations with plants, they continue to be studied chiefly in BOTANY and plant pathology institutions. Mycology, the study of fungi, began in Canada as a result of concern about plant diseases and timber decay. Its history is traced in works on plant pathology.

Classification Advances in BIOCHEMISTRY and electron microscopy have required changes in fungal classification. Acceptance of the kingdom Mycota (as distinct from the kingdom Plantae) entailed changes in rank. Changes are continuing, and the provisional system presented here omits several minor groups. Two divisions are recognized: Myxomycota, mainly slime molds, often considered protistans; and Eumycota or typical fungi. Slime molds have an amoeboid, noncellular growth phase during which they engulf food particles. At the end of the nutritional period they develop varied and often beautiful fruiting structures which produce masses of dry spores that disperse the organisms. They lack true mycelium, but curious and often decorated threads frequently are found among the spores. They are generally studied by mycologists. Eumycota include 5 subdivisions.

Occurrence Fungi grow in almost all environments from tropic to high arctic: in soil, fresh water (including hot springs) and seawater, or in association with many animals and all plant groups. Species attacking man, eg, on the skin (dermatophytes) or in the lungs, are relatively few but are difficult to eradicate.

Associations involving fungi are many and often very important. LICHENS have arisen repeatedly through association of various fungal genera with numerous algae. The importance of a fungal group in Canada does not always correlate with numbers of species, eg, some important pathogens (agents of disease) belong to small groups. Major groups in Canada include wood-rotting Aphyllophorales, more than 800 species; MUSHROOMS (Agaricales), more than 3000 species; ascomycetes and deuteromycetes, *c*5000 species (estimates are doubtful because many have unknown life cycles); rusts (Uredinales), 450 species and well-marked varieties; smuts (Ustilaginales), 140 species; downy mildews (Peronosporales), 100 species. Among important fungal PLANT DISEASES are wheat stem rust (*Puccinia graminis),* which reduced the Canadian crop in 1916 and 1954 by 2.7 and 4 million tonnes; other cereal rusts (*Puccinia*), which take a continuing toll; white pine blister rust (*Cronartium ribicola*), which nearly eliminated the eastern white pine; cereal smuts (*Tilletia* and *Ustilago*); potato late blight (*Phytophthora infestans*); sunflower downy mildew (*Plasmopara halstedii*); onion downy mildew (*Peronospora destructor);* chestnut blight (*Endothia parasitica*), which virtually destroyed the American sweet chestnut; and apple scab (*Venturia inaequalis*), which often causes heavy loss. Another important aspect of fungal activity is the production of serious toxins in moldy grain.

However, many fungal associations do no appreciable harm to the plant and some are highly beneficial. About 95% of SEED PLANTS have mycorrhizae, associations with one or more fungi that assist plant nutrition in most situations. Work in progress at Zürich, Switzerland, shows that healthy tissues of many plants yield numerous fungi, occasionally over 100 from a single plant species. These fungi do no visible harm to the plant and the associations may be mutually beneficial. In nature symbioses with fungi seem to vary from mildly injurious to strongly beneficial to the plant. Even parasites such as rusts probably supply some nutritional aid to the plant, partly offsetting their damage. Only when large areas are planted to one, often genetically uniform, crop do devastating losses occur. In natural grasslands, several to many GRASS species usually occur in mixed stands. This variety buffers the association against violent change, and rusts, although present, do little harm. In natural FORESTS, decay occurs chiefly in overmature or wind-thrown trees, and fungi speed the recycling of wood and bark into usable nutrients; but when the forest is treated as a crop, decay can be very costly. Trees must be cut while relatively young to reduce loss from decay; slash may stimulate growth of decay fungi; and human activity may damage trees and provide sites for infection. With fungi that are adapted to all trees and various climates, the problem is complex. The breakdown of litter in forests, grasslands and other biomes is as important as tree decay, although less spectacular. In each habitat there is an elaborate sequence of fungi, bacteria and minute animals, which completely reduce tissues to plant nutrients. Fungi are especially important in severe climates (eg, arctic deserts) that have minimal bacterial activity.

Dispersal Most species have airborne spores, some are spread in water or by water splash, and a few are carried chiefly by insects. Spores of some host-limited ascomycetes stick to seeds, fruits or bulbils of the plant and are carried with them. Thus, they may occur at the extreme limit of the host's range. Some pathogens are carried within seeds. Airborne spores may be released passively or discharged forcibly by several methods.

Fungi in Human Affairs The fungi best known to city dwellers are conveniently, if inexactly, termed MOLDS. They include the variously coloured growths that occur in damp environments on fruit, bread, cheese, leather and other organic substances, and involve members of several groups of fungi. Some optical glass is etched (and the part ruined) by fungal secretions. Mites carrying spores could enter poorly sealed instruments, die on a lens, and supply nutrient for a mold colony. Damage from fouling in Canadian-built field glasses and riflescopes was greatly reduced by improved packing and storage methods and by redesigning for perfect sealing. Although fouling is mainly a problem of humid tropics, severe damage did occur in a damp depot in Ontario, and some fouling was recorded in a survey instrument on Baffin I.

Edible mushrooms are a popular food (*see* MUSHROOM CULTIVATION) and other fungi also have uses in the various food industries. Industrial mycology was long concerned mainly with the use of YEASTS and a few molds in baking, brewing and wine making, and in flavouring cheeses. Development of antibiotics stimulated the use of more molds and, recently, some bird's nest fungi have yielded a promising antibiotic. Much attention is now being paid to the use of fungi (including some mushrooms and bird's nest fungi) for breaking down wood, straw and other plant debris into alcohol or edible carbohydrates. D.B.O. SAVILE

Funk Island, 25 ha, is a flat, 15 m high, wedge-shaped granite island, 800 m by 400 m, lying 60 km off Newfoundland's NE coast, E of FOGO ISLAND. The origin of the name is unknown, though it may have been inspired by the smell of the guano that covers much of the island. The W end is crowned by a 15 m cairn built by past visitors to this nearly barren spot. Jacques CARTIER visited the island, as countless other mariners did, for the abundant eggs and birds found there. Once a favourite hunting ground of coastal residents, both native and European, it was the last known breeding place of the great auk, *pinguinis impennis,* extinct from about 1840. Here "factories" were set up and the birds were boiled, their valuable feathers removed, and the bodies discarded. Consequently the island was the source of most of the great auk skeletons preserved in museums around the world. Today, still populated by thousands of murres, terns and puffins, the island is a seabird sanctuary protected by law. ROBERT D. PITT

Fur Farming In Canada, the primary MAMMAL species raised for fur are the MINK (*Mustela vison)* and the FOX (genus *Vulpes)*. A limited amount of chinchilla (*Chinchilla laniger)* is also raised. Before 1890, all fur in Canada was taken by trapping; now, however, 40% of Canadian furs come from farming operations.

Mink, a carnivore, has been raised for its fur since the beginning of the century. Mink farming began as an offshoot of fox farming. Canada produces only 6% of the world's pelts, but the "Majestic" mink is widely acclaimed. Today, about 600 Canadians are engaged in mink farming, primarily in Ont, BC, NS and Qué. They belong to the Canada Mink Breeders Assn. In 1982 Canada sold 1.2 million pelts, at an average price of $34.24 and a net profit of $5-10 per pelt.

Selective breeding has produced over 200 shades of fur (in the whites, blacks, browns and blues) among the mink types Standard, Jet Black, White, Pastel, Pearl, Lavender, Buff, Demi Buff, Aleutian, Silverblu, Sapphire, Violet, etc.

Mink are aggressive animals and must be handled with care. A typical mink farm has separate sheds for kits and for breeding adults; each shed holds several rows of individual cages. Establishing a fur farm requires an investment of about $275 per breeding female. One worker can care for 500-600 breeding females but vaccination and pelt preparation require extra workers.

The mink is killed by injection, gas or electrocution, and then skinned. The pelt is fleshed and degreased and dried on boards, usually fur side out. Pelts are then sent to a fur centre for classification ("Majestic," "Canada," "Unlabelled") and sale by auction; most pelts are classified and sold by the HUDSON'S BAY CO.

Fox, a carnivorous member of the family Canidae, has been farmed since about 1890. In the past, fox breeding underwent great fluctuations but, in the last decade, market demand

and prices have improved. In 1981 international production was 3 million blue fox pelts and 200 000 silver fox pelts; Canada produced 11 000 silver fox pelts. In that year, the price of the Canadian fox averaged $294 a pelt; production costs, about $100. In 1980 there were 295 fox farmers in Canada, mostly in NS, PEI, NB and Ont. A typical farm has breeding and fur sheds and a service building, but some farmers keep their breeding foxes in outdoor cages. Establishing a fox farm requires about $1100 per breeding female. A single worker can look after about 100 breeding females. Fox pelts are prepared in the same way as mink pelts; the skin is always dried fur side out. Classification and sale at auction take place at the same fur centres that handle mink.

RENÈ BELZILE

Fur Industry The Canadian fur industry consists of companies that buy raw furs from trappers, dealers or fur-marketing companies (eg, HUDSON'S BAY CO raw-fur auctions), send them to fur dressers and dyers in Toronto, match the skins and cut and sew them into garments. Most manufacturers make coats and most specialize in one or 2 types of fur. Before the coat can be finished, it must go through a fur-cleaning process and some companies do only this. Some cleaners also maintain cold fur-storage vaults to house furs during the summer, but many retail furriers also have their own vaults. Fur factories are generally small, the number of workers varying from 4 to 75; only 8 of the 299 operating factories employed over 100 people in 1981. In that year there were 2483 furriers in the MANUFACTURING work force, 1718 in Québec, 559 in Ontario and 125 in Manitoba. Almost all fur companies are Canadian owned; there is some foreign ownership, mainly American, in the retail sector.

Fur garments have been made using hand techniques for more than 100 years, although new technologies have been introduced in the last decade. Innovations include cutting machines, an attachment to guide fur through the wheels of the fur-sewing machine, and a German invention for finishing a coat, ie, installing the lining. Almost no research and development is done anywhere except in Germany, but innovation exists in Canada in dressing, dyeing and cutting.

Canada is known internationally as the producer of the world's finest furs. Jacques CARTIER was met in 1534 on the shores of the St Lawrence R by Indian chiefs wearing the robes of their rank, hand sewn from beaver and bear pelts. Western Europeans wintering in Canada found it essential to tan and sew pelts they had obtained by trapping or barter, although the resulting garments could hardly be called fur coats, since there was no styling. A modest custom-fur business sprang up to meet the demands of voyageurs and traders who wanted better garments. Exported pelts were used mainly for men's hats, but gradually fur fashions began to appeal to women in Europe and Canada (*see* FUR TRADE).

This demand created a market for custom furriers, who designed, made and maintained fur garments. The Hudson's Bay Co, formed in 1670 to collect pelts from Rupert's Land, slowly developed a garment business as well. From 1880 to 1920, many of the immigrants from Ukraine, Poland and Austria, as well as young men from England and Scotland, had had experience with the needle in Europe and went into Canadian fur stores and workrooms. The early custom furriers were Anglo-Saxon, but by 1930 Jewish immigrants had developed a wholesale manufacturing industry to serve the custom trade and the developing retail trade. In 1933, as the GREAT DEPRESSION created financial chaos, manufacturers formed the Fur Trade Credit Assn of Canada, later the Fur Trade Assn of Canada. Retailers



Archie White trading furs for stores from Andy Reid, manager of the HBC post at Cameron Bay, NWT, Aug 1937 (*courtesy Public Archives of Canada/C-33945*).

formed the Retail Furriers Guild of Canada. Each May the Fur Trade Assn sponsors great fur fairs and international shows in Toronto and Montréal, where retailers order coats for August fur sales. The 1950s and 1960s brought many trained furriers from Greece, almost all being from the small town of Kastoria which had been totally employed in manufacturing fur items for 2000 years. The Greek furriers congregated in Montréal, Toronto and New York, and they are becoming a major factor in Canadian fur manufacturing. They have developed their own trade association in Toronto.

Fur-production workers can be trained on the job or at Toronto's George Brown College to become cutters (who cut the pelts to fit the pattern, using a pointed razor-bladed knife), operators (who sew the pieces together), blockers (who tack or staple the sewn sheets of fur to the tracing of the pattern) and finishers (who close the coat and install the lining, buttons, etc). The fur industry consumes relatively little energy because so much of the work is done by hand. Synthetic fur uses much more energy and its manufacture creates chemical pollution.

The Canadian fur industry is a significant exporter of pelts and garments. The largest customers are the US, Western Europe and recently Japan, which is a rapidly growing market. According to Statistics Canada, the fur industry has grown from $51 million in wholesale shipments in 1970 to $170 million in 1978 (of which $81 million was exported) and to $234.5 million in 1980 (of which over $100 million was exported). In 1919 there were 107 plants; the peak of 642 plants was reached in 1949, and by 1982 the number had dropped to 270. Between 1949 and 1982 the number of employees decreased from 6700 to 2483. The fur industry receives no tariff protection and raw-fur prices continue to be high.

SIDNEY S. SCHIPPER

Fur Trade in Canada began as an adjunct to the fishing industry. Early in the 16th century fishermen from NW Europe were taking rich catches of COD on the Grand Banks off Newfoundland and in the Gulf of St Lawrence (*see* FISHERIES HISTORY). Drying their fish onshore took several weeks, during which time good relations had to be maintained with the Indians who were eager to obtain metal and cloth goods from the Europeans: iron knives and axes, awls, copper kettles, blankets and trinkets. All they had to offer in exchange were furs and fresh meat. The fishermen found an eager market in Europe for the furs and made high profits. When the wide-brimmed felt hat came into fashion later in the 16th century, the demand for BEAVER PELTS increased tremendously. The best material for hat felt was the soft underfur of the beaver, the strands of which had tiny barbs that made them mat together tightly.

Early in the 17th century French traders established permanent shore bases in ACADIA, a post at TADOUSSAC (Qué) and in 1608 a base at QUÉBEC to exploit the trade more effectively. The following year the Dutch began trading up the Hudson R (NY) and in 1614 established permanent trading posts at Manhattan and upriver at Orange [Albany]. This activity marked the beginning of intense rivalry between 2 incipient commercial empires. During these years the number of traders flooding into the St Lawrence region and cutthroat competition among them greatly reduced profits. In an attempt to impose order the French Crown granted monopolies of the trade to certain individuals. In return, the monopoly holders had to maintain French claims to the new lands and assist in the attempts of the Roman CATHOLIC Church to convert the Indians to Christianity.

In 1627 Cardinal Richelieu, first minister of Louis XIII, organized the COMPAGNIE DES CENT-ASSOCIÉS to put French territorial claims and the missionary drive on a firmer footing. Missionaries were sent out: in 1615, 4 Récollets, and in 1625 the first members of the powerful Society of Jesus (Jesuits) arrived at Québec. A mission base, STE MARIE AMONG THE HURONS, was established among the HURON near Georgian Bay, but the Huron were more interested in the trade goods of the French than in their religion. Yet it was fur-trade profits that sustained the missionaries and allowed the company to send hundreds of settlers to the colony. In 1642 VILLE-MARIE [Montréal] was founded as a mission centre. In 1645 the company ceded control of the fur trade and the colony's administration to the colonists (*see* COMMUNAUTÉ DES HABITANTS). Unfortunately, they proved to be inept administrators, and fur-trade returns fluctuated wildly as a result of an IROQUOIS blockade of the Ottawa R route to the West. Finally, after a desperate appeal by the colonial authorities to Louis XIV, in 1663 the Crown took over the colony.

The main staple of the trade was still BEAVER for the hat industry. The Ministry of Marine

(*see* MINISTÈRE DE LA MARINE), responsible for colonial affairs, leased the West Indies trade, the African slave trade and the marketing of Canadian beaver and moose hides to the newly formed COMPAGNIE DES INDES OCCIDENTALES, in reality a crown corporation. All permanent residents of the colony were permitted to trade for furs with the Indians but they had to sell the beaver and moose hides to the company at prices fixed by the Ministry of Marine. All other furs were traded on a free market; thus the trade was not a monopoly, but the law of supply and demand had been suspended for beaver and moose hides.

Jean-Baptiste Colbert, the French minister of marine, hoped to see the Canadian economy diversified to produce raw materials for French industry, particularly timber, and minerals and foodstuffs for the West Indies plantations. Thousands of emigrants were shipped to Canada at the Crown's expense to bring the land into production. Colbert discovered that a sizable proportion of the young men did not remain on the land but disappeared for years to trade with the Indians in their distant villages (*see* COUREURS DE BOIS). The main reasons for this phenomenon were the assured profits in the trade and the imbalance of the sexes, which was so great that until about 1710 only about one man in 7 could hope to find a wife — a necessity on a farm. In the interior, however, the traders quickly formed alliances with Indian women, whose economic skills facilitated adaptation by the French to wilderness life. By 1681 Colbert was forced to acknowledge the pull of the fur trade, and he inaugurated the *congé* system. Each year up to 25 congés (licences to trade) were to be issued by the governor and the intendant. Each congé allowed 3 men with one CANOE to trade in the West. It was fondly hoped that the Canadians would wait their turn for a congé, thus leaving the colony only 75 men short each year.

The new system did little to reduce the number of men away from the settlements (most of them illegally), and the amount of beaver pouring into Montréal continued to increase astronomically. By the 1690s the Domaine de l'Occident (Company of the Farm), which had been obliged to take over the beaver trade in 1674 from the defunct Compagnie des Indes Occidentales, was complaining of a huge glut. In 1696, in desperation, the minister of marine gave orders to suspend the beaver trade, to stop the issuing of congés and to abandon all the French posts in the West, except Saint-Louis-des-Illinois. This occurred while England and France were at war and the Canadians were engaged in a desperate struggle with the English colonies and their Iroquois allies. The governor (*see* GOUVERNEUR) and INTENDANT at Québec protested vigorously, declaring that to abandon the posts meant abandoning the Indian allies, who would then go over to the English. New France would be doomed. In addition, the English had been established since 1670 at posts on Hudson Bay (*see* HUDSON'S BAY COMPANY), and the western posts were essential to fend off that competition. The Canadian COMPAGNIE DU NORD had been founded in 1682 to challenge the HBC on its own ground, but it was a failure. The minister of marine was obliged to rescind his drastic orders and the beaver trade was resumed, for purely political reasons.

In 1700, on the eve of new hostilities, Louis XIV ordered the establishment of the new colony of Louisiana on the lower Mississippi R, settlements in the Illinois country and a garrisoned post at Detroit. The aim was to hem in the English colonies between the Allegheny Mts and the Atlantic. This imperialist policy depended on the support of the Indian nations; and the fur trade was used to maintain their alliance.

In 1715 it was discovered that rodents and insects had consumed the glut of beaver fur in French warehouses. The market immediately revived. As an item on the balance sheet of French external trade, furs were minuscule, and their share was shrinking proportionately as trade in tropical produce and manufactured goods increased; but it was the backbone of the Canadian economy.

Unlike the HBC with its monolithic structure, staffed by paid servants, in New France down to the early years of the 18th century the trade was carried on by scores of small partnerships. As the 18th century wore on and costs rose with distance, the trade came to be controlled by a small number of BOURGEOIS, who hired hundreds of wage-earning VOYAGEURS. Most companies consisted of 3 or 4 men who obtained from the authorities the lease on the trade at a specific post for 3 years; all members shared profits or losses proportional to the capital subscribed. Trade goods were usually obtained on credit, at 30% interest, from a small number of Montréal merchants who also marketed the furs through their agents in France. The voyageurs' wages varied from 200 to 500 *livres* if they wintered in the West. For those who paddled the canoes westward in the spring and returned with the autumn convoy, the usual wage was 100-200 *livres* plus their keep (about double what a labourer or artisan would earn in the colony).

Between 1715 and the SEVEN YEARS' WAR (1756-63) the fur trade expanded greatly and served a variety of purposes — economic, political and scientific. Educated Frenchmen were keenly interested in scientific inquiry, and government members, eager to discover the extent of N America, wished a Frenchman to be the first to find an overland route to the western sea (*see* NORTHWEST PASSAGE). Commissions were granted to senior Canadian officers, such as Gaultier de LA VÉRENDRYE, to discover that route. They were given command of vast western regions (some of which overlapped territory claimed by the British), with sole right to the fur trade. Out of their profits they had to pay the expenses of maintaining their posts and sending exploration parties west along the Missouri and Saskatchewan rivers. The Crown thereby made the fur trade pay the costs of its pursuit of science, and also maintained control over its subjects in the wilderness and its alliances with the Indian nations to exclude the English. By 1756, when war with England put a stop to EXPLORATION, the French had reached the foothills of the Rocky Mts. Warfare between the BLACKFOOT and CREE prevented further advances.

Throughout this period there was keen competition between the Canadian traders and the HBC, with the Canadians taking the lion's share of the trade. They had many advantages: they controlled the main waterways throughout the West; they had a sure supply of the birch bark needed for canoes (something that the Anglo-Americans and the HBC men both lacked); many of their trade goods were preferred by the Indians; and they had good relations with the Indians, with whom they had developed extensive kinship ties. Attempts by the English of the Thirteen Colonies to obtain more land for settlement by any means angered the Indians. The French did not covet Indian lands, but were determined to deny them to the English.

HBC traders made no real attempt to push their trade inland. Instead, they waited in their posts for the Indians to come to them. The Indians were astute enough to play the English and French off against each other by trading with both. The French dared not try to prevent Indians from taking some furs to the bay, but made sure to obtain the choice furs, leaving only the bulky, poor-quality ones to their rivals. In the St Lawrence region, New York and Pennsylvania traders made little attempt to compete with the Canadians. Instead, they purchased furs clandestinely from the Montréal merchants. In this way the Canadians obtained a good supply of strouds (coarse English woollen cloth), a favourite English trade item. The illicit trade between Montréal and Albany also removed any incentive the New York traders might have had to compete with the Canadians in the West.

When the Seven Years' War began, the fur trade continued out of Montréal. The Indian nations had to be kept supplied, but the volume of exported furs steadily declined. Within a year of the French capitulation at Montréal in Sept 1760, the trade began to revive, largely supported by British capital and Canadian labour.

W.J. ECCLES

Fur Trade After 1760

At the time of the CONQUEST, 1759-60, 2 systems dominated the commercial fur trade of the northern half of the continent: the St Lawrence-Great Lakes system, based at Montréal and extending to the upper reaches of the Mississippi R and its major northern tributaries, as well as to the prairies and the southern portion of the Canadian SHIELD; and the Rupert's Land system, which theoretically covered the whole region draining into Hudson and James bays. The St Lawrence-Great Lakes system, developed by the French, had come to be served by the *en dérouine* (itinerant peddling) pattern of trade, ie, a pattern in which the trade, dominated by many small partnerships, was conducted by parties of a few men sent out to do business with the Indians in their own territory. The Rupert's Land trading system, by contrast, had not evolved in the same manner; in 1760 the HBC's employees still followed the practice of remaining in their coastal "factories" (major trading posts), awaiting the arrival of Indians to trade.

After the Conquest, Anglo-Americans (Yankees, or *Bastonnais*), English and Highland Scots merchants supplanted the Canadian bourgeois and the agents of French merchants at Montréal. The new "pedlars" forged a new commercial link with London. The upsurge in activity in Montréal disturbed the HBC's "sleep by the frozen sea": the success of its new rivals forced the company to alter its coast-factory trading policy, and in 1774 the HBC penetrated inland from the bay to found CUMBERLAND HOUSE, close to the Saskatchewan R. For their part, the pedlars learned that co-operation among themselves, rather than competition, was the road to commercial success. The resulting NORTH WEST COMPANY rose rapidly to a position of dominance in the trade by gaining a *de facto* monopoly of the trade in the fur-rich area around LK ATHABASCA. Staple fur (beaver) and fancy furs (mink, marten, fisher, etc), unsurpassed in quality and number, assured handsome profits in spite of the high costs of the necessarily labour-intensive transportation system, the canoe brigade. The annual dash of brigades from Fort Chipewyan to GRAND PORTAGE (later to FT WILLIAM) on Lk Superior created much of the romantic image of the fur trade. To maintain its Athabasca monopoly the NWC competed, at a loss if necessary, with its opponents on the Saskatchewan R, around Lk Winnipeg and N of the Great Lakes. On the N Saskatchewan R, the rival companies leapfrogged westward past each other's posts in an attempt to gain a commercial advantage with the Indians. In all regions, small trading parties travelled *en dérouine* to waylay Indians travelling to rivals' posts and, when necessary, to force them to trade. In this competition the HBC appeared disadvantaged in spite of its having a major entrepôt, YORK FACTORY on Hudson Bay, much closer to the fur-gathering areas than was the NWC's transshipment point of Montréal. The HBC lacked personnel and equipment equal to the tasks of inland travel and trade. Not until the 1790s did the HBC evolve the YORK BOAT brigade as an answer to its rival's *canot de maître* and *canot du nord*. Even then, improved equipment and personnel were not sufficient to turn the commercial tide in the company's favour.



Oxford House, 1880. When the Indians came to trade, they camped close to the fur-trade post in an open area called the "plantation" (*courtesy Public Archives of Canada*).

Montréal agents such as Simon "The Marquis" MCTAVISH and his nephew and successor William MCGILLIVRAY shrewdly directed the NWC's affairs, but much of the company's success was due to the élan of its officers and employees (*engagés*). WINTERING PARTNERS participated in decision making and enjoyed the profits of the trade. Unlike the HBC, the NWC permitted all ranks to take Indian wives *à la façon du pays*, a policy that resulted in a certain stability and a sizable MÉTIS population by the early 19th century. In 1789 Alexander MACKENZIE carried the company's flag to the Arctic Ocean, and in 1793 he reached the Pacific Ocean overland. Later explorers such as Simon FRASER and David THOMPSON opened up the fur lands west of the Rocky Mts. The signing of JAY'S TREATY in 1794 ended the southwest trade, and a new rival, the XY COMPANY, appeared in 1798. But the NWC met its challenge and in 1804 absorbed the upstart.

It was the revitalization of the HBC, beginning in 1810, that ultimately defeated the NWC. That year, the earl of SELKIRK's decision to establish a settlement in HBC territory led him to purchase sufficient stock to place 4 friends (2 of them kinsmen) on the HBC's 7-man governing committee. These men, new to the company, emphasized efficiency in the trading process as the means to reduce costs and turn from loss to profit. Success in this endeavour led the company to attempt to invade the Athabasca country in 1815. Poor planning by the expedition's leader and the NWC's influence with the Indians in the region caused as many as 15 men to die of starvation. But the HBC, undaunted, returned a few months later and successfully challenged the NWC monopoly.

The governing committee gave Selkirk's RED RIVER COLONY assistance and co-operation, although officers in the region were unenthusiastic. The NWC saw the settlers as supporters of their newly revitalized commercial rival, and convinced the local Métis, who had settled the region earlier, that their lands were threatened. Commercial conflict erupted in violence when the colony's governor and some 20 other settlers and HBC servants died in the SEVEN OAKS INCIDENT on 19 June 1816; the Métis lost only one man. Such occurrences led the British government to demand that the competing fur companies resolve their differences. To this end the government passed legislation enabling it to offer an exclusive licence to trade for 21 years in those areas of British North America beyond settlement and outside Rupert's Land. In 1821 the 2 companies created the "Deed Poll," a document which outlined the terms of a coalition between them, detailed the sharing of the profits of the trade between the shareholders and individual officers in the field, and explained their relationship in the management of the trade. It was in this manner as well as in the sharing of profits that elements of the NWC survived in the new HBC, although what was a coalition in name became absorption by the HBC in fact when, in 1824, the board of management was eliminated. A majority of officers in the HBC after 1821 were former Nor'Westers.

Commercial agreements between 2 separate companies and the support given by government legislation and proclamation could not hide the NWC's defeat. The victorious HBC once again sought to increase its efficiency. Under the direction of Gov George SIMPSON, the "Little Emperor," the HBC achieved undreamed-of profits. But such profits required a constant monitoring of costs and a constant search for savings, as well as a policy of sharp competition with rivals in border areas. Through the company's policies and the actions of its personnel, the inhabitants of the old North-West had their initial exposure to the influence of changes wrought in Britain by the Industrial Revolution.

In monitoring the costs of the trade, Simpson clearly saw the importance of providing support to hunting and trapping Indians. In times of adversity the company offered medical services and sufficient supplies and provisions for the trapper and his family to survive. Yet in systematizing these services Simpson's policies led the Indians into an increasingly dependent relationship with the HBC. The Plains Indians, while the BUFFALO HUNT was still possible, could be independent of the company's services, but for others the new reality was increasingly economic dependence. Simpson's reforms, however, allowed HBC expansion along the Pacific coast, northward to the Arctic and into the interior of previously largely ignored Labrador. Such a vast fur domain attracted rivals.

Simpson's fundamental strategy was to meet competition in the frontier areas to preserve the trade of the interior. On the Pacific coast he reached an agreement with the Russian Fur Company permitting the HBC to pursue the maritime trade and successfully challenge the pre-eminence of the Americans. South and east of the Columbia R he encouraged expeditions to trap the region clean in a "scorched-earth" policy that left no animals to attract American "mountain men" or trappers. In the Great Lakes area he licensed small traders to carry competition to the territory of the American Fur Company, eventually causing it to abandon the field for an annual payment of £300. Farther east, the opponents were more difficult to dislodge. The KING'S POSTS, a series of posts N of the St Lawrence originally belonging to the French king, had been granted in 1822 to a Mr Goudie of Québec City, and along the Ottawa R lumbering provided bases for competition to arise. Yet the company vigorously pursued its competitors in all the frontier areas, sustaining its monopoly of the trade in Rupert's Land and in the licensed territories to the N and W. Even when, in the 1830s, silk replaced felt as the favoured raw material in the manufacture of hats and beaver lost its value as a staple fur, the company maintained a profitable trade emphasizing fancy fur. Settlement, not commercial rivals, finally successfully challenged the company.

West of the Rocky Mts, American settlers succeeded where their predecessors, the mountain men and the ships' captains, had failed. As a result of the OREGON TREATY of 1846 the HBC retreated N of the 49th parallel of latitude. To the E, at Red River, the HBC met the challenge of free traders by charging Guillaume Sayer and 3 other Métis in 1849 with violation of the HBC monopoly. Although the company won a legal victory in the courtroom, the community believed that the free traders had been exonerated. Henceforth the company would meet the free traders with the techniques of competition learned elsewhere in its domain to slow the assault on the fur resources to the W and N. In LOWER CANADA the company had acquired the lease for the King's Posts in 1832, but the northward march of lumbermen signalled the lessening importance of the fur trade in this region. Simpson countered brilliantly by making his company an important supplier of goods needed by the lumbermen.

When the geographical isolation of the West was breached in the 1840s, metropolitan institutions other than the fur interests became involved in opening the "Great Lone Land." Roman Catholic and Anglican missionaries who had appeared earlier now penetrated to the heart of the continent. They were followed by adventurers and government expeditions (eg, the PALLISER EXPEDITION) seeking resources other than fur. Simpson's death in 1860 and the sale in 1863 of the HBC to the International Financial Society, a British investment group that saw settlement as a source of profits, marked the beginning of the end of the historic fur trade. In 1870 the HBC's vast territory in the West was transferred to Canada, and what had been a trickle of settlers coming from Ontario became a flood. As settlement spread N and W, the HBC and rival free traders intensified the northward push of the trade, and eventually established enduring trading contacts with the Inuit.

In the face of competition and the presence of the Canadian government, the HBC reduced the support services that had been a part of its trading relationship with the Indians and had buffered the Indians against the swings of fur-market demands in western Europe. In the 20th century, fortunes in the fur trade came to reflect the swings of the market and the advent of FUR FARMING (*see* FUR INDUSTRY). Increasingly the Indians looked to the missions and even more to the government for support in times of adversity. This shift culminated in the granting of FAMILY ALLOWANCE, schooling and pensions after WWII, and marked the end of the historic fur trade. FUR TRAPPING continues as a cash crop in frontier areas, but as a way of life it is isolated to a few northern areas.

Historically, however, the fur trade played a formative role in the creation of Canada. It provided the motive for the exploration of much of the country and remained the economic foundation for western Canada until about 1870. The fur trade also determined the relatively peaceful patterns of Indian-white relations in Canada. A central social aspect of this economic enterprise was extensive intermarriage between traders and native women, which gave rise to an indig-

enous fur-trade society that blended Indian and European customs and attitudes. JOHN FOSTER

Reading: W J. Eccles, *The Canadian Frontier 1524-1760* (rev ed, 1983) and *Canadian Society During the French Regime* 1968); D. Francis, *Battle for the West* (1982); C. Gilman, *Where Two Worlds Meet* (1982); R. Glover, "Introduction" in E E. Rich, ed, *Andrew Graham's Observations on Hudson's Bay 1767-91* (1969); H. Innis, *The Fur Trade in Canada* (1930); G L. Nute, *The Voyageur* (1931); A.J. Ray, *Indians in the Fur Trade* (1974); E E. Rich, *The Fur Trade and the Northwest to 1857* (1967); Sylvia Van Kirk, *"Many Tender Ties"* (1980).

Fur Trade Routes Throughout the period of the historical fur trade, water routes were the natural "highways," and canoes (later boats — principally York boats) the vehicles. The placement of trading posts depended on the presence of numbers of Indians willing and able to trade, and on the ease of transportation to and from them. In the Atlantic region, the absence of a dominant river system resulted in only a localized traffic in furs; but the French tapped a vastly greater potential via the St Lawrence R and its tributaries. At posts at Tadoussac, Québec and Montréal they received furs from the Montagnais, Algonquin, Huron and Ottawa, who travelled various rivers from the King's Domain, or came down the Ottawa R from Lk Timiskaming and beyond. But most important to the later trade was the route the French themselves developed to the west via the St Lawrence, Ottawa and French rivers; by the 1740s they had extended it to the head of Lk Superior and thence to the prairies. After the Conquest of 1759-60 this route was adopted by anglophone independent traders and then by the NWC. From Kaministiquia (later FT WILLIAM) the route inland began at GRAND PORTAGE and twisted N and W through a series of streams, rivers and lakes marked by over 50 tortuous portages. From Lk Winnipeg the traders headed W via the 2 branches of the Saskatchewan R; many went





NW via Methye Portage [PORTAGE LA LOCHE] to Lk Athabasca.

The other major route was that of the London-based HBC through Hudson Bay. When that company began to move inland in 1774, with the construction of CUMBERLAND HOUSE on the Saskatchewan, most of its traffic inland was by the Hayes R from York Factory. In the direct competition that ensued between the HBC and other traders, the rivals paced one another westward across the prairies. Evèntually the routes proceeded via the Howse, Athabasca and Yellowhead passes through the Rocky Mts and down the Columbia R to the Pacific region. After 1814 HBC ships rounded Cape Horn to service Pacific posts by sea. As the more southerly trade declined, traders moved down the Mackenzie R into the western Arctic and from the East Main (E coast of Hudson Bay) inland. Access to Ft Chimo and to posts in Labrador was generally by sea. After the merger of the NWC and HBC in 1821, shipments through Montréal virtually ceased. JAMES A. OGILVY

Fur Trapping The FUR INDUSTRY is the oldest land-based industry in Canada. The fur resource is renewable and, after centuries of harvesting, Canada has maintained the stability of (and, in some cases, increased) its furbearer populations, which include BADGER, BEAVER, BOBCAT, COUGAR, COYOTE, ermine, FISHER, FOX, LYNX, MARTEN, MINK, OTTER, RACCOON, SKUNK, SQUIRREL, WOLF and WOLVERINE. In addition, BEARS are considered game animals in most provinces and are taken by hunters. There are no endangered furbearers in Canada; however, furbearer populations are sensitive to alterations in their habitat. Extensive clear-cutting leaves no home for squirrels, which means that marten, next up the food chain, lose the mainstay of their diet. Filling in marshland destroys the habitat of beaver, MUSKRAT and other furbearers. Loss of aquatic life in lakes and streams through the effects of ACID RAIN eventually eliminates mink and otter populations.

The primary producer of the furbearer resource is the trapper. Provincial and territorial governments impose controls on trapping, which include establishing various categories of licence (registered, resident or private land, farmer, zoned fur block, helper, native band trapline), setting quotas, establishing seasons during which hunting is permitted and granting export permits. Not all agencies have identical systems, but all Canadian trappers are licensed and fur shipped from each province or territory requires an export permit.

Fur management by provincial governments provides a data base allowing scientific control of seasons and harvesting. Ontario is the largest fur-producing province, followed by Québec and Alberta. Because 92% of Ontario's land is provincially owned, the province has a highly developed fur-management program. It has 2850 registered traplines, each assigned to one trapper who, depending on the size and location of the line, may have one or several assistants who are also licensed to trap. Most furbearer species harvested on registered traplines are controlled by quotas based on estimated populations. Because habitats produce only enough food for limited populations, the registered crown land trapper is required to produce 75% of the quota or forfeit his licence to trap. Beaver, in particular, can devastate food resources so that it will be many years before an area can support a family of beaver again.

The fur industry is big business in Canada, providing an economic and social base in every province and territory. It employs people living in areas where jobs are scarce and provides relief to landowners troubled by damage caused by "nuisance" furbearers. Wild furbearer meat is estimated to be worth millions of dollars and its nutritional value is considerable. Beaver, especially, is high in protein and low in cholesterol and is readily available to people without access to supermarkets. Muskrat, lynx and raccoon are also eaten.

The value of Canadian wild furbearer pelts sold in the 1980-81 season was over $72 million. More than 500 000 beaver pelts accounted for nearly $16.5 million of this total; over 2.1 million muskrat pelts contributed nearly $14 million. Major export markets for Canadian furs are Western European countries, but Far Eastern markets are growing steadily.

During the 1970s and 1980s, trapping techniques and equipment have become more efficient and humane as a result of public concern. Several new devices have been tested in the laboratory and, to a limited degree, in the field. Most ideas for innovations come from active trappers. Education in fur harvesting and handling is mandatory in BC and Ontario before a first-time trapper can obtain a licence. Other provinces are also active in trapper education and Alberta, in particular, has an excellent program. Many veteran trappers take courses and workshops to upgrade their skills.

The location and positioning of a trap is called a set. There are 3 kinds: blind, bait and curiosity sets. A blind set uses a trap placed in an area which the animal frequents so that it will encounter the trap or snare during its usual travels. A bait set uses food to lure the animal; the bait might be a fresh poplar stick (for beaver) or beaver meat (for fisher). A curiosity set uses scent as an attractant. Beaver castor mixed with oil from the beaver's oil sac, used in open water, will bring a beaver of a different colony or family to investigate, intent on challenging the outsider and maintaining its territorial rights. Lures made of synthetic ingredients or natural parts or substances, eg, fox bladder, urine and foot pads, allowed to age, will attract other foxes.

Methods of harvest include use of foothold or body-gripping traps, foot or neck snares, deadfalls and box or live traps. Deadfalls, constructed on a set location not to be moved, were one of the first methods of trapping animals. The snare was another early tool of the trapper. Until the development of the foothold trap, much of the fur was taken by hunting. The invention of the foothold trap is credited to New York State trapper Sewell Newhouse in 1823. Since that time there have been thousands of variations in size, style and manufacture. The foothold trap is the only one that will successfully hold a large animal without damage to the fur. It is also versatile, being readily adaptable to humane sets for aquatic furbearers. While body-gripping traps (eg, the Conibear, invented by BC trapper Frank Conibear in the 1950s) have been very successful for some species, the foothold trap is still the only type consistently successful in capturing canids (ie, fox, wolf, coyote). Increasing sales of new traps, such as the Conibear (used for beaver, raccoon, marten, fisher, muskrat and mink) show that Canadian trappers are willing to improve skills and use humane equipment and methods.

Since 1911, when Russia, the US, England, Japan and Canada signed the Pelagic Treaty to control the slaughter of Alaska fur SEALS, fur trapping has been under government regulation. Every Canadian province and territory controls trapping seasons and the size of the catch to conserve fur and control disease. Royalties are collected provincially and a great deal of biological research has been done since 1927.

Today's trapper is a small businessman who must operate efficiently and profitably to stay in business. Not all the estimated 80 000 Canadian trappers are totally dependent on trapping income, but many are and they contribute to the Canadian economy both directly, through royalty payments on fur that is collected in many provinces, and indirectly through a positive effect on Canada's balance of payments.

The majority of Canadian wild fur is sold at fur auctions, such as those held at the HUDSON'S BAY CO in Rexdale, Ont, and the Ontario Trappers Association Fur Sales Service in North Bay, Ont. Both sales offer fur from all areas of N America. In the sliding economy of 1981-82, some of the average and high prices attained at the OTA auctions were fisher ($182.21, $201), Ont/Qué beaver ($23.76, $91), western beaver ($18.84, $66), mink ($27.28, $77), marten ($32.08, $135), muskrat ($4.90, $12.30). Canada is recognized as the producer of the finest wild fur in the world, a fact attributable to our climate, habitat and the expertise of Canadian trappers. *See* FUR FARMING; SEALING; FUR TRADE.

ROGER BETZ

Furniture, Country In studies of antiques or material history, "country" (ie, traditional, provincial or folk) styles are contrasted with stylized or formal ones. What one individual calls country and admires perhaps for its decoration or painted finish, another may reject as crude and primitive. Although some may expect formal furniture to be constructed of finer hardwoods (eg, walnut, cherry, mahogany) and country furniture of softwood (eg, pine), an understanding of the difference between country and formal furniture goes beyond methods and mediums of construction, forcing consideration of other factors, including where and when the furniture was produced. Country furniture is probably best understood as material produced after or similar to the mainstream of influences or period styles (eg, Chippendale, Hepplewhite, Sheraton), using local woods and influenced by the limitations of the cabinetmaker's tool chest, imagination and level of workmanship. Country furniture includes all types found in formal furniture (eg, tables, chairs, cupboards, chests) as well as additional forms.

Maritime Provinces

Settlement in the Maritimes (comprising NS, NB and PEI) was essentially a rural experience. Although port cities, such as Halifax and Saint John, were important as political, social and economic centres, most people lived in small farming and fishing communities. Because of distances, lack of adequate roads and unreliable methods of transportation and communication, contact between the regions was limited and rural areas were isolated from urban centres and mainstreams of fashion and taste.

After the expulsion of the ACADIANS (1755-63), the first influx of immigrants began with the arrival of the PLANTERS from New England, followed by the LOYALISTS in 1783-84 and a substantial Scottish migration in the early 19th century. Although many of these settlers brought or imported their domestic furnishings, the migration included cabinetmakers, carpenters and joiners whose arrival and settlement quickly led to the establishment and production of indigenous Maritime-Canadian furniture, based on English and American styles familiar to the craftsman. Because cabinetmaking was essentially a conservative craft, based on an established APPRENTICESHIP system, and because furniture styles have a tendency to persist over long periods of time, the country furniture produced in the Maritime provinces from about 1770 to 1850 reflected the continuation of earlier styles such as Chippendale. Only in cities, which were open to the influx of new fashions, would one expect furniture styles to attempt to keep pace with new developments and trends in taste. The rural character of Maritime society also influenced the choice of construction materials. Except in urban centres, particularly port cities, where exotic woods (eg, mahogany) were available to local craftsmen, most furniture was constructed of immediately available woods (eg,

pine, birch, maple). Figured hardwoods (eg, birch, maple) were commonly used in both formal and country furniture because of their decorative grain. Country furniture (particularly that produced in pine) was often painted to represent more formal furnishings in exotic wood. In some cases, these painted finishes, which are often very vibrant and colourful, are the most important distinguishing feature of country furniture.

French (Acadian), English, Irish, Scottish and German influences are evident in the country furniture styles of the Maritimes. All ethnic groups used similar types of domestic furnishings, including blanket boxes, chests of drawers, tables of various sizes with and without drawers, chairs with and without arms, and corner and flat-to-the-wall cupboards. Not all groups, however, are represented in all 3 provinces, and some groups lavished more attention and detail on certain types of furniture than on others.

Prince Edward Island The flat-to-the-wall kitchen cupboard, usually with an open top, seems to have been the focal point of furnishings of Scottish and Irish homes during the 19th century. Although most of these cupboards were made by unknown craftsmen, PEI is rich in examples of furniture signed or in some way identified by its makers. Such cabinet and chair makers include Benjamin Chappell, a wheelwright from London who arrived in 1774, and Samuel Bagnall, a Loyalist who arrived from Philadelphia in 1787. Both are well known for their chairs, examples of which exist in public and private collections.

New Brunswick is also rich in furniture by known makers, particularly in Saint John, which was the most important centre of cabinetmaking. Known cabinetmakers working before 1800 include Robert Chillas, who arrived from New York in 1783; Daniel Fowler, who settled in 1785; Nathan Oaks and Robert Blackwood, who took out Freeman papers in 1795 and 1796, respectively.

Nova Scotia Like Saint John, Halifax was an important centre of cabinetmaking. NS saw the largest immigration of "Foreign Protestants" in the Maritimes. Lunenburg was settled by German-speaking immigrants in 1753. Although the initial migration numbered only about 2000, the Germans gave LUNENBURG county a distinctive tradition and culture which still survives. One of the early Lunenburg town furniture makers, listed in 1794 as a turner and wheelwright, was Casper Jung, who later anglicized his name to Young. In Halifax many signed examples of Windsor chairs are known by such makers as James Cole (about 1817), who came to Halifax from the US; George Gammon (about 1838), who worked in Cole Harbour, Halifax County; and Joy Humeston (about 1805), who made Windsor-style bamboo chairs and settees in Halifax. The Sibley family of Colchester County made other types of furniture but their chair, with its distinctive, shaped back slats and mushroom finials, is best known. Beginning with Joseph Sibley (born 1790), who was known locally as the "chair maker," the Sibleys continued in operation until 1900.

Of the Maritime provinces, NB and NS saw the largest influx of French-Acadian immigrants, beginning with the establishment of PORT-ROYAL in 1604. Expulsion of these Acadians was accompanied by the confiscation or destruction of such of their belongings as they could not carry with them. Therefore, much of the furniture identified today as "Acadian" actually dates from the post-expulsion period when, beginning in 1764, the French-Acadians returned to the region.

By the middle of the 19th century the craft tradition of furniture manufacture was rapidly being replaced by mechanization and factory production. Although in certain rural areas, such as parts of PEI, earlier furniture styles persisted well into the late 19th century, the cabinetmaking-apprenticeship tradition slowly disappeared as the Maritimes moved into the industrial age.

RICHARD HENNING FIELD



Rope bed and cradle (*courtesy Metropolitan Toronto and Region Conservation Authority/Black Creek Pioneer Village*).

Newfoundland

No furniture is known from Newfoundland which can be dated earlier than 1810-20, when restrictions on land granting were lifted and local development encouraged. The first British-trained cabinetmakers, Mark Green and George Hancock, arrived in St John's in 1815 to serve its growing population. Samuel Creed came from Halifax about 1833 and his surviving work suggests a conservative approach to current furniture styles. The fact that W. Gammon produced Windsor chairs in both Halifax and St John's, and that similar comb-back Windsors are found both in NS and Newfoundland, suggests an early, strong craft connection in the Atlantic region.

Although some cabinetmakers worked in major outports such as Harbour Grace, most were in St John's, the economic and political capital. That city had 6 cabinetmakers in the 1840s, 10 in the 1870s. Matthew Pope's furniture factory, opened in 1859, was one of a number that produced household and institutional furniture. What is known of the work of these individuals and factories suggests that their work was not imaginative; they were content to copy pattern-book styles to the limit of their abilities and equipment. There were exceptions, for example, H.W. Winter's workshop at Clarke's Beach, Conception Bay.

Real imagination can be found in outport furniture, whether homemade or made by a local carpenter. In such pieces as washstands and benches the whole repertoire of decorative treatments, eg, chip carving, applied motifs, spindles, chamfers, mouldings and arches, was exploited in inventive combinations augmented by strong colours in the paintwork. Where a particular skill was required, eg, with chairs requiring joinery, conservatism crept in. Old styles survived and new ones were adapted to the limitations of the craftsman and his tools. A form of chair generally considered 17th century, the Carver chair, was made until the end of the 19th century. Sheraton chairs are not uncommon (Chippendale are rare) but never have the turned leg (which requires a lathe) associated with the style; rather, they have the square-tapered Hepplewhite leg, which was easier to make. Similarly, because of the difficulty of producing them, no chairs with the Hepplewhite shield-back or Victorian balloon-back are found. This interaction of professionalism and conservatism can also be found in kitchen dressers of the 1810-20 period. These pieces were probably the work of housewrights, because they were generally part of the whole architectural treatment of the kitchen. Because the housewrights were not constructing for themselves, they could not indulge their imaginations and had to construct something which spoke of the owner's standing in the community, a situation which inspired conservatism.

At the end of the 19th century, the appearance of factory-made furniture, the availability of mail-order catalogues (the ordinary man's pattern book) and the more widespread use of woodworking equipment had their first effect on outport furniture. Chairs and settees in what must be called "Catalogue Style," with thin frames and applied decoration, replaced an earlier factory form, Eastlake, with machine-gouged decoration. Furniture imitating these forms is generally found outside St John's, where it was difficult to get "bought" furniture. It has an element of expediency, making use as it did of salvaged wood from packing cases or houses as well as of whole elements (eg, legs) from discarded furniture. Such curious combinations reflect an economy that neither encouraged nor allowed waste.

Because of Newfoundland's location on the periphery of N America and its marginal economy, the island's furniture, like many of its other CRAFTS, never entered the mainstream of the other Atlantic nations. As a consequence, Newfoundland retained earlier forms and construction techniques but applied to those forms a range of decorative treatments that speak of a strong and vigorous visual imagination.

SHANE O'DEA

Ontario

The phrase "country furniture" aptly describes most surviving antique Ontario furniture, held privately and in museum collections. Settlement began after the American Revolution and intensified during the 19th century. In those first years, the pressures of pioneering life ensured that most families had little time or money for high-style furniture, let alone access to it. Ontario country furniture was fashioned of native woods (eg, walnut, maple, cherry, birch, oak, basswood, pine), by hand, usually with some skill. It can be divided into 3 categories: copies of high-style furniture of British and American derivation; furniture with form and decoration of French, German and other European ethnic origin; and sturdy utilitarian furniture that was

used almost universally in town and country and in the less important rooms of city homes. All of the Georgian, Empire and Victorian styles were reproduced, alone or in combination, with varying degrees of success. Ontario cherry and figured maple provided excellent substitutes for imported mahogany and satinwood. Stain and paint were employed to simulate costly woods, veneers, inlay and carving, when cost or lack of skill or tools forbade such embellishments. Especially during the early years, cabinetmakers were more likely to use hardware (ie, hinges, handles, etc) that was readily available rather than what matched the style of the furniture. Decorative motifs such as the German 6-sided star and French diamond-shaped panels sometimes were used on country furniture that was British or American in form and style. Relatively few tools were needed to construct utilitarian furniture so it could be undertaken by most carpenters as well as joiners and cabinetmakers. Dual-purpose, space-saving forms included a chair with a back that could be lowered to form a table top, and a bench with a seat that unfolded to produce a full bed.

Country chairs fall into 3 groups: slat-backs, Windsors and Fancy chairs. Slat-back chairs had 4 turned legs, the rear ones extended and joined by several slats at the top to form a ladder back. A variation, the banister-back, had 2 slats, pierced by several vertical spindles. Woven ash splints or elm bark formed the seats. The Windsor, a chair of English derivation, was constructed like a stool with a back attached to the seat. Such chairs were named according to either the style or the shape of the back, eg, Sheraton, loop- or bow-back, arrow-back, low-back or Captain's, comb-back, spindle-back, short spindle-back or chicken coop, and gunstock. Slat-backs and Windsors were made as side chairs, armchairs and rockers; most were painted. Fancy chairs were side chairs with back, seat and leg patterns derived, at least in part, from Georgian and Victorian styles. Decorative, figured wood often was used; the seats were made of cane or rush. Many Windsors and Fancy chairs also were produced in early Ontario furniture factories.

The high, heavy, four-post, rope-spring bedstead and its accompanying trundle bed were succeeded by a lower, lighter spool-turned bed with slats. Hired-man cots, with spool-turned ends, became country settees when spooled or solid backs were added. Tables and stands of all sizes and for all purposes had tops that tilted, lifted, pivoted or were detachable, and leaves that could be dropped, drawn out or detached. Country schoolmaster desks with slanted lift tops might be attached to or detachable from a long- or short-legged frame below and a postmaster cupboard with pigeonholes above. Drop-front desks were composed of a cupboard front that dropped to form a writing surface, supported by a table or a lower cupboard. Country cupboards of one or 2 pieces, with glazed, solid, or no doors, some having a pie shelf sandwiched between the upper and lower parts, were built into corners or walls or were free standing. They were made in many sizes and shapes for storage of food or dishes and as dry sinks. Linen presses and wardrobes were constructed with fixed parts or, for ease of relocation, detachable ones. Most cupboards were painted or stained dark. Lift-top box chests, the earliest and best made of 6 dovetailed boards, were numerous and were even incorporated into the top part of early chests of drawers.

ELIZABETH INGOLFSRUD

Manitoba — Red River

With the arrival of the SELKIRK settlers in 1812 and the subsequent construction of permanent establishments by the HUDSON'S BAY COMPANY (HBC) and NORTH WEST COMPANY (NWC), domestic residences and a tradition of country furniture were introduced in the Red River Valley. From the outset, the geographic isolation of the RED RIVER COLONY and the logistic difficulties inherent in transport worked against the importation of furniture. Furniture sent out by the London-based HBC had to be transported by the annual ship to YORK FACTORY, transferred to the YORK BOAT brigades and carried the 1300 km inland to Red R. Aside from company officers, who imported fine furniture, employees were limited to the quantity of household goods they could transport in small wooden trunks or cassettes. The early settlers in Red R confronted these transportation difficulties by producing their own furniture on a modest scale. Settlers and company personnel who had the tools fashioned tables, chairs (eg, the Red River chair, a sturdy pine chair with a plank seat), storage chests and beds that put utility and structure ahead of ornament. Consequently, furnishings in even the centrally located fur-trade posts at Red R were characterized by simplicity, even austerity. Because the Red R community was primarily French, Scottish and English in cultural antecedents, no single, distinctive furniture tradition emerged.

Examples of surviving country furniture (chairs, chests, cradles, sofas, sideboards) are housed in private collections or museums and historic parks such as St-Boniface Museum or LOWER FORT GARRY. The principal woods used were oak, pine and ash, which were readily available in the area. After frames were carefully cut and fitted, joints were firmly fastened by wooden dowels, varying in diameter from 1/4" (about 0.5 cm) in the HBC "board room" chairs to ½" (about 1 cm) in beds and sofas. Generally, the furniture was left in its natural state until the 1870s, when many pieces were stained, waxed and ornamented with carvings of flowers or other designs. By the 1860s improvements in transportation through the St Paul route and the arrival of professional cabinetmakers spelled the decline of country-made furniture in the Red River Valley.

GREGORY THOMAS

Furniture, English, Scottish and American

It is a common misconception that early Canadian furniture consists only of pieces (eg, chairs, tables) roughly hewn from pine. In fact, much "fine" or formal furniture intended for the drawing room, parlor, dining room, etc, was made, following European models, by craftsmen well-versed in their craft. ENGLISH, Scottish (*see* SCOTS) and LOYALIST influences are apparent in much surviving Canadian-made furniture, in specific details and characteristics unique to particular areas.

Georgian Period

During the earliest period of English settlement in Canada (in NS from 1713 to 1783) domestic furnishings were either imported or homemade. A few cabinetmakers, notably Edward Draper, are recorded as working in Halifax after 1749. No known Canadian-made furniture survives from this period. The loyalists, who arrived in 1783-84, comprised the first substantial English-language population and were followed by an influx of Scottish settlers. Both groups included a great variety of specialized craftsmen, cabinetmakers among them.

The earliest known English Canadian formal or stylized furniture dates from about 1785 and follows then fashionable English styles. The so-called Chippendale style, in vogue in England until the 1780s, was followed by the Hepplewhite, Sheraton, classical-revival and regency forms into the early 19th century. While the cabinetmakers produced what their markets demanded, they were also products of their conservative training. As in most CRAFTS, training in cabinetmaking was through the APPRENTICESHIP system, so that cabinetmakers had a strong tendency to build furniture in the same styles and the same manner as had their teachers and masters. Changes in style and fashion most rapidly affected the larger cities. In outlying areas, particular styles in furniture, notably the Chippendale, were produced long after their periods of actual fashion had ended (*see* FURNITURE, COUNTRY). One notable craftsman, James Waddell of Truro, NS, made Chippendale chairs as late as 1825. Canadian furniture also includes examples of "throwback" pieces, ie, items produced from observation or memory in styles long out of fashion. Although derived from English forms, Canadian-made formal furniture was far simpler. It was also relatively unornamented, compared to its English or American colonial counterparts; inlay work and carving were rare.



This style of chair, with a Sheraton-style back, Chippendale arms and tapered legs, was common in the Scottish settlements of eastern Ontario (*courtesy National Museums of Canada/National Museum of Man*).

The earliest centres of sophisticated cabinetmaking and production were Halifax and Montréal. Many examples of Chippendale furniture of the 1780s and 1790s survive from these centres. Montréal furniture of the late 18th and 19th centuries was, by all accounts, the finest produced. Some Montréal examples are well veneered with exotic woods and include complex inlaid stringing and banding. Halifax furniture was far simpler. Although Québec was a smaller city than Montréal, specialized cabinetmakers were in operation there as early as the 1780s, producing very fine work. Most notable perhaps are clock cases by the Loyalist James Orkney. The Bellerose brothers, who operated in Trois-Rivières before 1800, are also known for fine clock cases. Cabinetmaking in NB developed somewhat later, in Saint John and the Saint John R valley. No NB furniture predating 1800 is known, nor has any NB Chippendale furniture been found; all pieces are in the later styles of the early 19th century. In UPPER CANADA in the first generation of settlement, furnishings also seem to have been imported or homemade. A few cabinetmakers are known to have operated before 1800, but again no formal furniture survives which can definitely be dated to before 1800.

While Canadian formal furniture can generally be identified as Canadian and often be ascribed to a particular region, it can rarely be attributed to a specific maker. Before the industrial period of the 1840s and 1850s, very few



American Empire sofa (*courtesy Metropolitan Toronto and Region Conservation Authority/Black Creek Pioneer Village*).

cabinetmakers marked or labelled their furniture. Before 1825 only 3 cabinetmakers are known to have used paper labels: the firm of Tulles, Pallister and McDonald of Halifax (1810-11); Daniel Green of Saint John, NB (before 1820); and Thomas Nisbet of Saint John (1813-48). Occasional pencil or ink markings are found but are often the signatures of owners rather than of makers.

Imported West Indian mahogany was the favoured cabinet wood, as in Britain and the US. Mahogany logs were relatively inexpensive to transport by sea, as ballast cargo. Mahogany was available, however, only to cabinetmakers in port cities: Halifax, Amherst, Saint John, Québec City, Trois Rivières and Montréal. Transporting the heavy wood overland was so impractical that cabinetmakers even slightly removed from the ports depended instead on native woods. In the Maritimes, birch, stained to a dark colour and known as "poor man's mahogany," was a widely used cabinet wood. In simple inlays, or segments such as drawer fronts, birch was often mixed with maple. In Québec butternut and maple were quite widely used in areas where mahogany was not available. Upper Canada, inaccessible to imports of mahogany until about 1830, depended for finer furniture on cherry, walnut and figured maple. The secondary or structural wood of virtually all Canadian furniture was pine, although exteriors were made of hardwoods. Mahogany was the only imported wood available before about 1810. Especially after the WAR OF 1812, satinwood and rosewood began to appear in Canadian furniture, usually in small segments and as veneers or inlays. Except for simple iron hinges, all hardware (ie, drawer pulls, casters and small knobs, typically of brass) was imported. As well as typically being of mixed woods, Canadian stylized furniture is often of mixed styles: characteristics of 2 or more design forms are often evident in a single piece of furniture.

With the coming of CANALS, steamships and finally RAILWAYS, the increasing mobility of people led to an increasing homogenization of style and design forms. Identifiable regional characteristics began to disappear slowly by 1830 and were entirely gone by 1860. New technologies also had an impact on the style and craft of cabinetmaking. The development of the circular saw after 1820, followed by the veneer mill in the 1830s, made veneers far less expensive to use than had been the case in the earlier period of hand carving. The screw-thread lathe led, in the 1820s, to a fashion for round, rope-turned legs on tables and case pieces. Again, these details were inexpensive because of mechanical production. Elaborate carving machines followed, making possible the decorative excesses of the Victorian period.

Beginning in the 1830s, furniture styles were increasingly adapted for component manufacture by machinery. The growth of the factory system after the 1830s led to a complete homogenization of design throughout N America and, by the 1860s, to a decline in the craft of cabinetmaking. Although there were many changes of style and fashion in the mid-19th century, furniture itself more and more became the product of factories and mechanization, and less and less the product of individual skills. D.B. WEBSTER

Empire and Victorian Furniture

During the Empire and Victorian periods, furniture design largely abandoned the restrained geometry of Hepplewhite, Sheraton and Adam in favour of picturesque outlines and historical revivals more in keeping with the eclectic ARCHITECTURE of the time. In addition, factory production and new forms of woodworking machinery began to replace the traditional methods of the furniture craftsman.

Empire refers to styles which first gained popularity in France during the reign of the emperor Napoleon I, in the first 2 decades of the 19th century. This period corresponds roughly with the time of the English regency. Fashionable furniture of the time was inspired by ancient Roman, Greek and Egyptian designs, popularized through publications such as Thomas Hope's *Household Furniture and Interior Decoration* (1807). Classical styles continued to dominate through the 1830s and 1840s. In Canada, "Empire" sometimes is used to describe the later manifestations of this style, which tended to follow American precedents; "regency" is the preferred term for earlier work.

Chairs from this period often followed the Greek *klismos* form, with sabre-shaped legs and a broad crest rail (ie, horizontal member at the top of the back). Armchairs had scroll-curved arms left open below. Sofas also tended to have scrolled arms, upholstered and often fitted with cylindrical cushions where they met the seat. The scrolled arms of Empire sofas found their counterpart in the high, curved headboards and footboards of "French bedsteads" (now commonly called sleigh beds). Tables often were supported on heavy pedestals set on wide bases with scrolled feet. Case pieces (eg, chests of drawers, sideboards) often had overhanging top drawers with columnar supports. Mahogany veneer over pine was commonly used.

Victorian By the mid-19th century, a wide variety of styles was replacing the classically derived Empire. The Victorian period (1837-1901) first saw the development of the rococo-revival or "modern French" style, which brought a return to rounded curves and naturalistic carving. The balloon-back side chair with its rounded open back and cabriole (S-shaped) legs was popular. The introduction of coil springs and factory-made upholstery materials in plush and horsehair brought a new era of comfort. Almost all lines were rounded; frames and cases were ornamented with carving in the forms of fruit, leaves and flowers.

At the same time, Gothic-revival furniture was coming into vogue, making use of architectural elements such as pointed arches, finials (eg, decorative knobs) and tracery. It was deemed most suitable for the library or entrance hall, where Gothic-revival chairs and benches often were the only unupholstered seating furniture in the house. "Elizabethan" was another popular mid-century style, although its characteristic ball or spool turnings had little to do with what actually had been used during the reign of Elizabeth I. All of these styles and their variants could be found in such popular handbooks as A.J. Downing's *The Architecture of Country Houses* (1850) or Blackie and Son's *The Victorian Cabinet Maker's Assistant* (1855).

By the late 1860s, some began to question the widespread use of revival styles, applied ornament and the trend toward factory production. In 1868, the English designer C.L. Eastlake published *Hints on Household Taste in Furniture, Upholstery and Other Details,* which advocated what he believed to be a return to simple, sturdy craftsmanship. The furniture he illustrated was invariably solid and geometrical in outline, eschewing the rounded curves of the rococo revival. It was ornamented with incised decoration in geometrical patterns, simple turnings and pierced decoration. Details of construction often were made visible through exposed pegs and joints. Eastlake's ideas found their counterparts in the Arts and Crafts Movement and the development of "mission" furniture. Much to the chagrin of the reformers, however, factories began taking up the name "Eastlake" and applying it to mass-produced furniture of simple, squarish outline. The Victorian period saw the introduction of a wide range of woodworking machinery which, combined with the development of steam power, the growth of markets and improved transportation, brought an end to the small, independent craftsman's shop.

Among the largest Canadian furniture factories was that of Jacques and Hay in Toronto, which produced such large quantities of furniture (from school desks to parlour suites) that often all Canadian Victorian furniture is erroneously called "Jacques and Hay." Proximity to the US also influenced furniture making in Canada. From an early date, Canadians purchased furniture, at both wholesale and retail levels, from American suppliers.

Thomas Nisbet table, *c*1830, from Saint John, NB (*courtesy Royal Ontario Museum*).



Interest in revival styles continued to dominate the furniture trade. Among the most influential by the 1870s was the renaissance-revival style, characterized by the use of bold cornices, pediments and pilasters, high-relief carving, classical anthemia (ie, floral or foliated ornaments) and a multitude of finials and drops. Bedsteads, sideboards and dressing bureaus with attached plate glass mirrors grew to astonishing heights. Marble tops became increasingly popular. Chair and sofa frames took on an often spiked, attenuated look; legs often were tapered, with either turned or panelled decoration.

The last years of Victoria's reign saw revivals of nearly every preceding style. Reproductions might be faithful to the original form or creative revivals influenced by the sinuous curves and sometimes bizarre shapes of art nouveau. The use of upholstery reached its height, often covering the frame entirely with several types or colours of fabric and ended on a tasselled fringe. New materials became popular, particularly wicker, iron, brass and bentwood. Oak replaced black walnut as the preferred wood for most furniture. Mail-order houses such as T. EATON COMPANY offered to ship furniture anywhere by rail.

W. JOHN MCINTYRE

Reading: H. Dobson and B. Dobson, *The Early Furniture of Ontario and the Atlantic Provinces* (1974); H. Pain, *The Heritage of Upper Canadian Furniture* (1978).



Late 18th-century serpentine fronted Québec commode, made of butternut in the Louis XV rococo style (*courtesy Royal Ontario Museum*).

Furniture, French Canadian furniture of French derivation was made between 1650 and 1820. It is of the traditional or regional type, ie, made of solid, jointed wood. This furniture was distinct from the grand style that emanated from the French court but was influenced by it, borrowing technical and artistic features, while retaining a peasant flavour. Some furniture was made by unskilled hands for a family's own use; most was made by skilled carpenters, who had come from France to meet the demands for churches, dwellings and furniture for the agricultural society that had replaced that of the fur traders. These men were artisans trained in the rigorous traditions of French *menuisiers*, ie, joiners. They were not *ébénistes*, cabinetmakers, whose specialty was marquetry and veneer. In the towns and villages of NEW FRANCE, professional woodworkers had their own shops, but sometimes worked directly in churches and dwellings where a particular piece was to be installed. There were also itinerant woodworkers who roamed the countryside and often spent weeks at a time making an armoire for a family, a convent or a seigneur.

The design and details of this furniture reflect regional origins from many French provinces, mainly Normandy, Picardy, Île de France, Brittany, Poitou, Aunis and Saintonge. The carved decorations particular to these regions are distinguished by traditional folk motifs: stylized flowers, leaves, rosettes, trees, stars and crosses of every kind of the Haute Bretagne; chip-carved circles, discs, lozenges, shells and hearts of the Loire Atlantique; in fact, whatever might spring from a pair of compasses and ruler or be drawn freehand. With time, these motifs became less varied than in Europe, until they evolved into entirely indigenous designs.

As in the French provinces, styles evolved slowly and period influences showed in furniture made long after the historical eras for which they were named. Between 1650 and 1750, the predominant inspiration was the Henry IV and Louis XIII style, featuring rectilinear lines and geometrical ornamentation with broad surfaces, pediments, multiple panels, lozenges, high and low diamond points and wood turnings with chamfered (ie, beveled) cubes or in a spiral twist. The flowing lines, graceful shapes and often asymmetrical decoration of the *régence* and Louis XV styles appeared between 1740 and 1760 and became very popular. In New France, as in the country districts of France, the heavily ornate Louis XIV styles had little impact. Whatever the period, there was no ormolu, marble or veneer, and little lacquer or marquetry; however, the furniture was liberally ornamented, particularly after 1785, both in the shaping of integral parts (eg, door panels, rails, aprons, legs, rungs) and with increasingly profuse and ebullient surface carving. The woodworkers were less inhibited than their counterparts in France; embellishment beyond the traditional motifs appeared earlier and sometimes included features never seen in France.

The *Rocaille* style, reminiscent of 18th-century gardens, flourished in the Louis XV period and was the last direct influence from France. Its principal motif was crosiered branches entwining leaves, flowers and shells. After the SEVEN YEARS' WAR, this style exerted a powerful influence on the traditional furniture of French Canada, which reached its peak of refinement in technique and design between 1785 and 1820. In this period, features of English and American designs began to appear in combination with the traditional French features, sometimes with harmonious effect, sometimes without.

Mid-18th-century diamond-point armoire from Notre-Dame-du-Bon-Conseil, Qué. This armoire was likely intended to hold a rich trousseau (*courtesy National Museums of Canada/National Museum of Man*).



The woods available or appropriate for furniture were unfamiliar to the early immigrant craftsmen. White pine, butternut and yellow birch, none of which was known in France, were the most widely used between 1650 and 1750. White and sugar maple were at first used as firewood and considered too difficult to work, but became popular at the end of the 18th century, particularly if the grain was wavy or curly. Ash and basswood were little used until the mid-19th century. Imported mahogany was introduced with English and American styles. Between 1650 and 1750, most furniture was stained a dark maroon, but after that period, almost all was painted, using powdered colours mixed with glue, linseed oil or skimmed milk, to seal the wood against dirt and grease. The colours were chiefly blue, green, pale or dark blue-green and white (tinted with yellow ochre or red ochre, very popular between 1785 and 1820). Iron and brass escutcheons, latches, handles, drawer pulls and fische hinges, often artistically designed, were made locally, usually on French patterns. The rattail or devil-tail hinge may have been adopted from England or New England, but was also current in Lorraine and Alsace.

Chests, the earliest and most basic form of storage, were of 2 types, flat topped (*coffres*) or dome topped (*bahuts*). They are simple, sturdy and generally made of pine, with corner posts and tongue-and-groove boards, the mortice-and-tenon joints secured with dowels. There may be panelling or geometric decoration. The lids are attached with strong hinges and close at the front with heavy locks, for everything was kept under lock and key.

Armoires and Buffets evolved naturally from the chest. Buffets, for storing food and dishes, were often 2 tiered, like 2 chests, one on top of the other, with doors instead of horizontal lids. Armoires, vertically extended buffets, are the most interesting of all rural furniture, for they lend themselves to the widest variety of style and decoration. They may have 1, 2 or 4 doors, most commonly 2 doors. Louis XIII designs (eg, lozenge panels) are typical in the early period. These motifs were followed but not entirely supplanted by Louis XV styles (eg, diamond

points). Between 1785 and 1820, shaped and carved decoration of *rocaille* and every other inspiration abounded. Such decoration was particularly exuberant in the Montréal region, where most of the prosperous merchants lived. Elements of English design, notably of Adam inspiration, were sometimes pleasingly blended with French designs. All armoires were assembled with mortice-and-tenon joints, without glue. Large pieces could therefore be dismantled for moving. Variations include dressers, glazed buffets and corner cupboards. Food lockers with ventilation to keep food fresh tend to be primitive, as are bucket benches and most dough boxes.

Commodes In Canada the commode, which also evolved from the chest, was rare in 1750 but rapidly gained popularity. It was found mostly in the homes of the rich but also in rural houses. The early models were sturdy pieces with 3 or 4 drawers. Later, there were more refined models with rounded corners and shaped fronts, the most popular being the *arbalète* (crossbow) style, a serpentine outline with a recessed, flat plane in the centre. The corner uprights of these commodes were cut from a single massive piece of wood; the drawer fronts, from immensely thick boards shaped only on the outside. The inside was left flat, contrary to the practice in France. The drawers were assembled with a huge dovetail on each side, as in France, and secured by a large, hand-forged nail. The feet are often of Louis XV cabriole style; however, after 1775, a popular design was the claw-and-ball foot of Chippendale inspiration. A very popular example of melded French and English design is the *arbalète* front combined with the claw-and-ball feet. Canadian commodes were always smaller than their French counterparts.

Beds in the early period were designed for privacy and protection from draughts. The *cabane* was a closed wooden box, lined with woolen cloth and with a straw mattress laid on planks. Four-poster beds with spiraled, turned or tapered columns were hung with curtains. In the early 19th century, as larger stoves were introduced, curtains were abandoned, the posts became shorter, and eventually spindle beds and sleigh beds appeared, as did folding and movable beds.

Tables usually have pine tops and hardwood legs and stretchers which, in fine pieces of the early period, are turned in the Louis XIII manner, often with finials (ie, decorative knobs). Many later pieces have cabriole legs. Aprons are often shaped and carved, and many have a drawer. Half-moon tables were common, but console tables were found only in churches and wealthy homes.

Desks were owned by the elite. The most common type was the slat-top *secrétaire*, although the earliest in existence is a knee-hole desk in the Louis XIII manner.

Chairs with backs were rare in the 17th- and 18th-century peasant homes in France, but were quite common in New France. The distinctive Ile d'Orléans chair, jointed and usually with an open-frame back, was found in every house in the region of Ile d'Orléans and Côte de Beaupré and was inspired by the Lorraine chair in France. Chairs termed "à-la-capucine" were found everywhere. They have high backs, straight or turned legs and shaped, ladder-back rails, doweled firmly into the uprights. Armchairs appeared in the latter part of the 17th century in Louis XIII styles, often upholstered. With the popular "os-de-mouton" armchair of the 18th century, graceful curves succeeded the earlier straight lines. Many other armchairs demonstrate originality and inventiveness. Chair seats were made of twisted straw or marsh grass woven in a diamond-point pattern; plaited elm bark woven in a basket-weave pattern; or rawhide, popular in the Montréal region. Upholstery was covered in serge, tapestry, needlepoint, painted linen or moquette (a woolen pile fabric); cushions were widely used on chairs, attached by ribbons. The rocking chair came to Canada in the 19th century through American chairmakers and won instant popularity. French Canadian woodworkers created an infinite variety and decorated them with motifs of every inspiration.



Québec pine armoire, in Burgundian style, late 18th or early 19th century (*courtesy Royal Ontario Museum*).

These were the last innovations to enrich Canadian furniture of French derivation. After the 1820s, furniture in French styles soon ceased to be made. The thread of tradition and aesthetics was lost with the last generation of woodworkers trained in the French tradition, and the heritage was forgotten. It was brought to light about 1925 by a few discerning collectors, but was not generally recognized until after WWII.

JEAN PALARDY

Furniture, German Furniture of Germanic derivation occurs in Canada as a result of immigration from Germany and from Pennsylvania (*see* GERMANS). Traditional German furniture in Europe evolved over several centuries to serve the needs of ordinary, primarily rural, people. The basic forms changed little through the years, although stylistic influences were adopted from fashionable furniture designs from time to time. The most important of these influences and, in fact, the dominant style of traditional German furniture in the 18th and 19th centuries was the baroque style, which inspired the complex intersecting curves in the design profiles and a profusion of decorative elements in surface treatment.

Traditional German furniture makers were excellent craftsmen, and even the most commonplace objects were carefully made, with well-fitted dovetail joints, crisp moldings, neat cutouts and pleasing proportions. The more ambitious and formal examples display excellent carving and inlay work. There were numerous centres of German settlement in early Canada, where skilled immigrant craftsmen made furniture in the traditional styles of the homeland. In NS, Germans arrived as early as 1750, and throughout the 19th century, thousands came to Ontario from the continent and from Pennsylvania. As the Prairie provinces developed, groups of MENNONITES and HUTTERITES found refuge there. The German settlements included members with a wide range of traditional skills; thus, the old traditions survived in many centres with little influence from the outside. Germanic furniture made in Canada includes a range of traditional forms which reflect several centuries of style and many regional characteristics. These traditional elements may be seen in combination with ideas adopted from the English-speaking community, especially in Pennsylvania-German furniture made in Ontario. The Pennsylvania Germans brought a furniture tradition which had been substantially altered as a result of their American experience. In particular, they had adopted the English Chippendale style in more formal furniture forms such as writing desks, chests of drawers and tall case clocks. Continental styles were retained in tables, benches, storage chests, cradles and other utilitarian furnishings. Similarly, the traditional German styles occurred, with various modifying influences, in other Canadian centres until mass-produced furniture largely replaced that of the local craftsman in the early 20th century. The most common forms in the German tradition are storage chests, tables, benches, chairs, cradles, beds, dish dressers, cupboards and *schrank*.

Storage Chests are, typically, simple rectangular forms. They may be plain or enriched by panels, moldings or turned details arranged in a geometric design. The base is sometimes intricately shaped or the chest might sit on bulbous turned feet.

Tables The most common design in dining tables was the sawbuck type, which has X-shaped trestles and a central stretcher supporting the tabletop. Most German country tables have a shaped cleat under the tabletop at each end, through which wooden pins are inserted to secure the top to the base; the top can be easily removed for cleaning.

Benches, the traditional seating form at these tables, were of simple plank construction on shaped trestles. The most popular type of chair was also of plank construction, with a shaped, often carved, back. The seat is a solid plank; the simple legs, inserted into cleats under the seat, lack the stretchers (to strengthen the chair base) found in many country chair designs.

Beds and Cradles are often of panelled construction, or the profiles may be a complex arrangement of intersecting curves. Many Ger-

Dry sink, common in Pennsylvania German homes in Upper Canada during the early 19th century and until much later periods (*courtesy Metropolitan Toronto and Region Conservation Authority/Black Creek Pioneer Village*).



man cradles feature distinctive heart-shaped cutouts at the head and foot, decorative elements that also serve as handles.

Dish Dressers with open shelves above and drawers and doors below were popular in country kitchens; wall cupboards and corner cupboards with glazed doors were used in the better rooms, particularly in urban houses. The recurring baroque influence is often apparent in these pieces in the complex curves and arches in the design of cornices and door panels.

Schrank, a large storage cupboard or wardrobe, is the most important form in the German furniture tradition and provided the craftsman with an opportunity to display his finest skills in creating elaborate panels, moldings and various surface treatments. The traditional schrank had 2 large doors, possibly 2 or more drawers below and different interior arrangements of hangers, shelves or drawers for storing clothing, linens, utensils, food or other household items. Because of its great size, the schrank was usually made in sections which could be separated for moving. Those used in the kitchen for food (*milchschrank*) have open grillwork in the doors for ventilation.

An attractive aspect of German traditional furniture, and further evidence of the baroque influence, is the extensive use of surface decoration employing various motifs including flowers, leaves, birds, stars, whorls, hearts and geometric designs, as well as names and dates in a calligraphic style. Often, the decoration commemorates a family event such as a wedding, anniversary or birth. These decorations may be painted in different polychrome techniques, carved into the surface or inlaid in contrasting wood tones. Furniture with painted decoration was usually made of softwood (eg, pine); inlaid or carved pieces were fashioned in hardwoods and were likely to be more sophisticated in style and execution. *See* GERMANIC FRAKTUR.

HOWARD PAIN

Furniture and Fixture Industry Canadian furniture originated with the first settlers and consisted of simple, handmade, utilitarian products. Later, local carpenters made furniture for others. The first Canadian furniture company was established in Berlin [Kitchener], Ont, in 1830; the next, in Toronto in 1834. The industry developed considerably in the last half of the 19th century, mainly in Ontario. There were a few factories in Québec before 1900, but the industry, particularly in the medium to low price ranges, developed there primarily after WWII. Furniture is considered, in economic terms, an "elastic commodity," ie, very sensitive to economic changes. This sensitivity was obvious in the 1930s, when production fell by two-thirds between 1930 and 1933. In 1980 shipments totaled $2.2 billion, of which 54% was produced in Ontario, 32% in Québec, 9% in the Prairie provinces, 4% in BC and 1% in the Atlantic provinces.

Today the Canadian furniture industry is divided into 3 subsectors: household furniture, office furniture and miscellaneous furniture (ie, for restaurants, churches, schools, etc, and box springs and mattresses). The industry operates at 3 levels (manufacturers, distributors, retailers). Manufacturers transform raw materials into finished products. Distributors are agents or sales representatives who sell the finished product to the retailer. Because few manufacturers have large enough sales volumes in a region to justify full-time sales staff, sales representatives are usually free-lance agents representing several product lines. Retailers sell furniture to consumers.

The Modern Industry

The Canadian furniture industry is 95% Canadian owned and consists mainly of small or medium-sized family-owned and -operated firms. Automation strongly affected the industry in the early 1970s and was partly responsible for the decline in employment at that time. A small percentage of the industry's production remains at the "craftsman" stage. The industry employs nearly 50 000 people, with a total payroll of more than $650 million. Work-force numbers include nearly 40 000 production workers, 357 working owners and clerical and administrative employees. The average wage for production workers was about $6.20 an hour in 1980. The industry is largely unionized, particularly in the case-goods (ie, wooden) subsector.

In 1980 there were 1461 furniture plants in Canada: 607 in Ontario, 568 in Québec, 141 in the Prairie provinces, 113 in BC and 32 in the Atlantic provinces. Nearly 50% of the major manufacturers are located in rural areas. In 1980 the industry consumed over $1 billion in supplies and materials (ie, nearly 50% of the value of Canadian furniture sales) and some $24 million in fuel and electricity. Raw materials included wood in all forms (over 30% of materials used in furniture manufacturing), furniture frames, rubber and plastics, textiles, plastified fabrics, steel and metal, paints, lacquers, sealers and varnishes, and miscellaneous materials (eg, mirrors, packaging, hardware).

In 1980 factory shipments of furniture and fixtures totaled $2.2 billion: the household sector accounted for $1.2 billion; office sector, $394 million; miscellaneous furniture, $611 million. The type of production varies among regions. Québec accounts for almost 50% of case-goods production; Ontario produces much upholstered and office furniture. Exports in 1980 totaled $223 million, 25% more than in 1979; imports totaled $282.4 million, 3.2% more than in 1979. Canada's furniture exports, which have increased greatly in the past decade, have almost reached the level of imports and may well surpass imports before the end of the decade. The household-furniture subsector accounts for about 75% of imports and 25% of exports. Canada's total furniture production in 1980 accounted for 0.74% of the Canadian GROSS NATIONAL PRODUCT.

The industry is affected by federal pollution-control legislation. Air pollution from paint and lacquer fumes is the most frequently cited environmental problem. Safety-related legislation has been passed on mattress flammability, light fixtures and children's furniture (eg, lead content in paint, sharp edges).

The industry has received federal and provincial aid (eg, for expansion programs, development of microprocessor data, industrial renewal, energy conservation, market development), but none of these measures are specific to the furniture industry. At present only Québec has a specific furniture program: between 1980 and 1983, some $8 million was invested to encourage innovation.

The last GENERAL AGREEMENT ON TARIFFS AND TRADE called for a progressive reduction in tariffs on furniture imported from the US: from 20% in 1980 to 15% in 1987 for household furniture; from 17.5% to 12.5% for office and metal furniture.

The Canadian furniture industry often finds it difficult to compete with other countries. Labour costs are much higher than in most competing countries — particularly the US, the source of most furniture imports. Canadian companies also have high transportation costs: it has been estimated that in 1978 Canadian furniture transportation costs exceeded US costs by as much as 40%. Because of the decreasing value of the Canadian dollar, imports to Canada of certain raw materials (eg, textiles, exotic woods) have increased dramatically. Finally, Canada's mostly small- and medium-sized companies have difficulty competing with American firms that have a much larger production capacity and thus can achieve economies of scale.

Two colleges offer courses on furniture production: l'École québécoise du meuble et du bois ouvré in Victoriaville, and Conestoga College in Ontario. Several colleges and universities offer courses or programs in INDUSTRIAL DESIGN and some in woodworking. There are 3 industry associations: the Québec Furniture Manufacturers' Assn Inc (Québec and the Maritimes); the Ontario Furniture Manufacturers' Assn Inc (Ont); Furniture West Inc (Prairie provinces and BC). These trade associations have formed the Canadian Council of Furniture Manufacturers to represent the interests of the industry nationally. There are 4 major Canadian furniture trade magazines: *Canada's Furniture Magazine* (Victor Publishing Co Ltd) and *Home Goods Retailing* (MACLEAN HUNTER LTD) for household furnishings; *Canada's Contract Magazine* (Victor Publishing Co Ltd) and *Canadian Interiors* (Maclean Hunter Ltd) for office and contract furnishings.

LISE BUISSON

Fytche, Maria Amelia, teacher, novelist (b at Saint John 1844; d there 1926). Fytche is one of several late 19-century Canadian women novelists, such as Sara Jeannette DUNCAN and M. Marshall SAUNDERS, who dealt seriously with the women's question. In her novel *Kerchiefs to Hunt Souls* (1895) in which her heroine sells her successful Maritime school for girls to pursue romance in Europe, Fytche studies critically women's education, homes, work and emancipation. Although the novel subscribes to many of the tenets of contemporary popular romantic literature, it offers some convincingly realistic characters and scenes that compellingly portray the working woman. Fytche also wrote a historical romance, *The Rival Forts; or The Velvet Siege of Beausèjour* (1907) and contributed short fiction and drama to periodicals. CARRIE H. MACMILLAN

Gaboury, Étienne-Joseph, architect (b at Swan Lake, Man 24 Apr 1930). Gaboury's strong links to the prairie landscape and the Franco-Manitobain community of his youth are reflected in his architecture. He was educated at St Boniface Coll, U Man (B Arch, 1958) and the École des Beaux-Arts, Paris (where the late work of Le Corbusier influenced him strongly). After apprenticing in Manitoba, Gaboury formed a partnership with Denis Lussier and Frank Sigurdson, and from 1976 was principal of his own firm. An important early building was the 1967 Église du Precieux Sang, St Boniface, a strikingly mystical church notable for its double helix of glu-lam beams spiralling above the altar. Gaboury has worked in a variety of other idioms, including the high-tech Royal Canadian Mint near Winnipeg (1978) and the hybrid Canadian-Mexican regionalism of the Canadian Embassy in Mexico City (1982). Gaboury's designs are linked by a concern with landscape, texture and cultural identity, and the manipulation and celebration of sunlight. T. BODDY

Gage, Thomas, army officer (b in Eng 1719 or 1720; d at London, Eng 2 Apr 1787). He served during the SEVEN YEARS' WAR in N America from 1755 and was present during several of the operations preceding the CONQUEST in 1760. He was then installed as military governor of Montréal, where, like fellow governors James MURRAY and Ralph BURTON, he attempted to reconcile the Canadians to British rule by retaining existing customs as much as possible and by introducing useful innovations such as his use of captains of militia in the administration of justice. In 1763 Gage replaced Jeffery AMHERST as commander-in-chief at New York City, where he was primarily concerned with growing tensions in the Thirteen Colonies. In 1774 he also became governor of Massachusetts, but his initial optimism faded as he recognized the strength of opposition to British policies. His increasingly gloomy reports caused his recall soon after the outbreak of hostilities in 1775. STUART R.J. SUTHERLAND

Gagetown, NB, Village, pop 618 (1981c), is situated on Gagetown Creek, near its confluence with the SAINT JOHN R and Jemseg R. English settlement began soon after Robert Monckton's expedition cleared the French from the lower Saint John Valley in 1758. By the time the LOYALISTS arrived in 1783 Grimross, as it was then known, had a population of some 200. It was laid out in grid pattern as a possible site for the provincial capital, but Gov Carleton chose St Anne's [Fredericton] and Gagetown became the shiretown of Queens County. During the 19th century it was the most important centre between Fredericton and SAINT JOHN and a prosperous farming and lumbering community. The establishment of GAGETOWN CFB after WWII stripped the village of its hinterland, and the abolition of county government in the 1960s deprived it of its importance as the shiretown. Although the village now lacks an important industry, it remains a viable community. JAMES K. CHAPMAN

Gagetown CFB functions primarily as the combat-training centre for the Canadian Army and comprises 111 000 ha between Fredericton and Saint John, NB, west of the Saint John R. Named after a nearby town, it is roughly egg shaped, with the permanent campsite at the northern tip. About 3000 soldiers are posted at the base, but the number of additional, temporary postings for combined arms (infantry, armour, artillery, air support) combat training varies greatly. The base was constructed in the early 1950s when Canada's NATO commitments required a location large enough for training an entire division. The federal government chose this site partly to provide needed economic stimulus to central NB and because fewer than 3000 people would be displaced in expropriating the land. Militarily it offered nearness to an all-



weather Atlantic port and a varied terrain — including open lands similar to northern Europe, swamps and dense forest, and high hills at the southern end. American and British forces have also used the base. BILL SMITH

Gagnon, André, pianist, composer, conductor, arranger (b at St-Pacôme-de-Kamouraska, Qué 2 Aug 1939). Despite the eclecticism of his compositions and interpretations, Gagnon has created for himself an easily identifiable style, a mixture of light and classical music. He studied with Léon Destroismaisons (theory), Germaine Malépart (piano), Clermont PÉPIN (composition) and, in Paris, with Yvonne Loriod (piano). Early in his career, he worked as accompanist, conductor or arranger for such artists as Claude LÉVEILLÉE, Pauline JULIEN, Renée CLAUDE and Monique LEYRAC. After 1969 he concentrated on composition, arrangements and his career as a soloist. He won Juno awards for his records *Saga* (1974) and *Neiges* (1975) and as best instrumentalist (1977). In 1979 his record *Le Saint-Laurent* was chosen the best instrumental record of the year during the ADISQ gala. HÉLÈNE PLOUFFE

Gagnon, Charles, painter, photographer, filmmaker (b at Montréal 23 May 1934). He spent the years 1955-60 in New York studying, painting in an abstract expressionist style, and photographing neglected or abandoned parts of the city. He returned to Montréal in 1960. He made his first films in the mid-1960s and has continued to work in a range of media. He undertook a large commission for the Christian Pavilion at EXPO 67, as well as a mural for the Lester B. Pearson Building in Ottawa. The latter, titled *Screenspace,* is a text painting based on the late prime minister's writings. DAVID BURNETT

Reading: Philip Fry, *Charles Gagnon* (1978).

Gagnon, Clarence, engraver, painter (b at Montréal 8 Nov 1881; d there 5 Jan 1942). After studying at the École du Plateau in Montréal, he received his artistic training from the painter William BRYMNER at the Art Assn of Montréal 1897-1900. The generosity of art patron James Morgan allowed him to go to Paris and study in the studio of painter Jean-Paul Laurens. Gagnon distinguished himself early in his career by the quality of his engravings, and won a gold medal at the St Louis Exhibition in 1904 and an honourable mention the following year at the Salon des artistes français in Paris. Returning to Canada 1909, he divided his time between Montréal and Baie-St-Paul. He became a member of the Royal Soc of Canada, and later was elected associate of the Royal Canadian Academy of Arts and, in 1923, received the Trevor Prize of the Salmagundi Club of New York. He illustrated *Le Grand Silence blanc* 1929 and Louis Hémon's *Maria Chapdelaine* 1933. Upon his return from a second stay in France, 1922-36, U de Montréal awarded him an honorary doctorate. Soon after his death the Musée du Québec, the Musée des beaux-arts in Montréal, the Art Gallery of Toronto and the National Gallery of Canada organized a major retrospective of his works. In 1974 Canada Post reproduced one of his works as a stamp. MICHEL CHAMPAGNE

Gagnon, Ernest, folklorist, organist (b Frédéric-Ernest-Amédée at Rivière-du-Loup [Louiseville], Qué 7 Nov 1834; d at Québec City 15 Sept 1915). Member of a prominent Québec City musical family, Gagnon is most noted for his work as a collector of French Canadian FOLK MUSIC. His song transcriptions, published 1865-67 as *Chansons populaires du Canada,* not only helped conserve a rich heritage, but alerted the musical world to the dignity and beauty of Québec's oral song tradition. Gagnon was also an expert plainsong accompanist and virtuoso organist at St-Jean-Baptiste Church 1853-64 and at the Québec Basilica 1864-76. BARCLAY MCMILLAN

Galaxy Stars are not distributed uniformly throughout the universe but are usually found in giant aggregations, known as galaxies, that are classified, according to their shapes, as spiral, elliptical or irregular. Earth's own galaxy is a large and probably typical spiral. Its most obvious component is an immense, flat rotating system of stars estimated to be about 100 000 light-years (some 10^{18} km) across.

Serious attempts to estimate the size of the Galaxy began in the 19th century. The early pioneers failed to appreciate its true immensity, partly because they did not recognize the existence of dust and gas between the stars, which absorb starlight on its way to Earth and prevent us from seeing the farthest reaches of our own galaxy. The application of photography to ASTRONOMY made it possible to accumulate data about apparent changes in the relative positions of stars (ie, proper motions) much more rapidly, and SPECTROSCOPY enabled astronomers to study velocities of stars along the line of sight (radial velocities). Thus, it became possible to study not only the structure of the Galaxy but also its dynamics.

A classic study was made by J.S. PLASKETT and J.A. PEARCE at the Dominion Astrophysical Observatory, Victoria. The results, published in 1935, gave the best available idea of the size, structure and rotation of the Galaxy until the advent of radio astronomy after WWII (*see* OBSERVATORY). The explosive development of astronomical knowledge in the last 2 decades inevitably led to revisions. This study also helped astronomer C.S. BEALS to develop greater understanding of interstellar matter.

There are estimated to be about 100 million galaxies in the observable universe. Many are powerful emitters of radio waves and study of their emissions has increased our knowledge of the universe. Most powerful and puzzling of all are the quasars, now generally believed to be very distant extragalactic objects, but the real nature of which is not yet understood.

Galbraith, John Kenneth, economist, writer (b at Iona Station, Ont, 15 Oct 1908). Having graduated from Ontario Agricultural Coll in 1931, Galbraith received a doctorate in agricultural economics at U of Calif, Berkeley. Most of his active life was spent in connection with Harvard, where postdoctoral work at Cambridge, Eng, had fitted him to replace Robert BRYCE as resident Keynesian. An activist liberal, Galbraith was personal adviser to every Democratic candidate for the US presidency from F.D. Roosevelt to L.B. Johnson and thus held a number of public positions including controller of prices in WWII and US ambassador to India (1961-63). He was active in Americans for Democratic Action, a group of eminent liberal intellectuals, particularly during its opposition to the Vietnam War.



John Kenneth Galbraith graduated from the Ontario Agricultural Coll in 1931 and went on to become one of the world's best-known economists. He wrote an entertaining account of his boyhood in southern Ontario (*courtesy Canapress*).

Galbraith's contribution to social science is an alternative concept of capitalism to that of established, neoclassical theory. In a number of books, including *American Capitalism* (1952), *The Affluent Society* (1958) and *The New Industrial State* (1967), he established a basis for liberal policy on the ideas of "countervailing power," "conventional wisdom," the "technostructure" and the institutional "convergence" of communist and capitalist systems. In 1956 he testified before the ROYAL COMMISSION ON CANADA'S ECONOMIC PROSPECTS and, at the request of CANADIAN PACIFIC, he watched over the production of R.E. Caves and R.H. Holton on *Canadian Economy: Prospect and Retrospect* (1959). *The Scotch*, Galbraith's entertaining account of his boyhood environment in southern Ontario, was published in 1964.

ROBIN F. NEILL

Reading: J.K. Galbraith, *A Life in Our Times* (1981).

Galiano Island, 5787 ha, pop 669 (1981c), is one of BC's GULF IS, named for Spanish navy commander Dionisio Galiano, who explored the area 1792. It has the driest climate of the islands. Shell middens at Montague Harbour suggest that SALISH have used the island for several thousand years. Settled by immigrants during the 1858 BC gold rush, the island became known as "Little England" because British families sent sons there to learn farming. Most settled at the S end; much of its narrow length was set aside for timber production. The island is now best known for its colony of writers, craftsmen and artists. PETER GRANT

Gallagher, John Patrick, "Jack", geologist, industrialist (b at Winnipeg 16 July 1916). After working as a student geologist in the NWT and graduating from University of Manitoba, he spent 11 years, starting 1938, as a petroleum geologist exploring for oil for Shell Oil, Standard Oil of New Jersey and Imperial Oil, in California, Egypt, S America and western Canada. In 1950 he established a firm that later became DOME PETROLEUM, with initial financing of $250 000 in equity and $7.7 million in loans, backed by Dome Mines and the endowment funds of several American universities. Dome made promising discoveries of oil at Drumheller and gas in the Provost field in Alberta, but Gallagher's real interest was in the Canadian Arctic, where, with its partners, Dome spent hundreds of millions of dollars drilling in the BEAUFORT SEA, finding several deposits of oil and gas that would, however, require billions of dollars to be brought into production. In the late 1970s Dome began unprecedented expansion and, after accumulating debts of some $7 billion, was forced to sell many of its assets. Gallagher resigned as chairman of the board and chief executive officer in 1983. EARLE GRAY

Gallant, Mavis Leslie, née Young, writer (b at Montréal 11 Aug 1922). An only child of mismatched parents, Gallant was raised virtually as an orphan and educated at 17 different schools in Canada and the US. At the age of 10, her father mysteriously died (suicide seems a strong likelihood), but Gallant was not informed even of his death for several years. Her mother made a hasty remarriage; Gallant did not like her new stepfather, so she was sent to live in the US. Gallant's father was most likely an Anglo-Scots remittance man, talentless in his chosen vocation as an artist. The "Montreal Stories" provide, in an almost documentary style, a complete and accurate account of an urban remittance man's life in Canada. She worked briefly at the National Film Board before becoming a feature writer for the *Montreal Standard* in 1944. While a journalist, she married Winnipeg musician John Gallant, but they soon divorced. Gallant began writing fiction in Canada, publishing 2 short stories in *Preview* (1944), one in the *Standard Magazine* (1946) and one in *Northern Review* (1950). But in 1950, determined to write fiction full time, she departed for Europe, finally settling in Paris, where she still resides. She has written a large body of nonfiction reviews and essays on French culture and society, including an introduction to *The Affair of Gabrielle Russier* (1971); in 1972, she began work on a chronicle of the Dreyfus case. Since 1951, she has published over 100 short stories in *The New Yorker;* many have been collected along with several novellas into *The Other Paris* (1956), *My Heart Is Broken* (1964), *The Pegnitz Junction* (1973), *The End of the World and Other Stories* (1974) and *From the Fifteenth District* (1979). Gallant focuses on exiles and expatriates, displaced from their cultural milieus through choice or circumstance; lacking a clear sense of direction, they eke out miserable lives in run-down European hotels and *pensions,* adrift as permanently lost tourists. In her 2 novels, *Green Water, Green Sky* (1959) and *A Fairly Good Time* (1970), similar patterns are evoked, with characters perpetually in transit. This prodigious output has long been curiously neglected in Canada but Gallant is finally gaining recognition here. In 1981, she was appointed an officer of the Order of Canada, and in 1982 Toronto's Tarragon Theatre premiered her first play, *What Is to Be Done?* In the same year, *Home Truths: Selected Canadian Stories* received the Gov Gen's Award. The collection of stories about young Canadians at home and abroad concludes with 6 linked, semiautobiographical "Montréal Stories." In this personal remembrance, Gallant portrays herself as a young woman and depicts life in Montréal. DONNA COATES

Reading: The entire issue of *Canadian Fiction Magazine* 28 (1978) is devoted to Gallant.

Gallicanism, primarily a theory about the proper relationship between church and state. In NEW FRANCE this relationship was governed by a web of traditions and usages that defined the status of the French church, both within the secular kingdom and within the universal church. Gallicanism's major characteristics included a certain defiance of the papacy, the defence of Gallic freedoms (which discounted the idea of absolute papal authority, in temporal or spiritual matters, over the French king and church), and the desire to ensure the Crown's full power even in the spiritual domain. After the CONQUEST, and especially in the 19th century, Gallicanism became a theory with 2 groups of supporters: those who did not believe in papal infallibility or saw no need to accept it as dogma; and those who halfheartedly accepted a degree of state intervention in traditionally church-controlled domains such as education, marriage, the development of parishes and the keeping of registries (baptisms, marriages and burials).

Gallicanism flourished in New France after 1660, when Intendant Jean TALON and Gov FRONTENAC sought to reduce overwhelming religious influence and make the church obey the state. A modus vivendi was quickly reached, guaranteeing a certain autonomy to the church while permitting some state intervention, even in such purely religious questions as the life of religious communities. However, after 1760, having assured its survival and won for itself a degree of freedom, Canadian CATHOLICISM rethought the division of religious and civil power. Two tendencies appeared after 1840. On the one hand, ULTRAMONTANES supported the supremacy of the church and its prior right in education, the legislation of marriage, and all joint domains. On the other, those who modified these claims to any degree or defended the rights of the state were called Gallicans — a title that included groups such as the Sulpicians; lawyers such as George-Étienne CARTIER, Rodolphe Laflamme and Joseph DOUTRE; and Université Laval professors such as Jacques Crémazie and Charles-François Langelier. Soon, however, extreme ultramontanes threw the epithet "Gallican" at anyone who did not think the way they did; Gallicanism as such existed to some degree but merged with Catholic liberalism, which was similarly denounced until the end of the 19th century. NIVE VOISINE

Gallinule, common name for some marsh-dwelling birds of the RAIL family (Rallidae), now also known as moorhens. Six genera, with around 14 species, occur worldwide. Several island-dwelling species are becoming rare. The common gallinule or common moorhen (*Gallinula chloropus*) breeds in a small area in southeastern Ontario and nearby Québec and has occurred in Manitoba. It resembles the COOT but has a bright red bill and forehead, green legs and lobeless toes. Like the coot, it pumps its head when swimming. Like coots, gallinules are often colonial; their nests are similar. The gallinule lays 9-12 buff eggs, spotted with dark brown. Common gallinules often betray their presence by loud, henlike cackling. The purple gallinule (*Porphyrula martinica*) breeds in southeastern US southward; occurrence in eastern Canada is only casual. E. KUYT

Galt, Ont, City, inc 1915, located on the Grand R 90 km W of Toronto. It was established around 1817 by William Dickson, a lawyer and merchant from Niagara-on-the-Lake. He engaged Absalom Shade, a Pennslyvanian Dutch carpenter, to build the townsite and mill and so it became known as Shade's Mill. In 1827 it was renamed Galt after John GALT, the Scottish novelist and colonizer who founded the CANADA CO. It was a centre of Scottish settlement in Upper Canada. The first macadamized road in UC linked it to Hamilton in 1837. The Grand R provided abundant water power and during the 19th century Galt was a significant manufacturing centre. In 1973 it formed part of the new city of CAMBRIDGE. DANIEL FRANCIS

Galt, Sir Alexander Tilloch, politician, promoter (b at London, Eng 6 Sept 1817; d at Montréal 19 Sept 1893). Galt emigrated to Canada in 1835 to work for the BRITISH AMERICAN LAND CO, which was opening land for settlement in Québec's Eastern Townships. As he rose in the company, Galt saw the advantages for the area of a railway link to the ocean (*see* RAILWAY HISTORY), and he became president of the ST LAWRENCE AND ATLANTIC RAILROAD in 1849. Galt was no excep-

tion to the rule that railway promoters — in search of state subsidies and bond guarantees — often entered politics, and he represented Sherbrooke in the legislature of the PROVINCE OF CANADA (1849-50, 1853-67). A Liberal, Galt voted against the REBELLION LOSSES BILL and supported the demand for ANNEXATION to the US (1849). In 1858 he introduced a resolution calling for a federal union of all the British N American colonies; he joined the reconstructed Cartier-Macdonald ministry DOUBLE-SHUFFLE that year as finance minister after being promised support for his union proposal. His revenue tariff of 1859, which provided "incidental" protection to Canadian manufacturers, aroused protest from British manufacturers, but Galt argued that without the right to set its own tariffs, a colony did not enjoy self-government. Galt, a member of the GREAT COALITION Cabinet, attended the QUÉBEC CONFERENCE in 1864 and was a Canadian delegate to England in 1865 and 1866. He resigned from the Cabinet in 1866 when he failed to obtain the education guarantees he had promised to Québec Protestants. After CONFEDERATION he joined the first federal Cabinet as minister of finance, but was forced to resign in Nov 1867 over the failure of the Commercial Bank of Kingston. He retired from Parliament in 1872, having opposed the Conservatives but being unwilling to support the Liberals. Galt was knighted for his services on the commission to settle the question of American payment for access to Canadian fisheries, as arranged by the TREATY OF WASHINGTON. He was the first high commissioner of Canada in London 1880-83, appointed to promote interest in financing Canadian railways, buying Canadian products, and emigration to the Canadian North-West. While in London, Galt furthered his own plans to develop coal fields that his son Elliott had discovered in southern Alberta while serving as assistant Indian commissioner. With the backing of London businessmen and federal land grants, Galt incorporated the Northwestern Coal and Navigation co, and began operations near Lethbridge. The successful business was sold to the CANADIAN PACIFIC RAILWAY in 1910. Truly, "the life of Alexander Galt is a history of Canada in the 19th century." MARGARET E. MCCALLUM

Galt, John, novelist, colonial promoter (b at Irvine, Scot 2 May 1779; d at Greenock, Scot 11 Apr 1839). While struggling to survive as a man of letters, Galt became involved with Canadian affairs, first as agent for those claiming losses in the WAR OF 1812, and subsequently (1824) as secretary of the board of directors of the CANADA CO. He came to Upper Canada on several occasions, remaining 1826-29 as company superintendent and founding the town of GUELPH in 1827; the town of Galt (now CAMBRIDGE) was named after him. He had continual conflict with the directors over policy and administration, was eventually recalled and spent his last years in impoverished ill health. Galt's best-known fiction deals mainly with Scottish life, and his writings, except for his *Autobiography* (1833) and *Literary Life* (1834), show only a limited influence of his Canadian involvements. Two of his novels embody his idea of emigrants best suited to the US (*Lawrie Todd,* 1830) and Canada (*Bogle Corbet,* 1831). J.M. BUMSTED

Gamache, Louis-Olivier, an inhabitant of Ile d'ANTICOSTI who had a far-reaching reputation as a man who sold his soul to the devil and had supernatural powers. He was referred to as a pirate and, when pursued, caused his ship to turn into a ball of fire and escaped. NANCY SCHMITZ

Gambling is the betting of something of value on the outcome of a contingency or event, the result of which is uncertain and may be determined by chance, skill, a combination of chance and skill, or a contest. Long before John Cabot's voyage to Canada in 1497, gambling was popular among native people. While many of the native games from the past are now recalled only as a part of cultural history, native people used gaming sticks for centuries before the arrival of the Europeans and the decks of playing cards they brought with them.



Interior of the remodelled Diamond Tooth Gertie's casino in Dawson, YT (*courtesy National Film Board/Photothèque*).

For the past century or so the most popular gambling games have been the card games of poker, stook and blackjack, and the dice games of craps and barbotte. During the KLONDIKE GOLD RUSH, the game of Faro, played with a regular deck of cards, was popular. The origins of Faro can be traced to the German game of "landsquenet," which was played as early as 1400. Faro was introduced by American gamblers in areas such as Dawson City in the Yukon, where fortunes were won and lost on the turn of a card. When the gold rush ended, so did the popularity of Faro in Canada, although its popularity has survived in the US. (The name has also survived in the name of the town of FARO, YT.)

Since its original enactment in 1892, the Canadian CRIMINAL CODE, following the English common law, has tolerated gambling under certain conditions. A 1910 amendment allowed pari-mutuel (from "Paris mutuel") betting. This form of betting, in which winners divide losers' stakes and a cut of the bet goes to the track, to the horsemen and the state, became the official and legal form of betting in France in 1894. The amendment also allowed occasional games of chance where profits were used for charitable or religious purposes. A few games were also permitted at agricultural fairs and exhibitions.

Gambling laws, although amended from time to time, remained relatively unchanged until 1970, when sweeping changes to the Criminal Code gave the provinces the authority to license and regulate gambling, with a few exceptions. Forms of gambling now licensed by the provinces include bingo, break-open pull tickets, raffles, and casino games consisting of blackjack, roulette and wheels of fortune. The revenues from the majority of licensed gaming activity in Canada must be used for charitable or religious purposes. The 1970 changes have resulted in the creation of a multi-billion-dollar gambling industry throughout Canada. The federal and provincial governments are now actively involved in operating LOTTERIES. A large number of charitable and religious groups have come to rely upon gaming revenues for annual budgetary obligations. AGRICULTURAL EXHIBITIONS and fairs derive substantial profits from gambling activity during annual celebrations. Parimutuel racetrack betting has long been and still is a popular pastime. In 1983 Canadians bet $1.67 billion at racetracks across Canada (*see* THOROUGHBRED RACING).

Sports betting, by far the most popular form of illegal gambling, generates large profits for the bookmakers, and is the largest source of gambling revenue of ORGANIZED CRIME. Illegal private gaming houses can be found in every major Canadian city. Swindlers, using a variety of cheating techniques, are common in gaming houses and are also active in legally operated private gambling establishments but almost never attract the attention of law enforcement. Illegal gambling is generally perceived as a "victimless crime" and is not one for which the police receive many complaints. Unlike other crimes, modern illegal gambling is tolerated, and there is no public pressure exerted to control it. Its existence and continual growth has seemingly had no effect on the legal gambling market. At the same time, liberalization of legal gambling activities since 1970 appears to have had no effect on illegal gambling.

During the past 80 years gambling in Canada has evolved from an activity socially tolerated only within narrow restraints to a broadly acceptable leisure-time activity. The social, legal and economic consequences of these activities have yet to be chronicled. R. RONALD SHEPPARD

Reading: W. Fadington, ed, *Gambling and Society* (1976); R. Herman, *Gamblers and Gambling* (1976); A. Waller, *The Gamblers* (1976).

Game Bird, any BIRD that is hunted, excluding WATERFOWL; 25 species now occur in Canada. Game birds are hunted because they are good to eat and are challenging to the hunter. Most are shot by walking hunters, who sometimes use pointing or retrieving dogs. Sandhill CRANES, band-tailed PIGEONS and mourning doves may be shot from blinds. The wild turkey (family Meleagrididae) disappeared from Ont around 1902 but has been reintroduced locally in Ont, Man and Alta. Eight members of the GROUSE family are found in Canada: spruce grouse in coniferous forest everywhere except Nfld and PEI; blue grouse in coniferous forest and savannah in Alta, BC, YT and southwestern NWT; sage grouse in southern Alta and Sask and formerly BC on sagebrush range; ruffed grouse everywhere in deciduous forests, introduced into Nfld; sharp-tailed grouse in open and brushy

habitat in muskeg and grassland W of the James Bay region, Qué; white-tailed PTARMIGAN in alpine areas of the West; rock ptarmigan in tundra and alpine habitats in BC, YT, NWT, Qué and Nfld; willow ptarmigan in tundra, shrub-tundra and alpine habitats in BC, YT, NWT, Man, Ont, Qué, Nfld and, in winter, in northern Alta and Sask. The greater prairie chicken, formerly found on the prairies and in Ont, has almost disappeared.

The only native PHEASANT is northern bobwhite, found in bushy and agricultural land in Ont. It has been introduced successfully to BC and unsuccessfully to Man and Alta. California and mountain quail, introduced to southern BC from the US, occupy wooded and brushy range. From Europe and Asia came the ring-necked pheasant and the gray (Hungarian) partridge, now established on agricultural land locally in all provinces but Nfld, and the chukar, established in the dry interior of BC and in southern Alta. The sandhill crane breeds on tundra and muskeg from Baffin I and the James Bay area of Qué to Siberia and locally on prairie. It migrates through western Ont, the prairies and BC. Of the RAIL family, the American coot (west of NB) and the common moorhen (southern Ont and Qué) are most commonly hunted in marshes. The smaller king rail (southern Ont) and Virginia and sora rails (all provinces) are rarely taken. The only members of the SANDPIPER family now hunted are the American WOODCOCK (from southern Man to Nfld) in woodland and the common SNIPE (throughout Canada) in marshland and wet pastures. Two members of the pigeon family are hunted: the band-tailed pigeon in forested western BC and the mourning dove, which occurs in agricultural land in all provinces except Nfld and PEI but is hunted only in certain provinces. Both species winter in the US. The once plentiful PASSENGER PIGEON is extinct.

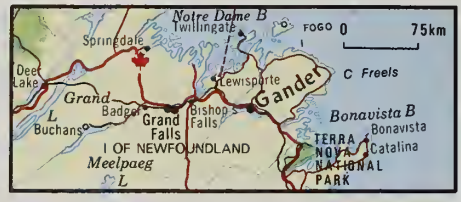
The harvest of game birds is controlled by bag limits and by length and timing of seasons. Not all species are legally hunted wherever they occur. Provinces and territories have the authority to set hunting regulations for turkey, grouse, pheasant, partridges and quail. These are considered nonmigratory, although some grouse populations may migrate long distances. The migratory game birds, including sandhill crane, American coot, common moorhen (gallinule), rails, American woodcock, common snipe, band-tailed pigeon and mourning dove, are regulated by the federal government under the Migratory Birds Convention Act (1917). The annual Canadian harvest of these birds probably exceeds 2.8 million. H.G. LUMSDEN

Gananoque, Ont, Town, pop 4863 (1981c), inc 1890, located at the confluence of the St Lawrence and Gananoque rivers, 29 km E of Kingston. Its name derives from an Indian word said to mean "rocks rising out of the water." The site was known in French times but was not surveyed until 1784. LOYALISTS John Johnson and Joel Stone were granted land in the area, but they quarrelled over the site. A compromise in 1789 gave Johnson the best land E of the Gananoque R, but Stone remained a resident, built a sawmill and with the McDonald family developed the site. It was raided by American forces under Benjamin Forsyth, Sept 1812. From the 1830s metal industries have been important. Now, as "Gateway to the Thousand Islands," it is a major tourist centre. There is a bridge to the US at nearby Ivy Lea. K.L. MORRISON

Reading: H.W. Hawke, *Historic Gananoque* (1974).

Gandalf Data Limited, *see* ELECTRONICS INDUSTRY.

Gander, Nfld, Town, pop 10 404 (1981c), inc 1954, is located on Gander Lake in east-central Newfoundland. Both the town and lake are named after the GANDER R. This fog-free site was



selected by the British and Canadian governments in 1935 to accommodate such flights as the regular transatlantic air service that had developed in the 1930s. By 1938 construction of what was then one of the world's largest airports had been completed and the community of Gander begun. During WWII Gander was a strategic link in the N American chain of defence, and in the RAF Transport Command's vital Atlantic FERRY COMMAND. The RCAF established a base here in 1940, which was also used by the USAF. The civilian use and enlargement of facilities after the war attracted a population of about 3000 by 1951, and by 1954 construction of a planned townsite began. Although Gander's importance as a refueling point has diminished, it has continued to attract many international flights, particularly from eastern Europe, and thus records many of the defections from communist countries that occur in Canada. Air Traffic Control (ATC) at Gander, the only oceanic unit in Canada, has jurisdiction over international and domestic airspace from W of Nfld to the mid-Atlantic and N to Greenland. In recent years the town has also become a major service centre for central Newfoundland.

JANET E.M. PITT AND ROBERT D. PITT

Gander River, 175 km long, drainage basin 6400 km^2, is the principal river of NE Newfoundland, emptying into Gander B. Named for its abundant geese, it rises in the central plateau and eventually falls 427 m to the Atlantic. The NW Gander flows 97 km into the W end of Gander Lk where it is joined by the 77 km long SW Gander R. The main river begins on the N side of the lake and twists NE 44 km to the sea. A waterway of the BEOTHUK, it has been fished for salmon by Europeans since 1725. It reaches into excellent stands of timber and has long been a route for lumbering. ROBERT D. PITT

Gannet, or northern gannet (*Morus bassanus*), large, long-winged SEABIRD, white except for conspicuous, black wing tips and yellowish tinged head. It weighs about 3100 g and is up to 100 cm long. Nine species of gannets and boobies comprise the predominantly tropical family Sulidae. All have a stout appearance, thick, sharply pointed bills, fairly short necks and legs, and wedge-shaped tails. They feed on fish caught by plunge-diving, often from heights of 20-30 m. Northern gannets are confined to the N Atlantic. They breed in dense colonies (6 in Canada) on steep sea cliffs or cliff tops, mainly on islands. Gannets first breed when 5-6 years old. Each pair produces a single, whitish egg. Incubation takes about 44 days and the chick is fed by its parent for about 90 days. Adults and immatures are common inshore in autumn, moving offshore in winter. About 70% of the N American population of 32 700 breeding pairs nest at 3 sites in the Gulf of St Lawrence; the remainder on the southeastern coast of Newfoundland. The largest colony, at Bonaventure I, Qué, is a federal migratory bird sanctuary and a provincial park. D.N. NETTLESHIP

The northern gannet (*Morus bassanus*) is confined to the N Atlantic region, where it breeds in dense colonies on steep sea cliffs or cliff tops, mainly on islands (*photo by Tim Fitzharris*).



Gar, large, slender, thick-scaled, predatory FISH of family Lepisosteidae, order Semionotiformes, class Osteichthyes. Gars are found in fresh waters of eastern N America, Central America and Cuba, occasionally in brackish water and, rarely, in the sea. The 7 living species are divided into 2 genera (*Lepisosteus* and *Atractosteus*) by some ichthyologists; others consider them all as *Lepisosteus*. In Canada, 2 species, the rare spotted gar (*L. oculatus*) and the more familiar longnose gar (*L. osseus*), reach their northern limit in the Great Lakes drainage basin. Gars are characterized by diamond-shaped scales and a long snout with needlelike teeth. The gas-bladder, cellular and richly supplied with blood vessels, acts as a lung, enabling gars to breath air in stagnant waters. Gars may reach 183 cm long and 22 years of age. They feed principally on other fishes, which they seize by a darting movement from cover of vegetation. A sideways swipe of the snout impales prey crosswise on their teeth. Gar flesh is edible but not attractive. The eggs are poisonous to mammals and birds. The importance of gars as predators of economically important fishes is uncertain, but large gars can destroy gear set for other fishes.

BRIAN W. COAD

Garant, Serge, composer, conductor, pianist, teacher, critic (b at Québec City 22 Sept 1929). A daring and innovative musician, Garant is known for his promotion of 20th-century music, especially that of Canada. He studied in Montréal with Yvonne Hubert (piano) and Claude CHAMPAGNE (composition), and in Paris with Olivier Messiaen and Andrée Vaurabourg-Honegger. Returning to Montréal, he worked in counterpoint with Jocelyne Binet, and later took summer courses with Boulez in Switzerland. By combining recording tapes and instruments in *Nucléogame* (1955) and by using the aleatory technique in his *Trois Pièces* for string quartet (1958), Garant introduced 2 innovative procedures into Canadian music. However, it was *Anerca,* created in 1961 by Mauricio Kagel, that gained him recognition as a leading Canadian musician.

Garant has worked for CBC Radio as an arranger, accompanist, conductor and critic. He is also musical director of the Société de musique contemporaine du Québec, copresident of the national committee of the Société internationale pour la musique contemporaine and a professor at U de M. He was awarded the Canadian Music Council Medal (1971), the Harold Moon trophy from the Performing Rights Organization of Canada Ltd (1978) and the 1979 Prix de musique Calixa-Lavallée. HÉLÈNE PLOUFFE

Garapick, Nancy Ellen, swimmer (b at Halifax, NS 24 Sept 1961). Although proficient in backstroke, butterfly, freestyle and individual medley, she enjoyed possibly her greatest success in the backstroke, setting a world record of 2:16.33 for the 200 m (1975) and a Canadian and Olympic mark of 1:03.28 for the 100 m (1976). Displaying her skills throughout the world with Canada's national aquatic team, Garapick collected an impressive array of honours and records. She represented Canada in the 1976 Montréal Olympics, claiming 2 bronze medals, and was named to the Canadian team for the boycotted 1980 Moscow Olympics. At age 14, in 1975, she was named Canada's female athlete of the year. BOB FERGUSON

Garbage, *see* SOLID WASTE; WASTE DISPOSAL.

Gardiner, Frederick Goldwin, lawyer, politician (b at Toronto 21 Jan 1895; d there 22 Aug 1983). A law graduate of Osgoode Hall (1920), Gardiner began his political career in 1936 as deputy reeve of Forest Hill, a suburban village in N Toronto. An ardent proponent of municipal amalgamation, he was persuaded to become first chairman of Metropolitan Toronto in 1953. Nicknamed "Big Daddy," he dominated municipal politics during a period in which Toronto "shrunk at the core and burst at the seams." He retired as chairman in 1961 and was appointed a Toronto Hydro commissioner in 1965, serving until 1979. A sharp debater and colourful speaker, he was also influential in the provincial and federal Conservative Party, and held several directorships of major corporations. JAMES MARSH

Gardiner, James Garfield, "Jimmy," teacher, farmer, politician (b in Hibbert Township, Ont 30 Nov 1883; d at Lemberg, Sask 2 Jan 1962). Of Scots descent, Gardiner left Ontario for the North-West Territories and in 1905 witnessed the creation of Saskatchewan, where he remained to champion Prairie interests. As MLA (1914-35), Cabinet minister (1922-26), premier (1926-29, 1934-35), and leader of the Opposition (1929-34), he tirelessly pursued Liberal policies. In 1935 he became federal minister of agriculture and served until 1957, so single-minded in espousing western affairs that he frequently exasperated colleagues. His PRAIRIE FARM REHABILITATION ADMINISTRATION was designed to assist drought-stricken prairie farmers. He was also minister of national war services in 1940-41. He sought his party's national leadership unsuccessfully in 1948.

Gardiner's role as a western tribune was influenced by early poverty and a doctrinaire training in liberalism at Manitoba Coll. His faith in individual effort and in limited government as the servant of individuals never wavered, and he consistently applied his ideas to building his province and helping its citizens in turn through depression, war and reconstruction. Notably partisan, he held that a minister should be fully responsible and he believed frankly in patronage. NORMAN WARD

Gardiner Dam, located 100 km S of SASKATOON is a 4 km long earth-fill structure towering 64 m above the S Saskatchewan riverbed. A dam near the "elbow" of the river (see ELBOW) had first been suggested in 1858 by Henry Hind, but construction did not begin until 1958 when a cost-sharing agreement was signed by the Diefenbaker (federal) and Douglas (provincial) governments. The dam is named after J.G. GARDINER, former Saskatchewan premier, federal agricultural minister and champion of the PRAIRIE FARM REHABILITATION ADMINISTRATION. The body of water behind the dam is named Lk DIEFENBAKER after the man who, as prime minister, put the plan in motion (though Diefenbaker and Gardiner were arch-opponents). The dam was created to utilize better the water resources of the S Saskatchewan R for irrigation, recreation, urban water supply, electrical power and river control. It was officially opened in 1967. DON HERPERGER

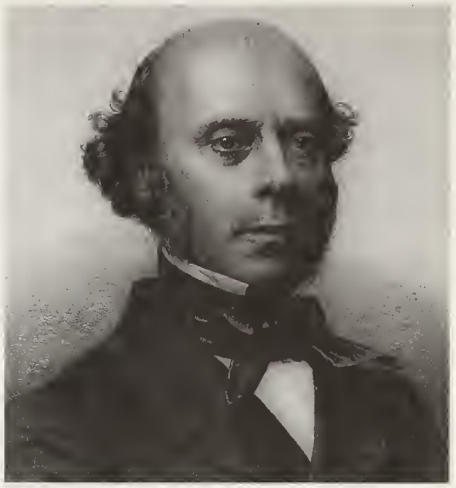
Garibaldi Provincial Park (est 1920), 1950 km² mountain wilderness located some 60 km N of Vancouver, normally reached by a short trail from Highway 99, N of Squamish. The mountains, which dominate the park and rise to 2678 m at Mt Garibaldi, are of recent volcanic origin. Lava from Price Mtn created a dam allowing 3000 m deep Lk Garibaldi to form. Subsequent erosion, especially by GLACIERS which still persist at higher altitudes, has sculpted the peaks, notably Black Tusk, and gouged the valleys, leaving a landscape of spectacular rugged beauty. Below 1500 m is a dense forest of Douglas fir, western red cedar and western hemlock; above, more scattered growth of mountain hemlock, yellow cedar, alpine fir and white bark pine. The alpine regions feature heather, numerous wildflowers and perpetual snow. Large mammals are scarce, although deer, mountain goats, grizzly and black bears are present. More noticeable are marmots, squirrels, ptarmigans, Canada jays and golden eagles.

Mt Garibaldi was named in 1860 by Royal Navy Captain George Richards after Italian revolutionary Giuseppe Garibaldi. Difficulties of access inhibited human exploitation of the area. Today, some 17 600 ha around Black Tusk are afforded special protection in a Nature Conservancy Area. Adjacent to the NW boundary is the Whistler Mtn resort, which provides some of the finest alpine and nordic ski facilities in N America. JOHN S. MARSH

Garneau, François-Xavier, notary, civil servant, poet, historian (b at Québec City, 15 June 1809; d there 3 Feb 1866). The greatest writer of 19th-century French Canada and its most important historian, he had a major influence on the thinking and letters of his time.

The son of an unschooled, poor father, young François-Xavier was soon known for his keen intelligence. He excelled in primary school, but lack of money apparently barred his way to a classical education. His self-education and natural reserve explain the "proud independence" which impressed his contemporaries. Having decided in 1825 to become a notary, he spent 5 years clerking for Archibald Campbell. The latter had an outstanding library and encouraged Garneau to study both English and French history and letters. He also helped him make a trip to the US, where Garneau discovered American-style democracy and confirmed his sense of identity as a North American. In 1831 the young notary went to London for 2 years as secretary to Denis-Benjamin Viger, sent to defend the rights of French Canadians. Garneau learned much about British politics and society and visited Paris twice. Back in Québec in 1833, he half-heartedly exercised his profession, wrote poems, started a cultural magazine and eagerly followed the debates in the House of Assembly and the Legislative Council, dominated respectively by French Canadian nationalists and the Anglo-Canadian establishment.

Garneau began his work as a historian in the late 1830s. He worked, above all, on a vast synthesis of French Canadian history, the 3-volume *Histoire du Canada,* which appeared between 1845 and 1848. A supplement published



François-Xavier Garneau, the greatest writer of 19th-century French Canada and its most important historian (*courtesy Public Archives of Canada/C-6721*).

in 1852 brought the account up to 1840. Garneau presented the history of French Canadians as a struggle for survival — against the Indians and Anglo-Americans on the battlefield, and then against the English-Canadian oligarchy in the parliamentary arena. The work was hugely successful and caused Garneau, while still alive, to be hailed "national historian." For over a century, novelists, poets and political thinkers borrowed from his documentation and interpretations. His spirited and passionate style assured the *Histoire* lasting success. After 1845 the clergy began to show concern regarding certain Gallican and liberal aspects in the work, and Garneau then developed a more conservative nationalism in religious matters. For 100 years the historiographical interpretation of French Canada was a synthesis of Garneau's political interpretation and the religious one of Catholic historians like Abbé Ferland.

Garneau lived a quiet life first as a notary and, later, from 1844 to 1864 as City Clerk. He was peace loving, even timid, but held firmly to his opinions. His capacity for work was legendary. Though impassioned by politics, he never entered political life. In his view, the church should either be subordinate to the state or uninvolved in sociopolitical affairs, yet he viewed Catholicism as integral to the national identity of French Canadians. In his nationalist interpretation of history and love of his native land which pervaded his style, Garneau remains a major figure in French Canadian literature. PIERRE SAVARD

Garneau, Hector de Saint-Denys, poet (b at Montréal 13 June 1912; d at Ste-Catherine-de-Fossambault, Qué 24 Oct 1943). Saint-Denys Garneau's writing marks a turning point in the history of Québec poetry. Great-grandson of the historian François-Xavier GARNEAU and grandson of the poet Alfred Garneau, Saint-Denys Garneau was the son of a comfortable middle-class family and cousin of the poet and novelist Anne HÉBERT. While taking his classical secondary course at the Jesuit colleges Sainte-Marie, Loyola and Jean de Brébeuf, he also attended art classes at the Ecole des beaux-arts in Montréal, but in 1934 his studies were interrupted by a rheumatic heart condition. Devoting himself to poetry, painting and music, he was associated for the next 3 years with the young Catholic intellectuals responsible for the magazine *La Relève.* During the 1930s also he kept his *Journal* (posthumously published in 1954 and translated into English by John Glassco in 1962) and composed the poems to appear in his only collection of verse, *Regards et jeux dans l'espace* (1937). Disillusioned by the volume's reception, Saint-Denys

Garneau withdrew to the seclusion of the family manor house at Ste-Catherine-de-Fossambault near Québec City, where he died in 1943, apparently of a heart attack while canoeing alone.

Radical in its form, with its unrhymed lines of various lengths, its lack of punctuation and its broken syntax, Saint-Denys Garneau's poetry was equally original in its themes (the spiritual adventure of the poet, the nature of artistic creation, the search for purity) and in its ironic distance. His hermetic poems, his cerebral correspondence and the restless searching of his diary make of Saint-Denys Garneau a unique figure in the intellectual history of Québec and its first truly modern poet. DAVID M. HAYNE

Garner, Hugh, writer (b at Batley, Eng 22 Feb 1913; d at Toronto 30 June 1979). Garner's parents immigrated to Canada in 1919 and his father abandoned the family soon after. Garner spent his youth in the poorer neighbourhoods of downtown Toronto and entered the publishing world as a newspaper copyboy. He rode the rails during the Depression and fought in the Spanish Civil War and WWII. Garner's poor, urban and Protestant background was a rare one for a Canadian writer and pervades his work. His focus is working-class Ontario and his preferred genre, the realistic novel; the best-known example is *Cabbagetown* (1968). Frequently, his theme is the victimization of the worker in a class struggle, reflecting his early association with radical socialism.

The legend of Garner grew out of a hard-living life-style that fed his writing. To the end he smoked and drank, and was outspoken, abrasive and always unfashionable. His extensive literary output — 100 short stories, 17 books, hundreds of articles and radio and TV scripts — has been criticized for banality and flawed characterization, but he loved telling stories and was genuine in his talent and determination. In 1963 a collection of his short stories won the Gov Gen's Award. MARLENE ALT

Garratt, Phillip Clarke, aviator (b at Toronto 13 July 1894; d there 16 Nov 1975). He served in WWI with the Royal Flying Corps, flew as a commercial pilot and joined DE HAVILLAND AIRCRAFT in 1936 where he directed the development of aircraft to operate in the Canadian North. After WWII, he fostered development of the Chipmunk trainer and a series of successful STOL aircraft, including the BEAVER and OTTER. He was awarded the MCKEE TROPHY in 1951 and 1966. JAMES MARSH

Garrett, Christopher John Raymond, physical oceanographer (b at Bude, Eng 30 July 1943). Educated at Cambridge, he joined the Department of Oceanography at Dalhousie in 1971. Known for his early work with W.H. Munk on the description of internal wave characteristics, he is also respected for his research on frontal processes, ocean mixing and shelf dynamics. He has been interested in numerous environmental issues, including the problem of radioactive waste disposal in the deep ocean. In 1982 he won the A.G. HUNTSMAN award in physical oceanography. G.T. NEEDLER

Garson, Man, Village, pop 318 (1981c), inc 1915 as the village of Lyall, is located 37 km NE of Winnipeg. In 1927 it reverted to its original name — after William Garson, an early quarrier of the area's mottled Tyndall limestone, used in many prominent Canadian buildings. Mixed farming by Ukrainian, German, Polish and Anglo-Saxon settlers began in the region in the 1880s. Garson operated the first of 5 limestone quarries which attracted a cosmopolitan mix of skilled workers from the turn of the century onward. Only one quarry operation remains today. The village's residents primarily commute to nearby centres to work. D.M. LYON



Six species of garter snake occur in Canada in a variety of habitats, from the NWT to urban environments of the south (*artwork by Claire Tremblay*).

Garson, Stuart Sinclair, lawyer, politician, premier of Manitoba (b at St Catharines, Ont 1 Dec 1898; d at Winnipeg 5 May 1977). After moving to Winnipeg as a child, he attended the Manitoba Law School, was called to the bar in 1919 and practised law at Ashern and Eriksdale, Man, until 1936. A Liberal-Progressive MLA for Fairford 1927-48, he held office as provincial treasurer 1936-48 and premier 1943-48. In 1937 he was instrumental in securing the appointment of the Royal Commission on DOMINION-PROVINCIAL RELATIONS; the greatest achievement of his premiership was the inauguration of an effective program of rapid rural electrification. From 1948 to 1957 he served as federal minister of justice and attorney general and as Liberal MP for Marquette. He then left politics to practise law until his retirement in 1965. He was named a companion of the Order of Canada in 1971. DONALD SWAINSON

Garter Snake, common name for 30 species of harmless colubrid SNAKES of the genus *Thamnophis*, found from NWT to Costa Rica. Most have a prominent, longitudinal stripe down the back. Six species occur in Canada, including the common garter snake, which has the widest range of any N American snake. Garter snakes are often abundant and occupy a wide variety of habitats, including urban settings. Diets vary among species but include slugs, earthworms, fish and amphibians. Mammals are eaten occasionally, especially by the western terrestrial garter snake, which restrains such prey by a primitive coiling behaviour. All are live-bearing and normally produce 10-20 young by late summer to early fall. PATRICK T. GREGORY

Gascon, Jean, actor, director (b at Montréal 21 Dec 1921). While studying at the Collège Sainte-Marie, he attracted attention for his performance in several plays with Jean-Louis ROUX. In 1942 they both appeared in *L'Échange* directed by Ludmilla Pitöeff for the Compagnons de Saint-Laurent. Gascon enrolled in medicine but continued his acting career with the Compagnons. When Pitöeff returned to Montréal with her company in 1946, Gascon and Roux appeared with her in *Phèdre* and *Le Pain dur*, and the following year Gascon followed Roux to France to perfect his craft. Gascon remained there several years, working especially at Copeau's École du vieux-colombier. When he returned to Canada, he, Roux, Éloi GRAMMONT and several others began the THÉÂTRE DU NOUVEAU MONDE, with Gascon serving as director. Early in 1952 they founded the École du TNM, which was replaced in 1956 by the National Theatre School. Gascon managed the TNM until 1966, as well as taking roles in plays such as *L'Avare*, *Don Juan* and *Richard II* and directing productions including *La Tartuffe*, *Venise sauvée*, *L'Opera de quat'sous* and *Klondyke*. Under him the company took part in several international festivals and in 1958 undertook a major tour to Europe, the US and Canada. Gascon appeared in 1956 in *Henry V* at the STRATFORD FESTIVAL and returned there to direct *Othello* in 1959 and *The Comedy of Errors* in 1964. He succeeded Michael Langham as artistic director (1968-74) at Stratford. After leaving Stratford, he took charge of theatre at the NATIONAL ARTS CENTRE in Ottawa in 1977. Gascon's many honours include the Prix Victor-Morin and the MOLSON PRIZE; he is a companion of the Order of Canada. ANDRÉ G. BOURASSA

Gaspé, Qué, City, pop 17 261 (1981c), inc 1874, is located on the bay bearing the same name, 650 km NE of Québec City. The name, whose origin and meaning are disputed, extends to an entire region, the GASPÉ PENINSULA. Following the amalgamation of 12 neighbouring localities between Anse-à-Valleau and Pointe-St-Pierre in 1970, Gaspé is now one of Québec's largest municipalities; the old town itself has only 3297 (1981c) inhabitants. Gaspé is one of the oldest settlements in N America: on 24 July 1534, Jacques CARTIER took possession of Canada on behalf of the king of France and placed a cross at this location, which very soon became a fishing port and supply centre for NEW FRANCE. Between 1628 and 1760, Gaspé was the scene of several incidents between the French and English. Sir William PHIPS's troops burned the village in 1690 and the English built a fort there just before the Conquest. After the American Revolution, many LOYALISTS settled in the area. Since then the population has been largely English speaking. Cod and salmon fishing dominated the economy for many years, but today other activities such as forestry, trade and tourism play a key role. A regional history and folklore museum opened in 1976, and Parks Canada has erected a monument nearby commemorating the arrival of Cartier. ANTONIO LECHASSEUR

Gaspé Peninsula, a large peninsula in eastern Québec, comprises 5 counties (Bonaventure, Gaspé-Est, Gaspé-Ouest, Matane and Rimouski) with a population of 199 657 (1981c). Except for the copper-mining town of Murdochville, most of the population lives along the lengthy coast-

line within a few km of the St Lawrence R, the Gulf of St Lawrence and Chaleur Bay. Principal towns include RIMOUSKI, GASPÉ and Matane.

The name Gaspé probably derives from a MICMAC word meaning "land's end." When Jacques CARTIER landed in Gaspé Bay in 1534 to plant a cross and claim the land for the king of France, he found the area occupied by Iroquoian-speaking Indians. By the beginning of the 17th century, when Samuel de CHAMPLAIN sailed along its coasts, the peninsula was inhabited by Micmac. Although never probably numbering more than a few hundred, they have continued to live there since. They were Christianized by French missionaries in the 17th century. The rich supplies of codfish, found in great numbers only a few km from shore, have long been the focus of the Gaspé economy; every year, for centuries, hundreds of tonnes of fish have been shipped to Europe, S America and the US. The wide, stony beaches and reliable sun and winds of Gaspé were perfect for dry-curing the cod; until refrigeration arrived in the 20th century, this was the only means to ensure that the fish would endure the long voyages to market without spoiling.

In the French period only a few fishermen settled in Gaspé permanently. When James WOLFE and his forces arrived in 1758 they found about 400 permanent residents on the coast. He destroyed their homes and possessions and sent most of them back to France. Still, a few managed to hide in the woods, continuing to live in Gaspé after it became British territory in 1763. They were joined by several families of ACADIANS who had avoided the British deportation campaign in NS. In 1784 about 400 English-speaking LOYALISTS, refugees from the American Revolution, came to settle in Gaspé. Thereafter, few immigrants arrived, though the population grew vigorously by natural means.

It was a long time before the people of Gaspé escaped dependence on the fishing industry. A little mixed farming was practised in Bonaventure County, but it was not until the 20th century that the forest and mineral resources of the interior were seriously exploited. Construction of a railway connection only began in the 1890s. In recent years tourism has become an important source of employment, thousands of visitors come to see the famous PERCÉ ROCK, the great bird colonies of Île de Bonaventure, Gaspésie Provincial Park in the rugged interior and FORILLON NATIONAL PARK. DAVID LEE

Reading: Jules Bélanger, Marc Desjardins & Yves Frenette, *Histoire de la Gaspésie* (1981).

Gatineau, Qué, City, pop 74 988 (1981c), inc 1975, is located at the junction of the R Gatineau and OTTAWA R, adjoining HULL, Qué. It was created through the merger of 7 municipalities situated E of the Gatineau R (Pointe-Gatineau, Touraine, East Templeton, East part of East Templeton, West Templeton, village of Templeton and Gatineau), and is the largest French-speaking municipality of the National Capital Region and seventh-largest city in Québec. It is named for Nicolas Gastineau who was active in the fur trade of the area in the 17th century. With only 35% of its urban core developed, Gatineau has experienced impressive growth in the last 10 years, with such developments as a new shopping centre (Les Promenades de l'Outaouais), a new hotel (l'Auberge des Gouverneurs), new hospital facilities, an airport coupled with a large industrial park, and a new superhighway. Spread over 263 km², it is inhabited by a population younger than that of Hull's and whose mother tongue is 89% French and 9% English. A comparison of age groups is striking: Gatineau has twice as many in the "0-14" age group (20 270 compared to Hull's 10 120; 1981c) and almost half as many over age 65 (2685 to Hull's 4735). PIERRE-LOUIS LAPOINTE

Gaucher, Yves, painter, printmaker (b at Montréal 3 Jan 1934). One of Montréal's most important abstract artists during the 1960s, he made his initial mark as a printmaker. His first purely abstract work is a suite of prints, *En Hommage à Webern* (1963), inspired by a Paris visit during which he realized that his artistic affinities were with New York, not Europe. Though his work developed parallel to American colour-field painting, he made formal choices closer to contemporary Montréal developments. His shapes and surfaces are anonymous and hard-edged, and he continues to be challenged by "relational" painting — balancing off structural components (since 1973 coloured planes of unequal weight and energy) to achieve a taut surface equilibrium. Gaucher sees formal problems as metaphors for existential ones, and reconfirms abstract painting's tradition of moral and spiritual enquiry.

ROALD NASGAARD

Gaudard, Pierre, photojournalist (b at Marvelise, France 6 Oct 1927). Gaudard moved to Montréal in 1952 and gained national recognition in the late 1960s with an extended photo-essay, about blue-collar workers, exhibited and published by the National Film Board. In 1972 he joined the short-lived Groupe d'action photographique (GAP), which recorded urban and rural Quebecers' lives. A commission from *Time* (Canada) to illustrate a cover story on the Canadian penal system in 1974 led to a Canada Council Senior Arts Award and a travelling exhibition in 1977 by the NFB. In 1980 Gaudard spent a year photographing in his native France. The resultant images, characterized by gentle humour and irony, were exhibited by the NFB in different parts of Canada.

LOUISE ABBOTT

Gaudaur, Jacob Gill, Jr, "Jake," football player, executive, commissioner (b at Orillia, Ont 5 Oct 1920). An all-round athlete, he was a prominent oarsman and an accomplished lacrosse player in his youth. He joined the RCAF and played football with the Grey Cup champion RCAF Hurricanes (1942). He continued playing after WWII, finally joining the Hamilton Tigers in 1948. He was captain of the club from 1950 and centre on the 1953 Grey Cup championship team. From 1954 to 1968, he was president and general manager of the Tiger-Cats. He also played an unofficial role for the CANADIAN FOOTBALL LEAGUE, selling TV rights in Canada and the US and negotiating an agreement with the US National Football League to honour each league's contracts. In Apr 1968 he was appointed commissioner of the CFL, a position he held to 1984.

FRANK COSENTINO

Gaudreault, Laure, teacher, unionist, journalist (b at La Malbaie, Qué 25 Oct 1889; d at Clermont, Qué 19 Jan 1975). Gaudreault attended the École normale Laval and then taught in Québec village grade schools. She wrote for various papers, analysing the position of women and, from 1930 on, tried to awaken her readers to the harsh working conditions of female rural school teachers. In 1936 she did the groundwork for the Association catholique des institutrices rurales and, in 1937, the Fédération catholique des institutrices rurales. She then organized female rural teachers to win improvements in salaries and pension programs; published *La Petite Feuille* and became a union organizer; was part of the 1946 fusion of various teachers' unions into the Corporation générale des instituteurs et des institutrices catholiques du Québec (CIC), precursor of today's Centrale de l'enseignement du Québec. Vice-president of the CIC, 1946-65, she participated in the major union battles of Québec teachers. MICHELINE DUMONT

Gauld, Bella Hall, labour educator, political activist (b at Lindsay, Ont 31 Dec 1878; d at Montréal 21 Aug 1961). Raised on a farm in Manitoba, Gauld qualified as a teacher before studying piano in Germany. Back in Canada (1905), she worked with German immigrants near Brandon, and then joined J.S. WOODSWORTH's All People's Mission in Winnipeg (1911). On his recommendation, she was hired as first director of the Montréal University Settlement (1914). She studied at the Rand School of Social Science (1919), and returned to Montréal to establish the Labour College (1920). On its demise (1924), she worked for the Women's Labour League which sponsored camps for poor children. Gauld joined the COMMUNIST PARTY OF CANADA (1922), becoming president of the Montréal branch of the Friends of the Soviet Union (1926-39). In the 1930s she operated a soup kitchen and played piano at fund raisers for various ethnic communities. During WWII, she was a frequent soloist at Navy League concerts for servicemen. She remained active in the Communist Party until her death. MARGARET E. MCCALLUM

Gault, Andrew Hamilton, army officer (b in Eng 18 Aug 1882; d at Montréal 28 Nov 1958). Of Canadian parents, he attended McGill U. Commissioned in the 2nd Canadian Mounted Rifles, he served in the SOUTH AFRICAN WAR and joined the Canadian Militia on return to Canada. On the eve of WWI he offered the Canadian government $100 000 to help raise and equip an infantry battalion for overseas duty, leading to the formation in 1914 of the Princess Patricia's Canadian Light Infantry regiment. Gault accompanied the regiment overseas as second-in-command, fighting until the loss of his left leg. On retirement (1920), he took up residence in England and was elected Conservative MP for Taunton (1924-35). Recalled to active duty in WWII, he served on staff with the Canadian Army in England (colonel, 1940; brigadier, 1942) and returned to Canada in 1945. Appointed honorary colonel (1948) and colonel (1958) of his regiment, he showed a keen interest in it until his death. JEAN PARISEAU

Gaultier, Jean-François, king's physician, naturalist (b at La Croix-Avranchin, France 6 Oct 1708; d at Québec C 10 July 1756). Appointed king's physician of NEW FRANCE, he arrived in Québec in 1742. There he took over M. SARRAZIN's medical and scientific duties, and became a corresponding member of the Académie royale des sciences in 1745. In 1747, encouraged by LA GALISSONIÈRE, he arranged for the post commandants to collect plant specimens for him. In 1749 Gaultier and Pehr KALM botanized around Québec C and E to Les Éboulements, and Kalm named for him the genus *Gaultheria*, or WINTERGREEN. Gaultier shipped plants to France each year. His 1749 manuscript lists 134 species, 61 first described by Sarrazin to which he added detail and 73 not mentioned by Sarrazin. Gaultier concentrated on the ligneous plants in his work and differentiated between 4 species of pines. He set up the first meteorological station in Canada and kept a log 1742-56, as well as sending minerals and preserved specimens of animals to France. But botany, including the medical properties of plants, was his great interest. His history of MAPLE SUGAR was published in the memoirs of the Académie.

BERNARD BOIVIN

Gauvin, William Henry, scientist, educator, SCIENCE POLICY planner (b at Paris, France 30 Mar 1913). A graduate of McGill (PhD, 1945), he has continued his association with that university (associate professor of chemical engineering, 1947-62; research associate, 1961). He has been a member of McGill's board of governors, the National Research Council (1964-70) and the Science Council of Canada (1966-70), and frequent

adviser for both the federal and Québec governments. A man of boundless energy and enthusiam, Gauvin was consultant and then head of the chemical engineering division, Pulp and Paper Research Inst of Canada (1951-61); and his research work with Noranda Research Centre (1961-83) was a source of inspiration to many. His publications include more than 150 papers on electrochemistry, high-temperature heat and mass transfer, fluid mechanics and plasma technology. He is a companion of the Order of Canada. LEO YAFFE

Gauvreau, Claude, writer, artist (b at Montréal 19 Aug 1925, d there 9 July 1971). Gauvreau studied at the Collège Sainte-Marie in Montréal but was expelled in his last months of study for having maintained publicly that the idea of hell was absurd. He later earned a BPL from U de M. During this period he published remarkable articles in several student and left-wing papers. Gauvreau was especially influenced by the painter Paul-Émile BORDUAS and from 1942 on followed the activities of the AUTOMATISTES. His main contribution to the group's activities was as a writer, first (by 1943) as a critic and then (by 1944) as a playwright and poet. The performance of *Bien-être* in May 1947 and the 1948 publication of this "dramatic object" in the collective REFUS GLOBAL were among the first signs of modernism in Québec theatre. His "amour fou" for certain great artists, especially actress Muriel Guilbault, is one of the principal themes of his work. Only one of his works was published in its entirety during his lifetime — a collection of poetry entitled *Brochuges. Oeuvres créatrices complètes,* which he was preparing for publication, did not appear until 1977; little of his important critical writing and correspondence has appeared. ANDRÉ G. BOURASSA

Gauvreau, Pierre, painter (b at Montréal 23 Aug 1922). In 1941, while a student at Montréal's École des beaux-arts, he discovered French modernism through magazine reproductions. His works made under this influence attracted Paul-Émile BORDUAS, who invited Gauvreau to join the radical young artists and intellectuals who met informally in his studio. Like them, Gauvreau and his poet brother (Claude GAUVREAU) became interested in the surrealist idea of automatism as a way of releasing creativity. In 1943 Gauvreau and others were invited to exhibit with the Contemporary Art Society, which fostered Québec's most adventurous art. Gauvreau remained associated with this circle, and became part of the group known as the AUTOMATISTES, who with others produced the 1948 manifesto REFUS GLOBAL. By the mid-1950s, Gauvreau was using looser, more gestural imagery in his work, and was also working for the new medium of TV, as a writer, director and producer. He stopped painting in the early 1960s and did not start again until 1975. His recent work continues his exploration of gesture and calligraphy. KAREN WILKIN

Gavazzi Riots On 6 June 1853, Alessandro Gavazzi, a recently arrived Italian patriot, gave a speech in Québec City at the Free Presbyterian Church. A riot resulted, the principal participants being Irish Catholics who reacted violently to Gavazzi's anti-Catholic sentiments. Gavazzi attributed the failure of the Italian national movement of 1848-49 to the defection of Pope Pius IX from the cause, and therefore rejected Catholicism. On June 9 he repeated his diatribe at Montréal's Zion Church. In the following riot, the police lost control and Mayor Charles Wilson apparently called out a detachment from the local garrison. The soldiers opened fire, killing 10 and wounding 50. The riots caused by Gavazzi's incendiary preaching in Québec and Montréal illustrate the instances of religious fanaticism that occurred frequently throughout the 19th century in Europe and America. PHILIPPE SYLVAIN

Reading: Philippe Sylvain, *Clerc, garibaldien, prédicant des deux mondes* (2 vols, 1962).

Gayford, Thomas, equestrian (b at Toronto, Ont 21 Nov 1928). An outstanding international competitor, Gayford was a member of the Canadian jumping team from the late 1940s until the early 1970s; he then became team coach. He first represented Canada at the 1952 Helsinki Olympics in the 3-day event and in 1959 helped win the 3-day event Pan-American Games gold medal. With James DAY and James ELDER he formed the gold-medal show-jumping team at the 1968 Mexico City Olympics. This team went on to win several international events. Gayford also captained the 1971 champion Pan-American Games team. He was 3 times individual high-jumping champion at the NY National Horse Show and jumping champion at the National Horse Show (1972). BARBARA SCHRODT

Gélinas, Gratien, man of the theatre (b at St-Tite, Qué 8 Dec 1909). The multiple activities of Gélinas — actor, director, producer, playwright — laid the base for contemporary Québec theatre. In 1937 Gélinas created the radio character Fridolin — a naïve, resourceful, softhearted but cynical young Montréaler. Fridolin became, in monologue form, the central character in annual theatrical revues, the *Fridolinons* or *Fridolinades* (1938-46), which were a spirited, popular and professional mixture of musical comedy, dance, mime and song, romantic sketches, satires and scenes of contemporary mores and trends. *Les Fridolinades* did not begin to appear in written form until 1980. Besides being a commentary on the social, political and cultural scene, they were a revue of theatrical styles and genres, from burlesque to melodrama, from the radio series to official speeches.

Tit-Coq, created in 1948, grew out of Fridolin. The drama of the bastard who did not want to leave bastards behind him, the unemployed conscript, the soldier sent to England who never really came home, contrasted in the play with vivid, moving tableaux of traditional family life. *Tit-Coq* triumphed in Canada (though it failed on Broadway) and inspired other playwrights. It dominated Gélinas's life for several years — revivals, tours, translations, films — but he worked briefly for TV, appeared in plays at the STRATFORD FESTIVAL and in 1957 founded La Comédie canadienne, which he directed until 1972. Gélinas's second play, *Bousille et les justes* (1959), is stronger and tougher than *Tit-Coq*. Another orphan, Bousille, is servant and scapegoat to a hypocritical and evil family of entrepreneurs, typical representatives of the class that rose to prominence during the Maurice DUPLESSIS regime. *Hier, les enfants dansaient* (1966) is a more conventional study of family tensions arising from Québec/Ottawa political tensions. Gélinas was chairman of the CANADIAN FILM DEVELOPMENT CORPORATION 1969-78.

Translator-adapter for George RYGA (*Rita Joe,* 1969), a remarkable film director of his own shows from the 1940s on, and a born writer for and about the theatre, Gélinas worked within a popular cultural tradition and transformed it. LAURENT MAILHOT



Gratien Gélinas's puppet character Fridolin, a softhearted but cynical young Montréaler, was the central character in the annual revue *Fridolinons;* 1945 photo (*courtesy Public Archives of Canada/PA-122724/NFB/Ronny Jacques*).

Gellman, Steven, composer, pianist (b at Toronto 16 Sept 1947). After early studies with Samuel Dolin in Toronto, he attracted attention in 1964 as soloist in his piano concerto, with the CBC Symphony Orchestra, and as first Canadian recipient of a BMI Award for student composers. Further studies were with Berio, Persichetti and Sessions at the Juilliard School (1965-68), Milhaud at Aspen, Colo (1965-66), and Messiaen at the Conservatoire de Paris (1973-76). Since 1976 he has taught at the U of Ottawa. Gellman's music is one of evocative, colourful sonorities, sometimes in an oriental-inspired contemplative mood, "in praise of the transcendental." Among his works are commissions from the Stratford Music Festival (*Mythos II,* 1968), CBC (*Symphony in Two Movements,* 1971; *Symphony II,* 1972; *Chori,* 1974), Hamilton Philharmonic (*Odyssey,* 1971; *The Bride's Reception,* 1983), Besançon Festival (*Deux tapisseries,* 1978), McGill U (*Trikaya,* 1981) and Toronto Symphony (*Awakening,* 1982). PATRICK CARDY

Gellner, John, author, journalist (b at Trieste, Italy 18 May 1907). Gellner graduated from Masaryk U in Brno, Czech, where he practised law until 1939. He served in the RCAF from 1940 until he retired with the rank of wing commander in 1958 to become a free-lance journalist. The bitter memory of WWII turned Gellner to the study of history and international power relationships and to the belief that only strength had ever preserved nations from war. He was an influential force behind Liberal defence policy in the early 1960s. Among his publications are *The Czechs and Slovaks in Canada* (1968), *Canada in NATO* (1970) and *Bayonets in the Streets* (1974), along with hundreds of articles on defence and international relations. He was a professor of political science at York, 1972-82 and editor of the *Canadian Defence Quarterly* from 1972. NORMAN HILLMER

Gemstone, MINERAL, rock or organic material used for personal adornment or for decorative purposes. A gem is the cut and polished finished product. Most gemstones are minerals: about 100 of the nearly 3000 mineral species known have gem varieties, but only about 25 are commonly marketed. The essential attributes of gemstones are beauty, derived from colour, brilliance, pattern, texture or light-reflecting qualities; durability, ie, sufficient hardness to resist abrasion, breakage or decomposition; and rarity, a quality that enhances their desirability and value.

Canada's most important gemstone, nephrite jade, was used extensively in British Columbia's NORTHWEST COAST as early as 3000 years ago. The INUIT of Ellesmere I, 500-700 years ago, chipped, shaped and drilled nodules of amber to form round and oval beads. They selected the clearer, gem-grade material, believed to have weathered from Tertiary coal beds (2.5- 65 million years old) along the shore of Hazen Lk, where amber

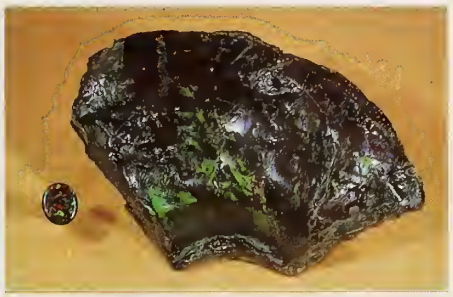
is still found today. They also fashioned ivory into beads and artifacts. Ivory was used for tools earlier (7500 years ago) by the Maritime Archaic peoples in coastal Labrador. The first gemstone exported from Canada is believed to be amethyst from NS. Crystals were presented to Henri IV of France by Sieur de MONTS when he was governor of Acadia, and one became part of the French crown jewels.

Modern use of Canada's gemstones began in the 19th century. As geological explorations disclosed gemstone occurrences, amateur lapidaries cut or carved and then polished the rough material, releasing its beauty and transforming it for gem or ornamental use. While lacking deposits of traditional gemstones (eg, diamond, ruby, emerald, sapphire), Canada can claim a varied assortment of lesser known but appealing gemstones. Their intrinsic value is relatively low but, in the hands of an expert artisan or creative designer-jeweller, their inherent beauty can be captured and their value enhanced.

Extraction of Canada's gemstones is both hobby oriented and a commercial enterprise. The amateur lapidary, individually or in lapidary club excursions, selects raw materials from outcropping rocks or from old pits and mines (*see* ROCK AND MINERAL COLLECTING). In some cases, as in the Cassiar asbestos mine in BC, the Jeffrey asbestos mine in Asbestos, Qué, and the Geco base-metal mine in Manitouwadge, Ont, interested miners or geologists rescued the gemstones (nephrite jade, hessonite garnet and iolite, respectively) from large-scale mining operations. From Yukon placer operations, the larger gold nuggets are set aside for use in JEWELLERY.

Commercial mining solely for gem material is small scale, often a one-person operation, and sporadic, responding to a fluctuating demand. The largest and most important commercial operations are for nephrite jade recovered from alluvial boulders and bedrock deposits. Production in recent years came from the Mt Sidney Williams, Mt Ogden, Cry Lk and Dease Lk areas of BC and from the Frances Lk area in the YT. Most of the jade was exported to cutting centres in the Far East. The 1981 total BC production was 59 208 kg valued at $133 000, a drop from the 1978 all-time high of 489 000 kg valued at $1.42 million, which reflects a depressed world demand. Canada is the world's leading producer of nephrite jade. Smaller commercial operations are conducted intermittently for amethyst near Thunder Bay; sodalite and rose quartz near Bancroft, Ont; labradorite on Tabor, Lab; amazonite (microcline) near Eganville, Ont, and Lac St-Jean, Qué; and rhodonite at Saltspring I, BC. The output is exported to suppliers in the US and to cutting centres in the Orient and Europe. A small proportion is distributed domestically to amateur lapidaries and to some of the 200-odd mineral/lapidary dealers in Canada. The exported material often returns to suppliers and retailers as unmounted cut stones and beads, jewellery or ornamental objects, their origin recognized only by geologists or connoisseurs of Canadian gemstones. One gemstone, ammolite, from Lethbridge, Alta, is an exception in that it is extracted and processed into jewellery-ready stones in an integrated operation. Canada's newest gemstone, it was introduced in the late 1970s and is derived from the iridescent shell of the Cretaceous (64-145-million-year-old) ammonite FOSSIL, *Cephalopoda ammonoidea*. The finished stone, an opallike mosaic of brilliant colours, is sold mainly to manufacturers and jewellers in Canada and the US. It is also known by the trade names "calcentine" and "korite."

Domestic use of commercial gemstone production is by hobbyists or custom lapidaries and designer-jewellers. Techniques used for cutting, shaping and polishing the rough material are essentially the same as those in use the world over for about 500 years. Transparent gemstones



Ammolite from Lethbridge, Alta; cabochon-cut stone and part of ammonite fossil (*courtesy Geological Survey of Canada*).



Two ammonite stones from Lethbridge, Alta, cut in free-form style (*courtesy Geological Survey of Canada*).

are faceted, ie, cut with flat faces (facets) as in a diamond; translucent and opaque material is cut in the cabochon style, with domed top and flat base. Nongem-grade material is carved into sculptures and ornaments (*see* INUIT ART).

Noncommercial extraction is by amateur lapidaries who process their own material. These gemstones are regarded as collectors' stones. The most common and popular are the quartz gemstones, agate and jasper, from localities in BC, Alta, Man, the Lk Superior region, Gaspé and the Bay of Fundy; amethyst from NS; and petrified wood from BC and Alta. Less common collectors'-gemstones include Alberta amber, British Columbia idocrase, Ontario feldspars (perthite and the moonstonelike peristerite), Québec scapolite, Newfoundland xonotlite and ivory, and soapstone and lapis lazuli from the territories. These collectors' stones are generally seen as unmounted cut stones, set in jewellery or as carvings at craft shows or gem and mineral shows staged annually by some of the 125 lapidary and mineral clubs in Canada. Jewellery and sculptures fashioned by native peoples are often sold through co-operatives. Canada's gemstone industry is modest in terms of production. It does, however, support domestic lapidary interests and a tourist industry, most of the deposits being open to visitors, both Canadian and foreign.

ANN P. SABINA

Genealogy is the study of family history, and usually involves the preparation of a pedigree (family "tree") and an accompanying narrative. Traditionally, genealogy and HERALDRY have been the preserve of the educated, the leisured and the high-born, but since the 1960s there has been a phenomenal expansion of the hobby. Many people believe that Alex Haley's popular book *Roots* (1976), which was made into a TV drama, sparked the explosion of interest; however, Canadian genealogical pioneers such as Cyprien Tanguay (1819-1902), Edward Marion Chadwick (1840-1921), Placide Gaudet (1850-1930), Pierre-Georges Roy (1870-1953), and William D. Reid (1905-69) were busy compiling studies of our forebears long before the pursuit became popular. Today, increasing numbers of Canadians have the spare time and the means to embark on this personal journey into the past.

A genealogical study begins with the researcher recording everything he knows about his immediate family. This information can be supplemented by oral tradition from elderly relatives. Family papers, such as letters, deeds and diaries, can help verify these recollections, as can old photographs. When such sources are exhausted, the researcher must turn to the public holdings of archives, libraries, government agencies and other institutions. These repositories contain a surprising wealth of data in church registers, newspapers, cemetery transcriptions, censuses, assessment rolls, wills, historical journals and monographs, passenger lists, petitions, maps and atlases, vital statistics, naturalization papers, Indian land claims, etc. Technological advances in the collection, preservation and reproduction of documents have made widely dispersed records increasingly accessible to the researcher.

Guidance for the novice is available in numerous genealogical handbooks, journals and newsletters. An excellent beginner's manual is *Tracing Your Ancestors in Canada* (8th ed, 1984), available free from the Public Archives of Canada. Each province has at least one genealogical society. These organizations offer publications, lectures, workshops and conferences on finding one's "roots." More specialized family, clan, ethnic and historical associations can also sometimes furnish useful information. For the reluctant researcher, there is always the option of commissioning a professional genealogist.

At some point the amateur genealogist may need to hire an expert in Canada or abroad, to overcome a particular difficulty (eg, a search of records in an unfamiliar language), but most family historians find it more satisfying to discover their lineage firsthand. Research need not involve costly commissions and extensive travel. Local public libraries can often borrow required books and microfilms from other libraries and archives. Additional resources can be found in university libraries and branch libraries of the Mormon Church; at the latter one can examine microfilmed records from the world's largest genealogical collection in Salt Lake City, Utah.

After the gathering of information, it is important to preserve the findings for posterity. Ideally a genealogy should include not only pedigree charts but also a documented, written history of the family. Some genealogists add illustrations and others even publish their work. However modest the findings or the format may be, it is worthwhile to distribute copies to relatives, libraries and archives, so that fellow researchers may benefit from the findings and reciprocate in kind.

Genealogy is an absorbing, lifelong pastime. Every search, every family has its own story. Although detective skills and patience are often tested, the curious and imaginative genealogist is seldom disappointed. Along the way each family historian acquires a personal link with the past and a greater sense of self-identity.

JOHN D. BLACKWELL AND LAURIE C.C. STANLEY

Reading: Research in Canada: Angus Baxter, *In Search of Your Roots*, rev ed (1984); Jeanne Grégoire, *Guide du généalogiste* (1974); Eric Jonasson, *The Canadian Genealogical Handbook* (2nd ed, 1978). Research Outside of Canada: Angus Baxter, *In Search of Your British & Irish Roots* (1982); T.F. Beard et al, *How to Find Your Roots* (1977); Gildas Bernard, *Guide des recherches sur l'histoire des familles* (1981); P.W. Filby, comp, *American & British Genealogy & Heraldry* (3rd ed, 1983); R.R. Hilborn, *Hilborn's Family Newsletter Directory* (3rd ed, 1984); K.A. Johnson et al, eds, *Genealogical Research Directory, Mid 1984* (1984); M.K. Meyer et al, eds, *Who's Who in Genealogy & Heraldry* (1981).

General Motors of Canada Limited, with headquarters in OSHAWA, Ont, is a major manufacturer and distributor of cars and trucks. It was formed in 1918 by the merger of the McLaughlin Motor Company, Ltd, and the Chevrolet Motor Company of Canada Ltd, and was incorporated as a wholly owned subsidiary of the American-owned General Motors Corporation. By 1921 the company was making Buicks, Oldsmobiles and Oaklands. Since then, GM has grown through various acquisitions and expansions. From 1942 until the end of WWII civilian automobile production was suspended so that the company could manufacture tanks, machine guns and other military equipment. In 1982, 77% of the company's vehicles sold in Canada were manufactured here, and there were 941 GM dealers across the country. GM had sales or operating revenue in 1983 of $13.8 billion (ranking 1st in Canada), assets of $3.0 billion (ranking 27th) and 43 410 employees. General Motors Corporation of Detroit holds 100% of the shares. DEBORAH C. SAWYER

Genereux, George Patrick, trapshooter, physician (b at Saskatoon, Sask 1 Mar 1935). At 13 Genereux claimed Midwestern International handicap honours, followed by 3 successive Manitoba-Saskatchewan junior titles. He also won the N American junior crown at Vandalia, Ohio, and tied for 2nd in world championship competition at Oslo. This tall 17-year-old with cool nerves and a keen eye reached the pinnacle of his shooting career in Helsinki in 1952 when he emerged with an Olympic gold medal. He was recognized as Canada's male athlete of that year. In 1960 he received his medical degree from McGill. BOB FERGUSON

Genetic Diseases are those resulting from chromosome abnormalities or mutant genes showing a specific pattern of inheritance. In addition, genetic factors are involved in susceptibility to some "nongenetic" DISEASES. As progress has been made in eliminating infectious diseases, genetic disease has come to represent an increasingly larger proportion of all disease. Genetic diseases among animals, particularly among domestic species, have sometimes provided useful information about human counterpart disorders. In Canada the earliest studies of human genetic disease were carried out by Norma Ford Walker (Toronto), Madge Macklin (London, Ont) and F. Clarke FRASER (Montréal). Recent advances in the study of DNA, the chemical basis of genes, will increase the possibility for understanding and controlling human genetic disease. A complete knowledge of disease at the gene level may make possible the replacement of faulty genes through GENETIC ENGINEERING.

Genetic Engineering is the introduction of new genetic material into cells to stimulate the synthesis of new proteins and hence altered cell characteristics. The foreign genetic material can range from a single gene, which produces only one new protein, to a whole cell nucleus, which can redirect the cell along an entirely new path of development. The development of genetic engineering techniques was made possible by an increasingly sophisticated understanding of the BIOCHEMISTRY and mode of transmission of genes, the basic units of heredity.

Startling discoveries in genetics are leading to radical revisions of theories about gene structure and function. Recent discoveries include "overlapping genes," which code for more than one protein; "jumping genes," which are not fixed at any specific point on the chromosome, and which inactivate any gene into which they "jump"; "pseudo genes," segments of DNA similar to functional genes, but which do not produce proteins; and "oncogenes," cancer genes. Studies of bladder cancer indicate that an "oncogene" differs from a naturally occurring gene by the replacement of a single specific nucleotide in the DNA by another. The result is an alteration in protein produced in the cancer cell: in the bladder all the normal glycine is changed to a valine. The significance of this simple change is not yet clear.

One of the earliest applications of genetic engineering was the introduction into bacteria of genes coding for animal proteins such as INSULIN, growth hormone and interferon. When these genes contain regulatory signals recognized by the bacteria, the bacterial cells make large quantities of the foreign proteins. Genetically engineered human insulin can be used in diabetic patients who are allergic to the animal insulins normally used. The gene specifying human insulin has been synthesized by scientists at the NATIONAL RESEARCH COUNCIL OF CANADA and propagated in the bacterium *E. coli*. Animal growth hormones are ineffective in humans, and the supply of human hormone obtained from cadavers was insufficient to treat all patients with growth hormone deficiency; hence the availability of genetically engineered human growth hormone is very important. Interferon, a protein being tested for its antiviral and antitumour properties, is very expensive when isolated from animal cells grown in culture. Genetically engineered interferon will be much less expensive and will be available in large quantities.

In Canada, genetic engineering research is taking place in laboratories of universities, federal and provincial research organizations and industries. For example, in the industrial sector, RDT research for medical applications is occurring at Ayerst Laboratories, Montréal, CONNAUGHT LABORATORIES, Toronto, and INSTITUT ARMAND-FRAPPIER, Laval-des-Rapides, Qué. Inco is applying RDT research to mining and metallurgy, and Labatt's Breweries is using recombinant techniques in yeast genetics experiments. The Veterinary Infectious Disease Organization, based at University of Saskatchewan, Saskatoon, is using genetic engineering technology for production of new vaccines for livestock diseases. *See* MICROBIOLOGY.

Genetics is that subdiscipline of BIOLOGY devoted to the study of heredity, the phenomenon by which organisms pass on their characteristics to their offspring. Although humankind has always shown an interest in heredity, the practice of the science is usually considered to have begun in 1865 with Gregor Mendel, an Austrian monk. Through a study of pea plants, Mendel worked out the simple patterns of inheritance that apply to most inheritable characteristics of living things (eg, height, shape, colour, hairiness, smell, behaviour, disease resistance). Mendel formulated the concept of the gene to define the fundamental units of heredity that determine such properties. Today the molecular structure and function of genes is quite well understood.

Modern genetics may be conveniently divided into 3 areas of study: transmission genetics, population genetics and molecular genetics. Transmission genetics is concerned with identifying genes affecting a particular characteristic and the patterns by which these genes are transmitted from generation to generation, within single organisms or cells. Population genetics analyses the pattern of distribution of such genes in populations of organisms. Molecular genetics focuses on the structure and function of the genetic units, ie, the chemical composition of genes and their expression in enzymes and proteins, the functional components of cells.

Transmission Genetics The total genetic complement of a cell or organism is defined as the genotype. Its physiological expression is called its phenotype. Genes can be identified only if some variation is visible in the phenotype. Phenotypic variation can be discontinuous (eg, yellow versus green seeds) or may occur as a range (eg, very short to very tall). Discontinuous variation can usually be explained by a simple (often single) gene difference. Continuous variation usually involves a larger number of interacting genes (polygenes); the greater the number of genes involved, the greater the possible range of variation. Mendel's classic experiments dealt with the inheritance of discontinuous traits.

Molecular Genetics Genes are organized into structures called chromosomes (humans have 2 sets of 23 chromosomes, each parent contributing a set, for a total of 46). Each chromosome is composed of a 50 mm length of a threadlike chemical called DNA (deoxyribonucleic acid); however, as each chromosome is less than 0.005 mm long, the DNA is very efficiently packed through coiling and supercoiling. A gene is simply a segment on the thread with a specific function. It embodies a coded message, in the form of a sequence of "building blocks" (nucleotides), that dictates the sequence of amino acids produced to make up a specific protein molecule. The proteins control chemical reactions taking place in cells, and are themselves important structural components of cells.

Prokaryotes, ie, organisms composed of a single cell that lacks a membrane-bound nucleus (eg, bacteria), carry a single chromosome that undergoes replication during one cycle of cell duplication. Both cell and chromosome divide (by binary fission) to yield 2 daughter cells, each of which carries a daughter chromosome. Eukaryotic organisms, ie, those composed of one or more cells having membrane-bound nuclei (all "higher" organisms), contain 2 kinds of cells with different genetic potential. Somatic (or body) cells carry 2 copies of each of their chromosomes and are called diploid cells. Gametes or germ cells (eg, sperm, egg) carry one copy only of the gene complement and are haploid. In eukaryotes, 2 haploid germ cells unite at fertilization. The resulting embryo goes on to grow, differentiate and produce the progeny cells or organism. Cells that derive from division of prokaryotic cells or somatic cells will be exact genetic copies of their parents. In contrast, the union of 2 haploid cells, deriving from 2 cells with different chromosomal complements, results in genetic diversity in progeny.

Living things can duplicate their genetic material exactly, an ability that results from the specificity of the DNA sequence. Infrequently, this DNA undergoes a change, termed a mutation, that alters both genotype and phenotype and results in genetic variation. Mutations without obvious cause are referred to as spontaneous mutations; induced mutations result from damage to genes caused by chemicals, radiation, viral infection and other environmental factors. Mutations are the material on which the environment acts to produce EVOLUTION; thus, a mutation that gives an organism an advantage may permit it to survive longer and produce more offspring which, in turn, contain the mutated gene. Over time, an entire population may change. Of particular concern to human populations is environmental mutagenesis, the development of mutations caused by environmental changes. Increasing levels of chemicals and radiation in the environment may cause mutations in germ cells that may, over time, result in genetic disease, or mutations in somatic cells resulting in CANCER.

Canadian Contributions

Genetics has had a major impact on medicine, AGRICULTURE and FORESTRY. It is now recognized that health and illness are strongly influenced by genetics; in fact, many diseases are known to be genetic in origin, resulting from a mutation. Well-known examples of such genetic diseases are hemophilia, sickle-cell anaemia and Down's syndrome.

Important work on genetic diseases has been

or is being done by F. Clarke FRASER (McGill University), who worked on the genetics of abnormal development in mammals; Howard NEWCOMBE (Atomic Energy of Canada, Chalk River, Ont), who studied bacterial population genetics, mutagenesis, radiation genetics and human population genetics; Charles SCRIVER (McGill) for contributions on human genetic diseases. The recent establishment of somatic cell genetics in Canada owes much to L. SIMINOVITCH (U of T).

Genetics has been applied to plant breeding and ANIMAL BREEDING. Canadian researchers have produced outstanding examples of improvement by genetic manipulation, the earliest being Marquis winter WHEAT, produced early in the 20th century by Charles E. SAUNDERS to withstand the severe prairie climate. More recently, Canadian geneticists have produced strains of wheat resistant to rusts (destructive parasitic FUNGI). Triticale, a new CEREAL CROP, was developed by Leonard H. Shebeski and Edward N. Larter at University of Manitoba. The development of CANOLA, ie, improved varieties of rape plants for production of a VEGETABLE OIL, was undertaken by research groups headed by R.K. DOWNEY (Agriculture Canada, Saskatoon) and Baldur STEFANSSON (University of Manitoba).

In 1944 Canadian biochemist Oswald Avery demonstrated that DNA is the hereditary material of the cell, a discovery that made possible the clarification of DNA structure by James Watson and Francis Crick in 1953. Other Canadian geneticists whose work has made major contributions to the international body of genetic knowledge include Howard FREDEEN (Agriculture Canada RESEARCH STATION, Lacombe, Alta), who developed the industrially important Lacombe hog; Leonard H. Butler (U of T), who studied tomato genetics; Clayton O. PERSON (University of British Columbia), for his work on the genetic basis for host-parasite relationships; R.C. Von Borstel (University of Alberta), for his work on the genetics of YEAST. David T. SUZUKI (UBC) achieved worldwide recognition for his work on the genetics of the fruit fly (*Drosophila melanogaster*).

The most recent revolution in biological science has come as a result of the evolution of recombinant DNA technology. These biochemical techniques permit genes to be removed from their original organism and spliced into the chromosomes of simple organisms (eg, bacteria, fungi); thus, they are far more amenable to study. Furthermore the cloned genes can be put to use to make their normal gene product in a new host that can be grown in large batches. Already such GENETIC ENGINEERING has been applied to development of new strains of bacteria with major importance in industry, agriculture and medicine (eg, useful in production of insulin and interferon for the treatment of viral-induced diseases, oil-eating bacteria and overproducers of protein for worldwide food distribution).

Education and Societies in Canada

Professional training for a career as a geneticist or medical geneticist can be obtained in universities, agricultural colleges or medical schools. At the undergraduate level students obtain a BSc degree in biology, genetics, BIOCHEMISTRY or MOLECULAR BIOLOGY. Graduate studies lead to MSc or PhD degrees. The MSc qualifies a student for work in a research facility and to teach in a subordinate position; the PhD permits work as an independent genetic researcher in a university department or other research institution. Physicians may take specialist genetics training through the Canadian College of Medical Geneticists (headquartered at the Alberta Children's Hospital, Calgary), the world's first such institution. A candidate desiring to pursue a career in clinical genetics (eg, genetic counselling) must pass the examination of the CCMG.

In Canada, research is proceeding in all areas of modern genetics. Most work is taking place at the universities and is funded mainly through federal grants. The federal government also sponsors research directly through its own administrative structure (eg, the many research branches of Agriculture Canada). Industry, especially companies producing agricultural or medical products, also do some genetics research. Medical genetics studies are undertaken at universities and hospitals. In this area, the BC Health Surveillance Registry has compiled a complete record of all birth defects in the province since 1952, a record almost unique in the world. These data permit calculation of risk estimates for various genetic conditions and of population trends in genetic disease

Geneticists make a major contribution to Canadian life in a variety of professional situations, eg, as research scientists at university, government or industrial laboratories and as genetics counsellors in hospitals. The Genetics Society of Canada, headquartered in Ottawa, is the professional association of Canadian geneticists. It holds annual meetings and publishes a journal, the *Canadian Journal of Genetics and Cytology*, with international distribution.

A.J.F. GRIFFITHS

Gentian, common name for several PLANTS of family Gentianaceae, primarily in genus *Gentiana*. The genus contains about 400 species of herbaceous perennials, some weedy, others with large, attractive, trumpet-shaped, usually blue flowers. Found chiefly in northern temperate and arctic zones, the genus is best developed in the mountains of Europe and Asia, where many excellent garden plants originated. At least 16 species occur in Canada, primarily in damp soils. Most are found W of Ontario; some are arctic; none have been reported from PEI or NS. The root of European yellow gentian (*G. lutea*) was used extensively as a tonic to promote digestion and aid appetite; closed gentian (*G. andrewsii*), native to eastern Canada, is said to have identical properties. N American Indians and European settlers used any species for a bitter tonic that was prepared by pouring boiling water over leafy tops and roots. Settlers improved on the infusion by adding a generous quantity of brandy.

GILLIAN FORD

Geochemistry is the study of chemical processes in the planet Earth, including freshwater bodies, oceans and atmosphere. It is closely allied to cosmochemistry, which studies other planets, stars and extraterrestrial matter. Although the focus is on chemical processes, geochemists also examine the abundance and distribution of chemical elements and their isotopes. Geochemistry began in the late 18th and early 19th centuries with chemical studies of natural materials. The word was first used in 1838 by the Swiss chemist C.F. Schönbein. The early history of geochemistry, rooted in mineralogy and inorganic CHEMISTRY, consists largely of the discovery of the elements and the development of ideas culminating in the periodic table, which arranges elements according to their properties. Most research was based on studies of MINERALS, but knowledge was accumulating about the elemental composition of natural waters, ores, salt deposits, fumaroles, gases and living organisms. The first statements about the principles of distribution of the elements and about the Earth's chemical processes appear in the writings of Russian scientist V.I. Vernadsky, F.W. Clarke, an American, and Norwegian-born V.M. Goldschmidt.

In Canada, many early geologists wrote on chemical aspects of Canadian GEOLOGY, but T. Sterry HUNT of the GEOLOGICAL SURVEY OF CANADA (GSC) was probably the first whose interests were geochemical in the modern sense. Although primarily a petrologist, F.D. ADAMS was important in the development of Canadian geochemistry. As early as 1921, H.V. Ellsworth carried out important work for the GSC on the distribution of rare earths and radioactive elements. More recently, H. Lundberg, H.V. Warren and A.R. Barringer have done much to develop applications of geochemical principles to mineral exploration. H.G. THODE has figured prominently in studies of stable-isotope chemistry in geochemical problems concerning ore and petroleum deposits and in cosmological research.

Geoffrion, Joseph André Bernard, "Boom Boom," hockey player (b at Montréal 16 Feb 1931). He joined MONTREAL CANADIENS in 1950, playing with them 14 years. His perseverance, thundering shot and spirited play made him one of the highest scorers in hockey history. He won the CALDER TROPHY (1951-52), ART ROSS TROPHY (1954-55, 1960-61) and the HART TROPHY (1960-61). In 1961 he became the second player (after Maurice RICHARD) to score 50 goals in a season. He retired briefly then joined New York Rangers 1966-68. He scored 393 goals, 429 assists in regular season play, and 58 goals, 60 assists in playoffs.

JAMES MARSH

Geographical Information Systems (GIS) are systems designed to store and manipulate data relating to locations on the Earth's surface. Common applications are land inventories, the census, urban planning, and so on, where the data banks contain locational references such as a county, or the actual boundaries of land parcels. Equivalent terms for such information are "spatial" and "geo-coded" data. Because of the need to manipulate extremely large quantities of data, most modern GIS now employ computer technology.

Canada has been a pioneer in the development of GIS. The Canada Geographic Information System (CGIS), initiated in 1963 by the Agriculture Rehabilitation and Development Agency, was the first operational land resource GIS. Now operating under Environment Canada, CGIS holds the world's largest land resource data bank. Another early system was the Geographically Referenced Data Retrieval System of Statistics Canada, started around 1965. Many of the concepts and methods developed for these systems are now routinely incorporated into new systems. Large GIS are still predominantly operated by federal and provincial agencies such as the CGIS and the Canada Soil Information System of Agriculture Canada, but there is growing application of GIS in urban planning, forest and petroleum industries, utilities, transportation systems, etc. It is expected that usage of the GIS will continued to expand.

THOMAS K. POIKER AND IAN K. CRAIN

Geography A core of geography deals with the description and analysis of physical environmental phenomena and their interrelationships, and with distribution patterns of human POPULATIONS and their activities as they affect the Earth. As history interprets temporal sequences, so geography interprets spatial associations. Geography is broken into subfields with varying emphases. PHYSICAL GEOGRAPHY is less directly concerned with people than is human geography. It describes and analyses the distribution and process relationships among elements in the physical environment, eg, landforms, CLIMATE, vegetation, SOILS and DRAINAGE. Some of its subfields are GEOMORPHOLOGY, CLIMATOLOGY, HYDROLOGY and BIOGEOGRAPHY. Human geography places more emphasis on people and is concerned with the reasons for the location of human activities. Some of its subfields are cultural, historical, economic, political and urban geography. Geography serves as a link between the physical and SOCIAL SCIENCES. The discipline is taught "topically," ie, as subfields (geomorphology, economic geography, etc) and "regionally,"

ie, by studying distribution patterns within defined areas.

Geography is one of the oldest studies, originating with Greek scholars 2000 years ago [*geo,* "earth"; *graphos,* "to write"]. The concepts of modern geography were developed in Germany in the last half of the 19th century, and the subject was well known in France and Britain early in the 20th century. Geography was mainly an academic discipline in most countries until about 1940. The application of knowledge about the world's physical environments and resources became significant during WWII, and applied geography became a career possibility after 1945. Much of the philosophy and methods of modern geography came to Canada through Canadians trained in geography departments in American universities during the 1950s and 1960s. Other geographers came from Britain and France.

In 1923 UBC became the first Canadian university to have a partial geography department, when a Dept of Geology and Geography was established. Courses were taught by professors trained in geology. The first academic geographers came from France in the mid-1920s and lectured at Université de Montréal. The first full Dept of Geography was established at University of Toronto in 1935, headed by T. Griffith TAYLOR, a British geographer who had lectured in Australia. Most large Canadian universities established geography departments during the 1950s; more than 40 had geography departments or programs in the early 1980s.

Although the term "geographer" was used by provincial and federal governments before 1940, it usually referred to a person engaged in map production (*see* CARTOGRAPHY) and often trained in drafting or SURVEYING. The federal government engaged its first professional geographer, J. Lewis Robinson, in 1943, and geographers were carrying on studies in RESOURCE USE and planning in most provincial governments by the 1950s. The Canadian Assn of Geographers was formed in 1951 when about 50 geographers, mainly from Ontario and Québec, met at McGill in Montréal. The first president was Donald PUTNAM of U of T. Members have an academic degree or professional experience in geography. The association publishes a quarterly periodical, *The Canadian Geographer.* Geographical societies which are not professional organizations but are open to the public operate in some parts of Canada. The oldest is the Québec Geographical Soc (founded 1877); the largest, the Royal Canadian Geographical Soc, which publishes the popular *Canadian Geographic.*

Geographers are employed in diverse occupations. Most students at the bachelor level do not become professional geographers. For many of these, geography is part of a general education which permits them to become involved in matters such as people's use of the natural environment and natural-resource analysis, or to study about people and their activities in cities or in large regions. Many students continue into fields such as planning (environmental, urban, etc), architecture, law, commerce, public administration and especially teaching. By the mid-1970s increasing numbers of geography students were finding employment in business and industry. Others work where their technical skills in the design, preparation and reading of maps are useful, and where knowledge of air and satellite photos, or statistical methods, are required.

During the 1970s Canadian universities granted about 200 master's degrees in geography each year. Most of these geographers became lecturers in community colleges; planners, research scientists and administrators in consulting firms or governments; or applied geographers in business and industry. During the 1970s doctoral degrees in geography were awarded each year to 25-35 people, most of whom became university professors. J. LEWIS ROBINSON

Geological Dating For centuries people have argued about the age of the Earth; only recently has it been possible to come close to achieving reliable estimates. In the 19th century some geologists realized that the vast thicknesses of sedimentary rocks meant that the Earth must be at least hundreds of millions of years old. Charles Darwin reinforced this idea by pointing to the time that must have been required for the EVOLUTION of advanced life from primitive forms. On the other hand, the great physicist Lord Kelvin vehemently objected and suggested that the Earth might only be a few tens of millions of years old, based on his calculations of its cooling history. These discussions were rendered obsolete by the discovery of radioactivity in 1896 by the French physicist Henri Becquerel. The existence of radioactivities of various kinds in rocks has enabled earth scientists to determine the age of the Earth, the MOON, meteorites, MOUNTAIN chains and OCEAN basins, and to draw up a reasonably accurate time scale of evolution. It has even been possible to work out a time scale of the reversals of the Earth's magnetic field. This "radiometric" approach has superseded all other techniques for determining absolute ages.

Radioactive Clock The vast majority of atoms (each composed of a nucleus surrounded by electrons) are stable. Essentially, they will exist forever. A critical few, however, are unstable. Their nuclei tend to emit particles spontaneously, ie, they are radioactive. Because of this particle emission, the original radioactive parent atom changes its identity, becoming a different, stable daughter atom. This change takes place at a known rate determined by the half-life, ie, the time required for one half of the original number of radioactive atoms to convert to the stable daughter product. The remaining number of radioactive atoms is halved every half-life. Radioactive elements of use in geological dating have relatively long half-lives. A good example is rubidium-87 which changes to strontium-87 at a rate of one-half every 50 billion years. Therefore, a rock can be dated by measuring how much of its original rubidium content has changed into strontium. The other key dating techniques involve uranium-235 transforming to lead-207 at a rate of one-half every 713 million years, uranium-238 becoming lead-206 at one-half every 4.5 billion years, potassium changing to argon (and calcium) at one-half every 1.3 billion years and samarium-147 becoming neodymium-143 at one-half every 1.06 billion years. These radioactive processes present a set of natural clocks which reveal when the rock was formed, or when it was last heated severely. The well-known carbon-14 method involves the conversion of radioactive carbon-14 to stable nitrogen, at a rate of one-half about every 5700 years. It can only be used to date organic matter, and is accurate only for materials 35 000 years old or younger. It is, therefore, of limited use in geological dating (*see* ARCHAEOLOGY).

Since 1950, radiometric methods have been developed to a very sophisticated level in several countries, including Canada. It has been demonstrated that when rocks which have led an undisturbed history are analysed, all methods reveal the same age. This uniformity demonstrates that the principle is reliable. When disturbed rocks are studied, the different techniques may give different readings and much research has been carried out on how to interpret such results. It often proves possible to date even severely disturbed rocks.

Age of the Earth To date the time of formation of a planet 12 640 km in diameter and 72% covered by water is not easy. Only the tiniest fraction of the Earth, the crust, is accessible. Those rocks available for analysis (ie, the oldest ones) have been heated and squeezed many times in their GEOLOGICAL HISTORY, because for billions of years continents have been drifting over the Earth's surface, colliding and producing mountains and new ocean floors. Two approaches have been developed to circumvent these problems. The first involves sampling as much of the Earth's crust as possible and dating these rocks. The Earth certainly must be older than the oldest terrestrial rocks found. Stephen Moorbath and his colleagues at Oxford have shown that rocks near Godthaab in SW Greenland either formed or were in existence approximately 3.8 billion years ago. These results have been confirmed and agreement has been found among the rubidium-strontium, uranium-lead and samarium-neodymium methods. Rocks of almost this age have also been identified in other localities, including Labrador, Minnesota, Africa and India. Therefore, it is clear that the Earth is over 3.8 billion years old. Many scientists are searching for rocks older than these, and in 1983 Australian scientists claimed to have discovered minute zircon crystals 4.2 billion years old.

The second approach, which is more indirect but gives an answer currently believed correct, involves a comparison of the Earth with meteorites. They have clearly fallen to Earth from outside, often gouging out huge craters such as that called New Québec (61°17′ N, 73°41′ W). Rubidium-strontium, potassium-argon, uranium-lead and samarium-neodymium dating all show that the meteorites formed about 4.6 billion years ago. But detailed studies of lead isotopes in meteorites and terrestrial rocks strongly indicate that the Earth and meteorites formed at the same time. Therefore, since the meteorites are very accurately dated at 4.6 billion years old, the Earth is also considered to be the same age. Dating of the lunar samples collected by the Apollo missions strongly indicates that the moon is of the same age. If the Earth, the moon and meteorites are all 4.6 billion years old, then so very probably is the whole solar system.

Age of Canadian Shield The most ancient rocks of Canada comprise the Canadian Shield (*see* GEOLOGICAL REGIONS). Many Canadian scientists, and others, have examined these rocks to work out the region's history. The Shield is made up of areas of rocks of distinctive ages. The oldest, found in Saglek Bay and near Hebron Fjord in Labrador, are about 3.6 billion years old. Other massive slabs are dated at 2.9-2.5 billion years, 1.8-1.7 billion years and 1.3-0.9 billion years. Some of these areas represent the roots of what were ancient mountain chains, the upper parts of which were long ago removed by EROSION. Others represent volcanic belts, many of which have never been very deeply buried. Scientists are studying whether these portions of different age and geological history were always close together or were far apart until gathered together by continental drifting and PLATE TECTONICS. Although the igneous rocks of the Shield are very ancient, the formation of igneous rocks has been a continuing process in Canada. The rocks formed by the Aiyansh lava flow in BC are thought to be 90 to 350 years old, confirming legends of the TSIMSHIAN people of Nass R describing volcanic activity.

Time Scale of Biological Evolution It seems probable that life has existed on the Earth for well over 3 billion years. FOSSIL bacteria have been tentatively identified in the Fig-Tree Sediments in South Africa. Volcanic rocks associated with these have been dated at 3.5 billion years by the samarium-neodymium method by scientists at Columbia and by the potassium-argon method at University of Toronto. Probably the oldest fossils in Canada (2.5 billion years old) are the stromatolite formations at Steep Rock Lk, Ont. An indisputably biogenic, highly diverse microfossil assemblage is present in the approx-

imately 1.9-billion-year-old Gunflint cherts of southern Ontario. However, the fossil record is well documented only for the last 570 million years, for only during that period did organisms exist with the hard phosphate or calcium-carbonate components which make for good fossil preservation. The final 570 million years of evolution have been divided by paleontologists into 3 eras: Paleozoic (ancient life), Mesozoic (middle life) and Cenozoic (present life). The eras are subdivided into periods. The numerical estimates of the time occupied by these periods were made mostly with the aid of potassium-argon and rubidium-strontium dating of rocks which could be correlated with the time scale. Humans are creatures of only the last few million years. Fossils of apelike, upright-walking, potential human ancestors were found in 1981 in Ethiopia by an international expedition led by Desmond Clark of University of California at Berkeley (*see* PREHISTORY). A volcanic ash associated with these fossils has been dated at U of T at about 4 million years old, showing that creatures even remotely resembling modern humans have been on the Earth for less than one-tenth of 1% of our planet's history. DEREK YORK

Reading: Derek York, *Planet Earth* (1976).

Geological History Fundamental to all ordering of events of the Earth's history is the principle of the positional relationships of rock and MINERAL bodies. For example, in any stratified rock sequence, younger rocks overlie older ones. Similarly, stratified SEDIMENTARY ROCKS intruded by formerly molten IGNEOUS ROCKS are clearly older than the igneous rocks. Study of positional relationships allows the geologist to establish a relative sequence of events. Positional relationships underlie all attempts to decipher geological history, and they allowed the development in the 19th century of a relative time scale based on the sequences of fossil assemblages which also provided evidence for the theory of EVOLUTION.

At the end of the 18th century, James Hutton formulated another major contribution to the understanding of the rock record, the principle of uniformitarianism, which states that the same geological processes now operating also acted in the past, producing similar results. This principle underlies the use of modern geological processes, rates and products as guides in interpreting and explaining the rock record. On a broad scale, 3 geological phenomena exhibit systematic changes which are essential to the construction and continued refinement of the geological time scale: the evolution of life, the radioactive decay of unstable isotopes and the paleomagnetic signature of rock and mineral bodies.

Whereas earlier attempts to understand the Earth's history focused on specific kinds of rocks, with crystalline igneous rocks considered oldest and sedimentary rocks progressively younger, the recognition of distinctive FOSSILS within the younger part of the rock record led to rapid progress. Most major divisions of the Phanerozoic [Gk, "visible life"] part of the geological time scale, the last 570 million years, were established in the 19th century, based on their distinctive fossil content. Cambrian, Permian, Triassic and most other names of the Phanerozoic systems were in common use before 1900 to refer to the rocks and time periods in which particular organisms were abundant. Recognition of the geological periods and eras permitted relative dating of rocks to move from local divisions, based on positional relationships, to regional and international dating; however, the time scale remained relative.

Calibration of the 19th-century geological time scale had to await 2 major advances of 20th-century earth science: discovery of natural radioactivity and development of tools to measure this radioactivity accurately (*see* GEOLOGICAL DATING). Radiometric dating techniques have permitted calibration of the geological time scale and are essential to subdivision of the vast Precambrian part of the rock record which lacks hard-shelled fossils.

Geological Eras About five-sixths of geological time is assigned to the Precambrian, which ended about 570 million years ago. Less is known about it than about the Phanerozoic (the most recent 570 million years) because more of the Phanerozoic is preserved and exposed, and because it contains most of the fossil record. The concept of geological eras came from the Phanerozoic part of the rock record, and the names of its 3 eras — Paleozoic (ancient life), Mesozoic (middle life) and Cenozoic (modern life) — are based on how closely the fossils resemble living forms. Each era had its own most characteristic organisms, and these and others are used to identify Phanerozoic rocks around the world. The hard-shelled arthropods and CORALS of the Paleozoic oceans gave way to the REPTILES of the Mesozoic oceans and, in particular, to the land-dwelling DINOSAURS. These, in turn, were replaced by the more adaptable, warm-blooded MAMMALS of the Cenozoic. Canada has world-famous exposures of Lower and Middle Paleozoic sedimentary rocks in the Rocky Mts (*see* BURGESS SHALE); of classic, Upper Paleozoic rocks in the high arctic islands; and abundant, widespread Mesozoic and Cenozoic successions in the sedimentary basin of the prairies (*see* BADLANDS; DINOSAUR HUNTING IN WESTERN CANADA), in the northern arctic islands and on the Continental Shelf off the Atlantic provinces.

The great age of Precambrian rocks and the general lack of fossils precludes fine-scale subdivision of this part of the rock record. Nevertheless, there are major global changes in the nature of these rocks through time. Archean rocks, those older than about 2.4 billion years, commonly consist of belts of volcanic rocks (greenstone belts) surrounded by masses of granitic rock. The Superior Province of the Canadian SHIELD is the largest and among the best-known bodies of exposed Archean rocks in the world. Proterozoic rocks, also abundant in the Shield, are about 570 million to 2.4 billion years old. These rocks begin to have a modern look: large sequences of shallow marine and continental sedimentary rocks can be distinguished, as can mountain belts similar to modern, continental-margin, mountain belts. There is no agreement on whether plate-tectonic processes operated in Archean time, but there is reasonable evidence that some lithospheric plates were established by Proterozoic time. This evidence is provided largely by the strong similarity between the Proterozoic Wopmay Mountain Belt in the Slave Province of the Canadian Shield and modern mountain belts.

Since the 1960s, the advent and acceptance of plate-tectonic concepts has resulted in great interest in detailed reconstruction of the Earth's crust and surface in past geological times. Canadian earth scientists are leaders in this work because of the long emphasis on regional geological studies in Canada and because of the diversity and complexity of the country — with its enormous Precambrian-Shield core, its widespread interior-platform sediments, its continent-bounding mountain belts on east, west and north sides, and its well-developed, continental-margin sedimentary sequences. This work depends fundamentally on continued refinement of subdivisions and methods of dating the rock record, through paleontological studies, radiometric dating, magnetic reversal chronology and other methods. The selection of suitable field localities as standards or references, eg, geological systems (such as the Devonian), is a vital part of this work. Government earth scientists, especially those of the GEOLOGICAL SURVEY OF CANADA, play a key role in regional geological studies, particularly in remote areas of northern Canada (*see also* GEOLOGICAL REGIONS; PLATE TECTONICS).

R.W. MACQUEEN

Geological Regions Canada consists of 6 geological regions. Five of them are of Phanerozoic age (under 570 million years old) and are arranged roughly concentrically around and partly on the sixth, the Canadian SHIELD (of Precambrian age, over 570 million years old). The Phanerozoic regions, which overlap in age, are the Innuitian Orogen, the Appalachian Orogen, the Interior Platform, the Canadian Cordillera and the continental shelves. Each region has a distinctive architecture and is composed of building blocks of characteristic types and sequences of ROCKS (tectonic assemblages) that record its development (*see also* PLATE TECTONICS). Probably the most important developmental events in geological history were the orogenies, periods during which compressive deformation, metamorphism, granitic intrusion and other processes formed MOUNTAIN RANGES (*see* GEOLOGICAL DATING).

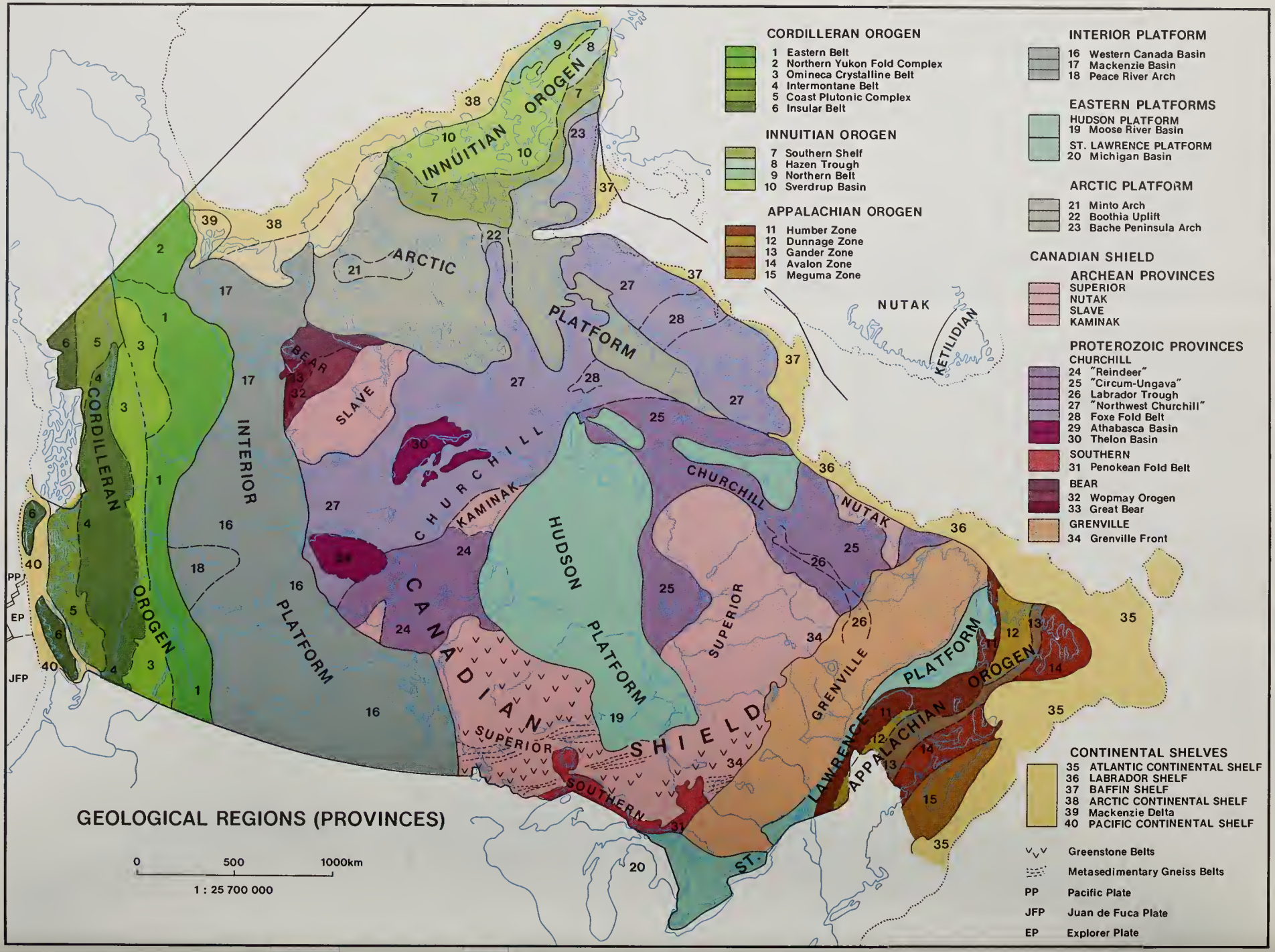
Canadian Shield

The Canadian Shield is a mosaic of geological provinces in which those of Archean age (more than 2.5 billion years old) are surrounded by a matrix of Proterozoic rocks (2.5-0.6 billion years old). The Archean provinces (Superior, Slave, Kaminak and Nutak) were cratons (ie, stable, low-lying continental parts of the Earth's crust) by the end of the Kenoran Orogeny (2.5 billion years ago); now they are mainly metamorphic and granitic rocks with irregular belts of turbidites and "greenstone" (metamorphic basic volcanics) 18 km in thickness. The Proterozoic provinces (Bear, Churchill, Labrador and Southern) are marked by orogenic trends developed during the Hudsonian Oregeny (1.9-1.8 billion years ago). The consolidated Shield was finally completed on the SE by the addition of Grenville Province about 1 billion years ago.

Superior Province is the largest Archean province. Its southern part comprises easterly trending belts, alternating between gneisses and greenstone. Some 3.8-billion-year-old gneisses occur in the extensions of Superior Province into Minnesota and of Nutak into Greenland. Slave and Kaminak cratons resemble Superior craton in overall aspect, age of contained rocks, and nature and timing of structural development. In Slave craton, however, weakly metamorphosed turbidites (ie, SEDIMENTARY ROCKS formed in water) predominate.

Churchill Province, the largest of the Lower Proterozoic provinces, includes the sinuous, intensely deformed, metamorphosed and intruded "Reindeer-Circum-Ungava" belt and the reworked fragments and edges of Archean cratons in "Northwest Churchill" domain. The southern margin of "Circum-Ungava" belt contains 6-10 km of Lower Proterozoic layered rocks overlying the Archean basement rocks of Superior Province. This rock succession, reflecting the separation of parts of Superior Province, comprises local clastic-volcanic rift assemblages, overlain by a clastic-carbonate shelf assemblage, succeeded by iron formation (*see* MINERAL RESOURCES). The shelf sediments pass outward into oceanic basalt with some ultramafic lava (ie, lava rich in iron and magnesium). Convergence and orogeny are manifested along the southern margin of the "Circum-Ungava" belt by folds and thrust faults. The northern margin of the belt is a rough mirror image of the southern margin.

"Reindeer" belt is a region of complexly deformed metamorphic rocks that includes the Flin Flon and Lynn Lk volcanic arcs separated by a turbidite basin. The NW margin contains metamorphosed remnants of shelf sediments


CORDILLERAN OROGEN
1 Eastern Belt
2 Northern Yukon Fold Complex
3 Omineca Crystalline Belt
4 Intermontane Belt
5 Coast Plutonic Complex
6 Insular Belt
INNUITIAN OROGEN
7 Southern Shelf
8 Hazen Trough
9 Northern Belt
10 Sverdrup Basin
APPALACHIAN OROGEN
11 Humber Zone
12 Dunnage Zone
13 Gander Zone
14 Avalon Zone
15 Meguma Zone
INTERIOR PLATFORM
16 Western Canada Basin
17 Mackenzie Basin
18 Peace River Arch
EASTERN PLATFORMS
HUDSON PLATFORM
19 Moose River Basin
ST. LAWRENCE PLATFORM
20 Michigan Basin
ARCTIC PLATFORM
21 Minto Arch
22 Boothia Uplift
23 Bache Peninsula Arch
CANADIAN SHIELD
ARCHEAN PROVINCES
SUPERIOR
NUTAK
SLAVE
KAMINAK
PROTEROZOIC PROVINCES
CHURCHILL
24 "Reindeer"
25 "Circum-Ungava"
26 Labrador Trough
27 "Northwest Churchill"
28 Foxe Fold Belt
29 Athabasca Basin
30 Thelon Basin
SOUTHERN
31 Penokean Fold Belt
BEAR
32 Wopmay Orogen
33 Great Bear
GRENVILLE
34 Grenville Front
CONTINENTAL SHELVES
35 ATLANTIC CONTINENTAL SHELF
36 LABRADOR SHELF
37 BAFFIN SHELF
38 ARCTIC CONTINENTAL SHELF
39 Mackenzie Delta
40 PACIFIC CONTINENTAL SHELF
Greenstone Belts
Metasedimentary Gneiss Belts
PP Pacific Plate
JFP Juan de Fuca Plate
EP Explorer Plate
INNUITIAN OROGEN
ARCTIC
PLATFORM
NUTAK
KETILIDIAN
CORDILLERAN
OROGEN
INTERIOR
PLATFORM
BEAR
SLAVE
CHURCHILL
KAMINAK
HUDSON
PLATFORM
CHURCHILL
NUTAK
SUPERIOR
GRENVILLE
PLATFORM
OROGEN
CANADIAN
SHIELD
SUPERIOR
SOUTHERN
LAWRENCE
APPALACHIAN
ST.
PP
EP
JFP
GEOLOGICAL REGIONS (PROVINCES)
0 500 1000km
1 : 25 700 000

interfolded with Archean basement that extends into "Northwest Churchill" domain. Much of the latter was probably a semi-stable extension of Slave Craton that was variably affected by the Kenoran and Hudsonian orogenies. It contains remnants of a thin veneer of Lower Proterozoic rocks consisting of 1.5 km of quartz-rich clastics, deposited in restricted basins, succeeded by a more extensive, 3 km thick, platformal assemblage of quartz-rich sandstone, carbonate, local clastics and volcanics. Much of the domain is characterized by the jostling of large blocks of Archean basement, brought together along major faults. In the Foxe Fold Belt, Archean basement and the overlying Proterozoic sediments are tightly folded together; elsewhere they are more broadly folded.

Southern Province contains a southeasterly thickening wedge of Lower Proterozoic, quartz-rich, shelf clastic sediments and subordinate mixed volcanics (7-11 km thick). The wedge accumulated along the southern edge of Superior Province. Its lowest part includes uranium-bearing conglomerate; its upper (NE) part contains sediments deposited during an ancient ICE AGE. The SE part of the wedge was variably metamorphosed and deformed by folds and thrust faults, pushed N to form the Penokean Fold Belt. The intensity of metamorphism and deformation increases southward, reflecting the convergence of a 3.5-billion-year-old Archean cratonic block northward against Superior Craton (2.2-1.7 billion years ago). Sudbury Basin and its associated nickel-rich intrusion may have resulted from meteorite impact about 1.85 billion years ago (*see* METEOR).

Bear Province consists of the northerly trending Wopmay Orogen overlapped (in the N) by younger Proterozoic rocks. Westward from Slave Craton the orogen comprises 4 zones, all cut by northeast-trending strike-slip faults. The first zone is a thin veneer of platform carbonate and sandstone superimposed by the outer part of a westerly derived clastic wedge. An eastward thrust and folded assemblage (5 km thick) of shelf clastics and carbonate is overlain by the wedge. A clastic-volcanic rift assemblage (10 km thick) overlain by fine-grained off-shelf clastics, then by early clastic wedge rocks, was deformed, metamorphosed and intruded by 1.89-billion-year-old granites. Finally, in Great Bear Belt, 1.87-billion-year-old arc volcanics (8 km thick) were deposited on 1.92-billion-year-old basement and are overlapped by younger, more extensive arc volcanics. The orogen began its complex evolution 2.1 billion years ago with the splitting of Slave Craton along northerly and east-northeasterly trending rifts. This led to the deposition of a continental margin assemblage along the W edge of Slave Craton. The assemblage was deformed, metamorphosed and intruded by granites 1.9 billion years ago in response to the collision of a microcontinent from the west. Subsequently, east-sloping subduction led to arc volcanism which extended onto the continent. A second collision farther W generated northeast- and southeast-trending strike-slip faults across the entire orogen. The indentation of Churchill Province by the rigid Slave Craton cracked the Churchill crust and possibly gave rise to 1.8-billion-year-old alkaline volcanics in the Thelon Basin.

The middle and late Proterozoic record is fragmentary but nevertheless indicates stability of the Canadian Shield from 1.8-0.57 billion years ago. In Middle Proterozoic time, an extensive 1.5-billion-year-old continental and marine sandstone-carbonate assemblage (preserved in separate, partly fault-bounded basins, eg, Athabasca Basin) was deposited over much of the Shield, overlapping 1.8-billion-year-old alkaline volcanics. Concurrently, from Labrador SW into Grenville Province, huge masses of anorthosite (composed almost entirely of plagioclase feldspar) and related granitic rocks were intruded. Concurrent and later widespread stretching across much of the Shield resulted in rifting, dike intrusion and volcanism. About 1.3 billion years ago, rifting, accompanied by basaltic volcanism and intrusion of alkaline rocks, began in Labrador parallel to Grenville Front. Enormous amounts of basalt were extruded in the Lake Superior region, accompanied by alkaline intrusions nearby, during the formation of a major continental rift that extended NE from central Kansas to Lk Superior and SE into Michigan (1-1.3 billion years ago). Depression of the crust from the weight of the volcanics created a basin in which clastic sediments were deposited until the end of Precambrian time. Concurrently, swarms of basic dikes, 1.2 billion years old, were intruded along northwesterly and northeasterly trends across much of the Shield; related basalts were extruded into parallel northwesterly trending sediment-filled rifts on Baffin I and as lava plateaus in northern Bear Province.

Grenville Province The convergence of Grenville Province against the adjacent provinces to the NW completed assembly of the Canadian Shield (0.9-1.2 billion years ago). Near Grenville Front this resulted in thickened crust and northeasterly trending structures pushed towards the NW. Subsequent uplift and erosion reveals widespread metamorphic rocks.

Interior and Related Platforms

At the end of Precambrian time (0.57 billion years ago), the Canadian Shield was a stable craton of low relief forming the foundation of the N American continent. In early Paleozoic time the Shield was depressed slightly, and much of it was gradually covered by warm, shallow seas. This inundation resulted in deposition of interrupted platformal sequences (1-3 km thick), now preserved in the Interior, Arctic, Hudson and St Lawrence platforms. These sequences generally consist of quartz-rich sandstone, overlain by interbedded carbonate and shale. By mid-Paleozoic time, differential uplift and subsidence across the Shield had created a network of arches and intervening basins which led to interruptions in the depositional sequences. The uneven relief, together with the growth of carbonate reefs, produced enclosed basins in the central Interior Platform, in Hudson Platform and in Michigan Basin where evaporites (eg, salt, potash) accumulated.

Platformal sequences of the Interior Platform, containing rocks from Cambrian to Jurassic age, are overlain by a foreland basin which migrated eastward and covered much of the platform ahead of advancing pulses of deformation and uplift in the Cordillera. Sandstone, conglomerate, shale and coal accumulated in 2 major clastic wedges of late Jurassic-early Cretaceous and late Cretaceous-Paleocene age, respectively. The lower wedge reflects several lesser, northward-migrating pulses. The 2 major wedges are separated by mid-Cretaceous marine shales deposited in a shallow sea that covered Interior Platform. A clastic wedge in Mackenzie Basin accumulated in pulses from early Cretaceous to Eocene time. Lower Cretaceous coal-bearing clastics were deposited in Moose River Basin on Hudson Platform.

Appalachian Orogen

The Appalachian Orogen records the latest Precambrian rifting of the ancestral Canadian Shield, the earliest Paleozoic opening of the Iapetus Ocean to the E, its mid-Ordovician closing and related deformation, and mid- and late-Paleozoic folding and faulting. The orogen consists of several zones of which only the innermost, Humber Zone, was deposited directly on ancestral N America. There, Grenville Province basement is overlain by Upper Proterozoic rift clastics and volcanics covered by a more extensive Cambrian-Ordovician sandstone-carbonate shelf assemblage. Succeeding clastics were derived from the SE, heralding the early Paleozoic arrival of a slice of off-shelf assemblage and higher slices of Ordovician oceanic crust thrust northwestward from Dunnage Zone and now stacked above the clastics.

Dunnage Zone consists of rock complexes which floored the Iapetus Ocean: pieces of upper mantle-oceanic crustal sequences overlain by Lower Ordovician arc volcanics, related clastics and local masses of jumbled blocks of volcanics and clastic rocks surrounded by Ordovician shale. The ocean's eastern margin may be represented in Gander Zone by pre-Middle Ordovician clastics, associated with gneisses in Newfoundland and overlain by arc volcanics in NB. Zonal boundaries are straddled by overlying Upper Ordovician-Silurian marine and continental sediments and volcanics indicating that Dunnage and Gander zones were accreted to N America during the mid-Ordovician Taconian Orogeny.

Avalon Zone is a foreign fragment composed of Proterozoic partly glacial sediments and volcanics, overlain by Cambrian sediments containing FOSSILS different from those in Humber Zone and St Lawrence Platform, and capped by Ordovician clastics with iron formation. Avalon Zone accreted to Gander Zone during mid-Paleozoic Acadian Orogeny, resulting in steeply inclined folds and faults and extensive granitic intrusion across the entire orogen, and disruption along steep faults in nearby platforms.

Meguma Zone is also foreign because it includes folded Cambrian-Ordovician turbidites, derived from an unknown source to the SE, and distinctive granites of Devonian age unlike those associated with Acadian Orogeny. Meguma Zone was accreted to Avalon Zone along steep faults with horizontal slip before both zones were partly covered by continental, coal-bearing Carboniferous clastics. The region contains evidence recording the final assembly of the supercontinent Pangea. The development of rifts in Triassic time (225-190 million years ago), the deposition in them of rift clastics and basalt and the intrusion of alkaline rocks in the Cretaceous are associated with the breakup of Pangea and the subsequent opening of the Atlantic Ocean in the Mesozoic.

Innuitian Orogen

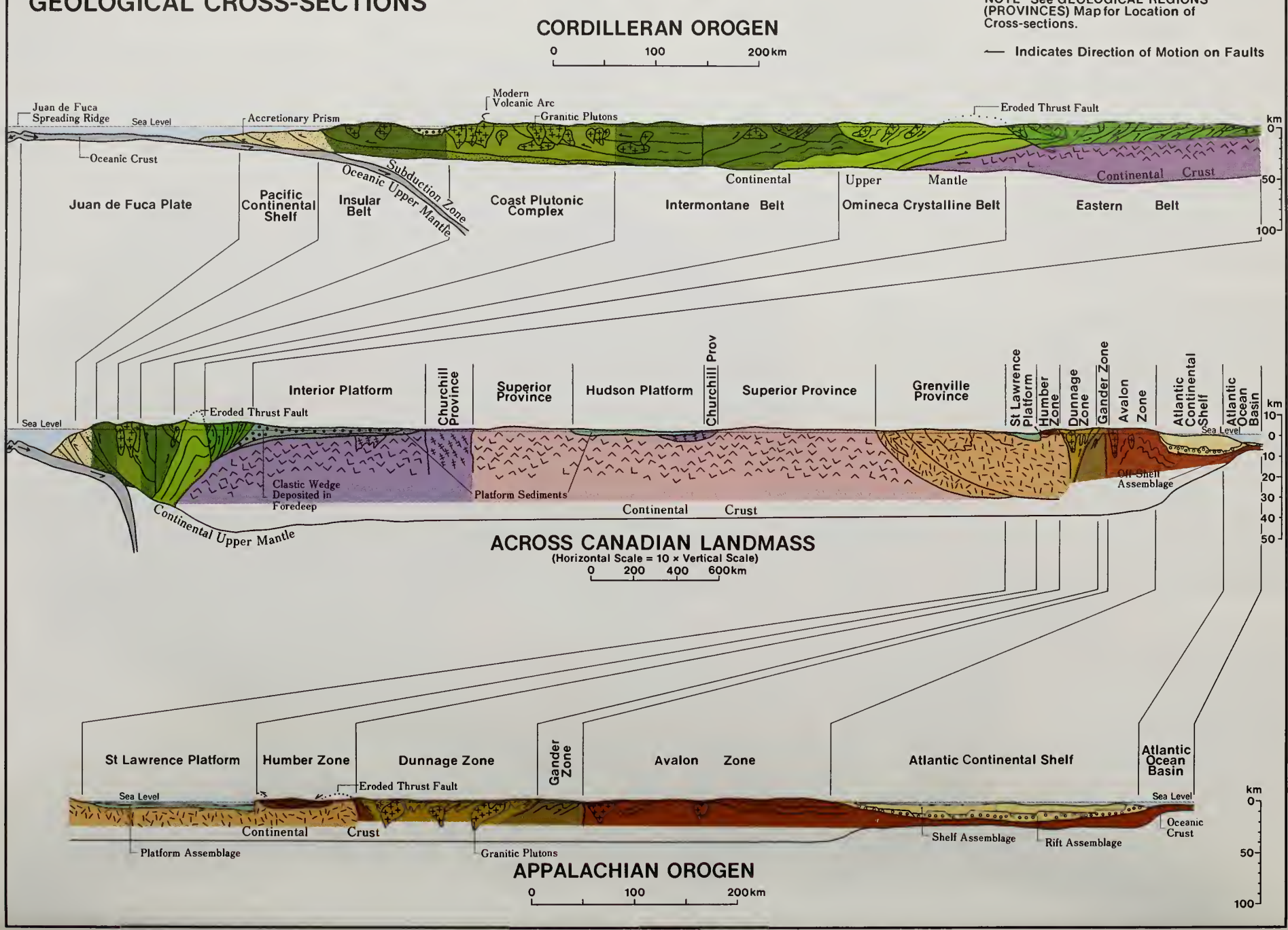
The Innuitian Orogen began with earliest Paleozoic rifting of northern ancestral N America, followed by early Paleozoic deposition of shelf and off-shelf sediments, the latter in a deep trough bounded on the N by foreign continental fragments. A younger, overlapping clastic wedge was deformed in the mid-Paleozoic and, finally, the orogen was partly superimposed by a mainly Mesozoic clastic basin, which was itself deformed in latest Mesozoic and early Tertiary time.

The Arctic Platform merges northward into a Cambrian-Lower Devonian southern shelf assemblage of 5 km of carbonate, shale and evaporite. It is adjoined by Hazen Trough, containing Lower Cambrian rift clastics overlain by deep-water shale and 3 km of turbidites. Hazen Trough is bounded on the N by the Northern Belt which comprises continental fragments (largely volcanics and granites). Northerly derived turbidites indicate that the Northern Belt was uplifted, following the collision (along a zone marked by oceanic ultramafic rocks) of Proterozoic and Middle Ordovician fragments in mid-Ordovician time. This collision ended arc volcanism in the Northern Belt. It was followed by pulses of folding and uplift in Silurian and Devonian times and by granitic intrusion in the Devonian. Uplifts in northeastern and eastern parts of the orogen shed detritus to a southeastward advancing Middle and Upper Devonian clastic wedge. It was compressively folded during the Ellesmerian Orogeny (about

GEOLOGICAL CROSS-SECTIONS

NOTE See GEOLOGICAL REGIONS (PROVINCES) Map for Location of Cross-sections.

— Indicates Direction of Motion on Faults



345 million years ago) which migrated from the Northern Belt to the Southern Shelf. Subsequently, stretching and subsidence led to the deposition of 12 km of sediments in Sverdrup Basin, mainly of Mesozoic rift clastics and basaltic lava and intrusion, and some Upper Paleozoic evaporites that were locally squeezed upward into overlying sediments. The latest Cretaceous uplift in the eastern Sverdrup Basin shed a clastic wedge across the basin to the continental margin. This was succeeded by the Eurekan Orogeny (about 65 million years ago) which created broad folds and thrust faults directed south and east. At the same time, more than 3 km of clastics accumulated in local basins on land and in narrow, marine fault-troughs. Late Cenozoic vertical faulting produced the present topography.

Canadian Cordillera

In the Canadian Cordillera rifting and continental shelf development took place from Proterozoic to mid-Mesozoic time in the Eastern Belt. Elsewhere, foreign fragments were accreted successively to western N America in mid- and late-Mesozoic time. Each accretion was followed by orogeny and deposition of a clastic wedge; related metamorphism and granitic intrusion were restricted mainly to zones straddling the boundaries of accreting blocks. Since the late Mesozoic, the Pacific Ocean Basin has slid under and horizontally past the Cordillera along northwest-trending transform faults.

A long-lived phase of continental margin sedimentation from Proterozoic to Jurassic time (1.5 billion-160 million years ago) is recorded in the Eastern Belt in at least 3 rift and shelf assemblages, totalling 25 km in thickness. The 2 Middle Proterozoic assemblages reflect continental rifting and separation 1.5 billion years ago, and deposition of 2 clastic-carbonate shelf sequences, the first of which was deformed 1.35 billion years ago. They were accompanied by development of connecting, easterly trending fault-troughs that protruded into the continent. The third assemblage comprises partly glacial Upper Proterozoic rift clastic overlain by Cambrian to Jurassic shelf sequences continuous with thinner sequences in Interior Platform but passing westward off the shelf to shale and turbidites. Northern Yukon underwent Devonian-Mississippian folding, granitic intrusion and uplift. This and other northern Cordilleran uplifted areas shed clastics SE across the continental margin.

An accretionary phase in late Jurassic to Cretaceous time resulted from the westward drift of N America and its collision with several northward-moving Pacific plates. Several foreign blocks were amalgamated into 2 large composite fragments (Intermontane and Insular belts) which, as a result of this collision, were then accreted successively to N America. The foreign blocks show fossil and other evidence of displacement through 30° or more of latitude.

The Intermontane Belt consists of 2 extensive Upper Triassic-Middle Jurassic volcanic arcs, each built largely on an Upper Paleozoic foundation. They are separated by an oceanic terrane which includes subduction complexes of repetitively stacked accretionary wedges and of jumbled blocks of basalt, ultramafic, chert and blueschist. The eastern arc is bounded on the E by a region of Upper Paleozoic oceanic crust, telescoped over a small Paleozoic terrane that was deformed before Mississippian time.

The Omineca Crystalline Belt embraces the region where the Intermontane composite fragment collided with and partly overrode the Eastern Belt. This mid-Jurassic collision gave rise to the Columbian Orogeny. Rocks of the outer part of the continental margin and the adjacent Intermontane fragment were compressed, metamorphosed and displaced into stacked sheets transported mainly eastward, but also







Big Muddy Valley (*top*); Baffin Island, NWT (*centre*); and Shield near Flin Flon, Man (*photos by Richard Vroom/ Miller Services Ltd.*).

partly westward, from a central metamorphic core zone. From the resulting uplift, clastics were shed mainly eastward into a foredeep and partly westward into a backdeep. Eastward displacement over the Canadian Shield resulted, in effect, in a westward subduction of continental crust which, when partially melted, gave rise to mid-Cretaceous granites in eastern Intermontane and Eastern belts.

Insular Belt comprises 2 large terranes amalgamated in late Jurassic time. One is mainly of Paleozoic sediments and volcanics; the other a Triassic to mid-Jurassic sequence of basalt, carbonate and arc volcanics, overlying an Upper Paleozoic basement. The outer margins of the belt contain remnants of Upper Mesozoic and Cenozoic subduction complexes, suggesting prolonged east-sloping subduction of oceanic crust beneath the Insular Belt. In late Cretaceous time an Insular composite fragment collided with and accreted to the Intermontane Belt which was by then part of N America. This process created the Coast Plutonic Complex, a belt, uplifted in Cenozoic time, consisting of extensive granitic plutons and of medium-grade metamorphic rocks that straddle the boundary between these composite belts. Contemporaneously, arc volcanism and related intrusions of granitic plugs took place in the Intermontane Belt while in the Eastern Belt further thrust faulting and uplift during Laramide Orogeny completed the building of the Rocky Mountains. A related clastic wedge was deposited in a foredeep extending into the western Interior Platform. In the late Cenozoic, extensive crustal stretching resulted in extrusion of widespread sheets of fluid basalt over much of the Intermontane Belt and of local rift and arc volcanics in its western part.

Continental Shelves

The Canadian continental shelves are the youngest additions to Canada's landmass. The arctic and eastern shelves developed along continental margins adjacent to opening oceans; the Pacific Shelf formed along a continental margin that slides over or horizontally past oceanic crust. The shelves form submarine terraces, 5-700 km wide and up to 300 m deep. With the exception of the Pacific Shelf, they are underlain by relatively undeformed Mesozoic and Cenozoic prisms of sedimentary rocks (3-13 km thick), composed of materials eroded from the continent, draped over older rocks along its margin.

The Arctic Shelf evolved following opening of the Arctic Ocean basin, possibly from the counterclockwise rotation of Alaska 120 million years ago. Subsequently, 4 km of shelf sediments were superimposed by 9 km of Upper Cretaceous-Cenozoic clastics of the Mackenzie Delta which progressively expanded northward. The eastern shelves built outward as the Atlantic Ocean basin opened and as N America separated from Africa 165 million years ago, from Europe 100-90 million years ago, and from Greenland 70-60 million years ago. Eastern shelves comprise 2 or 3 tectonic assemblages: a lower rift assemblage in fault troughs containing clastics, evaporites and volcanics lying on Precambrian and Paleozoic rocks; an upper, more extensive clastic-carbonate shelf assemblage deposited during a continental drifting phase after the continents separated; and a final capping of Pleistocene glacial deposits. Continental crust is 35 km thick under the inner shelf, thinning to 15-20 km under the outer shelf.

The narrow Pacific Shelf lies along an active margin marked by numerous EARTHQUAKES. West of Vancouver I, the oceanic Juan de Fuca and Explorer plates are descending beneath the continent along a northeasterly sloping subduction zone. This has resulted in 2 modern assemblages: an active volcanic arc 300 km NE of the foot of the Pacific Shelf, where the subduction zone emerges; and Upper Mesozoic and Cenozoic accretionary prisms of clastics and oceanic volcanics scraped off the descending plate and stacked in easterly tilted wedges beneath the narrow shelf. Northwest of Vancouver I, however, oceanic crust of the Pacific Plate is sliding horizontally NW past the continent along a transform fault.

J.O. WHEELER

Reading: R.J.W. Douglas, ed, *Geology and Economic Minerals of Canada*, 2 vols, (1970).

Geological Survey of Canada, one of Canada's oldest scientific agencies, was founded in 1842 to assist in developing a viable MINERAL industry by establishing the general geological base on which the industry could plan further, detailed investigations. Originally limited to the PROVINCE OF CANADA, the GSC is now involved in earth-science studies throughout Canada, especially in the YT and the NWT. On 10 Sept 1841, £1500 was set aside to establish a geological survey, and the GSC began work in a warehouse in Montréal. The first director, geologist William Edmond LOGAN, was appointed in Apr 1842. His first project, a simple questionnaire sent to landowners, doctors, etc, from Niagara to Gaspé, provided the first overview of the GEOLOGY of the area. Logan's one assistant, Alexander Murray, was a topographer. Later, T.S. HUNT and Elkanah BILLINGS joined the GSC as mineralogist and paleontologist, respectively. In the next decade the GSC participated in several international exhibitions (eg, London, 1851; Paris, 1855) at which elegant displays advertised Canada's potential MINERAL RESOURCES. The first comprehensive report of the geology of the United Province, Logan's *Geology of Canada*, was published in 1863, and the first large-scale maps appeared in the same decade (*see* CARTOGRAPHY). Confederation increased tenfold the area for which the GSC was responsible. Emphasis was given to economic geology, especially to assist the government in making RAILWAY land grants. The value of the GSC to the economic growth of Canada became obvious during the mid-19th century. The organization, funded initially by two 5-year parliamentary grants, was a branch of the Dept of the Interior in 1877-90, moving to Ottawa in 1881. Between 1890 and 1907 it formed a separate department. Then began the change of titles reflecting the growth of parts of the original GSC: Mines (1907), Mines and Resources (1936), Mines and Technical Surveys (1950) and finally Energy, Mines and Resources (1966). The NATIONAL MUSEUMS OF CANADA, the Topographic Survey and the Canada Centre for Mining and Energy Technology (formerly the Mines Branch), all originated in the GSC.

Early geologists were also explorers, geographers, botanists, zoologists and anthropologists who played a large role in opening up the West and later the Arctic. Notable names include G.M. DAWSON, third director, who carried out extensive reconnaissance mapping in BC, prepared a comprehensive report on the HAIDA, and mapped in the YT a decade before the KLONDIKE GOLD RUSH; Robert BELL, who for 34 years explored the North and West, including the coasts of Hudson Str and Hudson Bay; A.P. LOW, whose work in central Labrador and Ungava included recognition of the potential of the region's vast iron resources and who, in 1903-04, commanded the government expedition to northern waters in the Neptune, in a voyage that was Canada's first clear exercise of authority over the ARCTIC ARCHIPELAGO; J.B. TYRRELL, whose epic trips across the Barrens in 1893 and 1894 filled large blanks on the map; and J. Mackintosh Bell, whose surveys from Lk Athabasca to Great Bear Lk in 1900 resulted in observations that 30 years later led Gilbert LABINE to the discovery of URANIUM deposits at Port Radium.

Studies having a strong economic focus were emphasized during the 1930s and WWII, but by 1950 the need for the earth sciences to benefit from rapid advances in technology became apparent. The GSC again became research oriented and experienced a considerable expansion in staff and resources. To facilitate its coast-to-coast activities and provide closer liaison with its users, several small regional offices were expanded and a new headquarters was opened in Ottawa (1959).

To provide basic earth-science information, the GSC has always depended on field studies. The introduction of light-weight helicopters in the 1950s provided a tool that allowed the geologist to spend most of the working day making observations, instead of slogging through bush, climbing mountains or portaging a canoe. By 1973, all of Canada had been examined at a reconnaissance scale and more detailed studies had begun.

Technological developments in the field of airborne geophysics have made major programs possible, such as the GSC's national aeromagnetic survey. By 1982, more than 8 million line-kilometres had been flown, and 8000 aeromagnetic maps portraying data of great interest to the mining industry had been published. The GSC's expertise in the fields of airborne geophysics and GEOCHEMISTRY has also allowed significant contributions to be made to developing countries, especially in Africa, through the Canadian International Development Agency (CIDA).

The GSC's present role involves 3 main activities: ensuring the availability of basic, geoscientific knowledge about the landmass and offshore areas; acquiring information on the nature, distribution and magnitude of ENERGY and mineral resources, and on related exploration technology; identifying and assessing geological hazards and processes that affect the environmental balance and may constrain use of Canada's landmass. In 1983-84 the GSC had a budget of $51 million and a coast-to-coast staff of 760, organized into 8 divisions.

Cordilleran Geology Division, Vancouver and Patricia Bay, BC, conducts studies of the geology of BC and the YT, and the marine geology of the Pacific Continental Margin.

Institute of Sedimentary and Petroleum Geology, Calgary, provides geological data on the hydrocarbon-rich western and arctic sedimentary basins.

Precambrian Geology Division, Ottawa, conducts studies of the geology of the mineral-rich Canadian Shield, composed of some of the oldest rocks on the Earth.

Atlantic Geoscience Centre, Dartmouth, NS, responsible for geological and geophysical studies of the Atlantic and arctic offshore regions.

Terrain Sciences Division, Ottawa and Calgary, studies surficial materials, geomorphology and natural terrain hazards of the Canadian landmass, including the effects of human activity.

Economic Geology Division, Ottawa, conducts studies of the processes which lead to the formation of mineral deposits and determines the probable distribution and abundance of non-hydrocarbon minerals.

Resource Geophysics and Geochemistry Division, Ottawa, conducts aeromagnetic, radiometric and geochemical surveys and develops new methods for obtaining geophysical and geochemical data.

Geological Information Division, Ottawa, responsible for drafting, editing and publishing maps and reports and for maintaining Canada's largest earth-science library.

Central Laboratories and Technical Services Division, Ottawa, provides analytical services and carries out mineralogical studies.

R.G. BLACKADAR

Reading: Morris Zaslow, *Reading the Rocks* (1975).

Geology Every day of our lives we interact with the planet we live on. Normally, the interaction is quiet and unobtrusive and we take a stable ENVIRONMENT for granted. But, at times, we are reminded that this planet changes: a VOLCANO erupts in a remote country and its dust reduces sunlight by 5% for a few years; an EARTHQUAKE leaves thousands dead or homeless. We have been forced to become aware of the limitations and fragility of the Earth, and of problems such as ACID RAIN and toxic-waste POLLUTION. Geology deals primarily with the study of the planet Earth. Significant questions involve the size, shape and chemical makeup of the Earth, now and throughout geological time. Of equal importance are questions about the origin and evolution of life, and about RESOURCES and the possible effects of resource limitations on human development and survival.

Earth is 70.8% covered by water but only with the development of SONAR techniques has it become possible to describe the solid earth below the oceans. With increasingly sophisticated satellite observations, relatively fine structural details (eg, areas of volcanic activity) can be seen. With modern techniques geologists can observe on almost all appropriate scales: we can "see" the entire planet on a scale of 10^7 m and, with electron microscopes, we can see atoms of $1/10^{10}$ m diameter.

Geological Sciences in Canada

Canada has the second largest land area (after the USSR) and the largest coastline of any nation, as well as a vast area of continental shelf. Its population is small; the natural resources vast. Geology in Canada may have begun with Jacques CARTIER when, in the 1530s, he returned to France with a load of worthless crystals he thought were diamonds. Martin FROBISHER made the same error in the 1570s, mining quantities of useless ore on Baffin I. In the early 1800s, systematic geological mapping in Europe was becoming a science. The Industrial Revolution demanded coal, iron ore and other minerals, and early hit-and-miss PROSPECTING techniques were proving costly. Public interest in geology broadened as the study of rocks accelerated and, inevitably, as dogmas concerning time and life came under fire. In Canada, the systematic study of geology can be said to have begun in 1842 with the founding of the GEOLOGICAL SURVEY OF CANADA.

Early geologists in Canada went far beyond the massive task of describing the stratigraphy and producing accurate maps; they were true natural scientists who described every aspect of the natural and human environment. The great traditions established at that time have continued, and the present GSC remains a world leader. The mineral industry was slow in attaining worldwide importance. It was not until after 1945 that the steel, oil and gas industries began accelerated development; Canada first exported oil in 1949. The community of geologists grew with the mineral and oil boom. Canada became a leader in techniques for REMOTE SENSING, for geophysical techniques based on gravity, and for seismic, magnetic and electrical methods of mapping. As detailed maps improved, the most favourable rocks for particular resources became better understood. Canada perhaps still leads the world in modern prospecting technology, and Canadian geologists are sought in developing countries to assist in exploration programs. As the resource industries became increasingly important, the provinces began to build their own more specialized surveys, which have come to assist and amplify the task of the GSC. The membership patterns of the various specialized societies (involving government, university and industry representatives) illustrate the strength of the geological community.

Abbé Jean Holmes began geology instruction in Canada early in the 19th century at the SEMINAIRE DE QUÉBEC (later Laval University). The first geology department was established at University of Toronto in 1853. To provide for the training of young geologists, William LOGAN endowed a professorship of geology and paleontology at McGill University. In 1855, J.W. DAWSON became principal of McGill and first incumbent of that chair. By the end of the 19th century there were 6 geology departments in Canadian universities. The most impressive growth occurred 1949-70, when the number increased from 15 to 30. Earth science instruction also takes place in departments of GEOGRAPHY, PHYSICS, MINERAL AND MINING ENGINEERING, CIVIL ENGINEERING (geotechnique) and SOIL SCIENCE. GEOCHEMISTRY and GEOMORPHOLOGY are also geological subjects.

Relation to Other Sciences and Society

To many, the most important justification for the study of geology is the necessity of providing raw materials. In Canada, the economic aspect of the science is large: minerals provide 26% of exports and, overall, almost 40% of Canada's economy involves the mineral industry. Today, the impact of earth sciences goes much further than mineral and energy production. Geochemists are skilled in the analysis of trace quantities of metals and hence are in demand for the study of environmental aspects of inorganic pollution (eg, heavy metals). Geologists are needed when dams, highways, airports, nuclear power plants, urban expansion or even agricultural developments are planned. Earth scientists are involved in any problem focusing on human impact on the environment.

The earth sciences have always had close links to other sciences. Thus, the solid-state physics of materials under extreme pressure and temperature is closely related to studies of the deep Earth and of objects in space. Views on nuclide synthesis in stars draw heavily on data from geochemistry. For BIOLOGY, studies of fossil organic matter in rocks make a vital contribution to an understanding of the origin of life and its tolerance to environmental change. Modern geologists require knowledge from many related sciences, for example, the paleontologist needs biology; the geophysicist, physics and applied mathematics; the structural geologist, a background in solids mechanics and fluid dynamics.

Canadian Institutions

Federal and provincial geological surveys still remain the key organizations for a continued understanding and improvement in knowledge of Canadian geology. From their work come essential geological and geophysical maps. University geologists have made large contributions to understanding the fundamental processes of geology. The main geological societies and their publications include Assn of Exploration Geologists, *Journal of Geochemical Exploration;* Canadian Assn of Geographers, *Canadian Geographer;* Canadian Exploration Geophysical Soc, Canadian Geophysical Union, *Canadian Geophysical Bulletin;* Canadian Geotechnical Soc, *Canadian Geotechnical Journal;* Canadian Institute of Mining and Metallurgy, *Canadian Mining and Metallurgical Bulletin, Journal of Canadian Petroleum Technology, Canadian Metallurgical Quarterly;* Canadian Soc of Exploration Geophysicists, *Journal of the Canadian Soc of Exploration Geophysicists;* Canadian Soc of Petroleum Geologists, *Bulletin of Canadian Petroleum Geology* and *Reservoir;* Canadian Soc of Soil Science, *Canadian Journal of Soil Science;* Canadian Well Logging Soc, *The CWLS Journal;* Geological Assn of Canada, *Geoscience Canada, Canadian Journal of Earth Sciences;* Mineralogical Assn of Canada, *Canadian Mineralogist.*

The Canadian Geoscience Council, Dept of Energy, Mines and Resources, co-ordinates information from all subdisciplines. It also publishes special studies (eg, a recent pamphlet on careers in geoscience). The GSC and the various provincial surveys publish bulletins and maps and supply information of local and general geological significance. *See also* FOSSILS; GEOLOGICAL HISTORY; PALEONTOLOGY; PLATE TECTONICS; GEOLOGICAL REGIONS; MINING; MINERAL RESOURCES.

W.S. FYFE

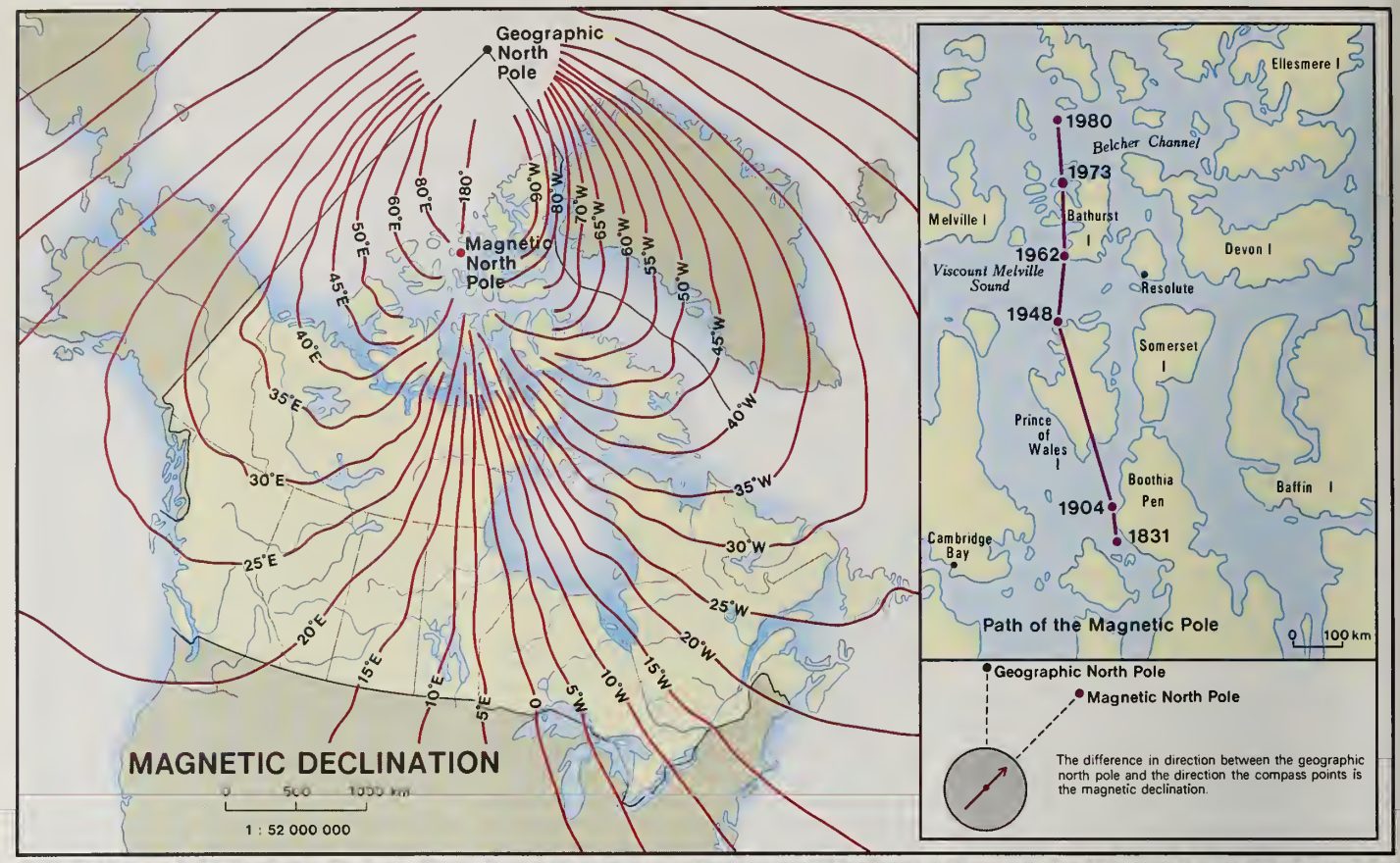
Reading: R.J.W. Douglas, ed, *Geology and Economic Minerals of Canada* (1970); F. Press and R. Siever, *Earth* (1982).

Geomagnetic Pole The Earth behaves like a magnetised sphere with its magnetic poles near, but not identical to, its poles of rotation. In 1831 James Clark Ross located the N magnetic pole on KING WILLIAM ISLAND in the Canadian Arctic where his compass dipped vertically downwards. This pole probably moves continuously and it is now over BATHURST ISLAND. Convection currents flowing in the white-hot liquid iron of the Earth's outer core are thought to generate the main magnetic field; secondary effects from the sun (eg, magnetic storms, solar winds) continuously agitate the field and its poles (*see* NORTHERN LIGHTS). An investigator in space would see that the field is distorted. The average of the whole field would have a pole (ie, north geomagnetic pole) over Baffin Bay near NW Greenland. The south magnetic pole is in Antarctica. Irregularities in the core's convection currents are believed to cause the magnetic poles to wander about the poles of rotation and to change in intensity so that the field dies away and returns with reversed polarity at intervals of thousands of years. This property is useful in archaeology, in dating magnetic rocks and in measuring the rates of seafloor spreading. *See also* NORTH POLE; map page 734. J. TUZO WILSON

Geomorphology studies the form of the Earth's surface. It includes the description, classification, internal structure and GEOLOGICAL HISTORY of surface features resulting from EROSION and deposition by RIVERS, GLACIERS, OCEAN WAVES, WIND, gravitational movement of material down slopes and weathering. Faulting of the Earth's crust and volcanism are also included. Most of Canada was covered by continental glaciers several times; therefore, glacial GEOLOGY receives most attention from Canadian geomorphologists. Arctic geomorphology and coastal geomorphology are also important. Most geomorphic processes result from the CLIMATE; hence, CLIMATE CHANGE is a uniting theme, especially in the closely related field of Quaternary geology, which deals with the last 2 million years.

Geomorphological accounts occur in most reports of exploration since the 1850s and surface deposits have been described by the GEOLOGICAL SURVEY OF CANADA (GSC) since its creation in 1842. Early discussions focused on whether erratic boulders were transported by floating ice or by continental glaciers. By about 1875 the glacial theory was widely accepted, except by J.W. DAWSON of McGill, author of *The Canadian Ice Age* (1894). His son, G.M. DAWSON explored much of western Canada and published the first comprehensive work on Canada's physiography (1884). Before 1850 most geomorphology reports were minor sections within reports on bedrock, but several geologists with the GSC made more definitive contributions: Robert Chalmers in southern Québec and NB; J.B. TYRRELL in northern Manitoba; W.A. Johnston in Ontario, the eastern prairies and BC; J.W. Goldthwait in the St Lawrence Valley and NS; and E.M. Kindle studying recent sedimentation processes. After WWII the GSC established a group of a dozen glacial geology specialists, which evolved into the Terrain Sciences Division, the largest single group of geomorphologists in Canada.

Early contributors outside the GSC were David Honeyman in NS (active 1862-88); J.W. Spencer, F.B. Taylor and G.M. Stanley, students of the glacial Great Lakes (1894-1945); and A.P. Coleman who worked across Canada and wrote on



Precambrian and Pleistocene GLACIATIONS, including his book *The Last Million Years* (1941). Glaciological observations were begun in Alberta and BC by George and William S. Vaux in 1899 and continued by A.O. Wheeler until 1931. Erosion surfaces of the Precambrian SHIELD were treated by A.W.G. Wilson in 1903 and by H.C. Cooke of the GSC in 1929-33.

Physiography took root in university GEOGRAPHY departments in the 1930s, promoted by Raoul Blanchard in Québec and Thomas Griffith TAYLOR at University of Toronto. The expansion of geography departments offering programs in PHYSICAL GEOGRAPHY (3 in 1947, 35 in 1979) brought an influx of European geographers. In 1979, 23 departments offered master's programs; 16 awarded doctoral degrees. Probably over half of these were in geomorphology. Similar growth increased the number of geology departments from 15 to 30, of which 23 gave graduate instruction in geomorphology and 14 offered advanced degrees in geomorphology or Quaternary geology. The Geographical Branch, a federal agency parallel to the GSC, was created in 1947 and emphasized arctic geomorphology. It was dissolved in 1967; its journal *Geographical Bulletin* ceased publication and most staff members joined other units. An explosive increase in the number of geomorphological publications took place between 1950 and 1970. Regional monographs appeared on the Canadian CORDILLERA by H.S. Bostock (1948), on southern Ontario by L.J. Chapman and D.F. PUTNAM (1951), on BC by S.S. Holland (1964), on the Arctic by J.B. Bird (1967) and on Canada as a whole by Bird (1972).

Applications Geomorphology is applied in SOIL research; in engineering geology and CIVIL ENGINEERING projects such as route location, foundation problems, CONSTRUCTION materials, slope stability and geological hazards; and in environmental and GROUNDWATER studies. The tracing of transported indicators is an important technique in mineral PROSPECTING. REMOTE SENSING requires some knowledge of geomorphology. In Canada great effort is expended in mapping surficial geology, terrain characteristics and resources such as SAND AND GRAVEL (*see* CARTOGRAPHY). Much applied research is done, especially by geologists, geographers, civil engineers and foresters, on the behaviour of frozen ground and on slope stability (*see* LANDSLIDES). The federal and most provincial governments have geomorphologically oriented agencies. The GSC was responsible for about a third of the projects in Canada in 1979-81; Environment Canada, the Alberta Research Council and the Ontario Geological Survey had roughly 6% each. Among academic institutions, University of Alberta (Geology) leads with 10%.

Societies and Journals Canadian geological geomorphologists benefit from memberships in the Geological Soc of America and publish in its *Bulletin* and its monthly periodical, *Geology*. The Geological Assn of Canada with the *Canadian Jnl of Earth Sciences* is a major forum. The *Canadian Geographer* of the Canadian Assn of Geographers publishes some papers on geomorphology. The Canadian Quaternary Assn serves geomorphologists interested in Quaternary research. In Québec, l'Assn Québecoise pour l'étude du Quaternaire sponsors the journal *Géographie physique et Quaternaire*, and a few geomorphological papers appear in *Cahiers de Géographie du Québec*. Most Canadian areal studies requiring maps are government reports.

J.A. ELSON

Geopolitics, a strategy for national identity and development based on a country's geographical characteristics and natural resources. From the development of a geopolitical strategy can flow industrial strategies, defence policies and a formula for permanent control over local branch plants of externally owned, multinational corporations. The study of the influence of geography on national and international politics began in the early 20th century. In 1919 an influential British geographer, Sir Halford J. Mackinder, theorized that the domination of the Euro-Asian "heartland" by one country, eg, Germany, would upset the world's balance of power. German geographers used Mackinder's theories to provide a justification for Nazi territorial expansion. Geopolitics has also been used to explain the idea of "Manifest Destiny" espoused by the US in the 19th century.

Canada is an outstanding example of a "geostrategic region," identified by American political geographer Saul B. Cohen as a region "large enough to possess certain globe-influencing characteristics and functions." In 1937 French geographer André Siegfried noted that Canada's 2 basic assets were its vast natural resources and its geographic position. Nevertheless, geopolitical thinking has been absent in Canadian governmental and industrial planning, chiefly because policy planners have viewed it as deterministic and authoritarian. The long search for a national industrial strategy has failed partly because Canadians have not developed a prior and overall geopolitical view of Canada. Thus, for example, Canada approaches the social and economic development needs of its arctic regions piecemeal. With 3 long ocean coastlines Canada has never, since the work of the PERMANENT JOINT BOARD ON DEFENCE in the 1940s, attempted to develop a geopolitical strategy for defence. At the same time, such federal government programs as the 1961 National Oil Policy and the 1980 National Energy Policy could be defined as "geopolitical": both policies represented efforts towards the "Canadianization" of our strategically situated but largely foreign-owned oil and natural gas industries.

By comparison, other large nations including the US, USSR and Brazil, with great potential in their natural resources and dominant geographical positions in their regions, have defined themselves geopolitically. Their well-developed geopolitical positions have resulted in the growth and use of their military and commercial sea power, the control of their natural resources, and the direction of management and labour toward national goals.

JOHN D. HARBRON

George, Dan, or Teswahno, actor, public speaker (b on Burrard Indian Reserve No 3, BC 24 July 1899; d at Vancouver 12 Sept 1981). By his film roles and personal appearances Dan George helped improve the popular image of Indian people, often represented as bad characters. Until age 60, he worked as longshoreman, logger and itinerant musician, and was chief of the Squamish Band of Burrard Inlet, BC, 1951-63. He was discovered in 1959 and acted a succession of roles as gentle Indian elder on Canadian television and stage, including CBC's "Cariboo Country" (1961) and the original production of George RYGA's *The Ecstasy of Rita Joe* (1967). He recited his much-publicized "Lament for Confederation" on Indian defeat and resurgence at Vancouver's Canadian Centennial celebrations in 1967. During his Hollywood career his roles included at least 8 feature films, among which are *Smith* (1969), *Little Big Man* (1970), *Harry and Tonto* (1974) and *The Outlaw Josey Wales* (1975). A non-activist, George refused to endorse Indian political causes but insisted on portraying only "good" native figures. He was author of *My Heart Soars* (1974) and *My Spirit Soars* (1982), both prose-poetry. BENNETT MCCARDLE

Reading: Hilda Mortimer, *You Call Me Chief: Impressions of the Life of Dan George* (1981).

George Cross The aerial bombing of centres of civilian population in Britain early in WWII gave rise to numerous acts of the most conspicuous bravery. In response, King George VI instituted a major decoration in 1940 for which civilians and members of the armed forces are eligible. The George Cross ranks immediately after the VICTORIA CROSS in the scale of Commonwealth HONOURS. Recipients have included 8 Canadians and one non-Canadian serving in a Canadian military unit. The decoration is in the form of a plain silver cross with, at its centre, a representation of St George slaying the dragon encircled by the words "For Gallantry." The ribbon is "garter" blue. CARL LOCHNAN



The George Cross, established by King George VI in 1940 to honour acts of bravery, has been awarded to 8 Canadians and to one non-Canadian in a Canadian unit (*courtesy National Museums of Canada/National Museum of Man/K71-96*).

George Rivière, 560 km long, in northern Québec, drains N into the E side of UNGAVA BAY. Its southern and eastern divides, along with those of tributary rivers Ford and De Pas, extend along much of the Québec-Newfoundland and Labrador border. The river's 41 700 km^2 basin includes Lac de la Hutte-Sauvage (Indian House) and Lac aux Goélands (Whitegull) among many lakes that provide a mean discharge of 881 m^3/s. Over granitic gneiss of the Churchill geological area, the vegetation is transitional — from boreal forest in the S and W to tundra in the E and N. The river has supported a salmon sport fishery and the basin makes up much of the range of the George River CARIBOU herd. Native occupation of the area is by MONTAGNAIS-NASKAPI Indian and LABRADOR INUIT. Moravian missionaries named the river for George III in 1811, but European exploration of the extent of the river was not made until John MCLEAN's attempt to establish a transportation route for the HBC from Fort-Chimo to Lk MELVILLE. McLean, preceded in 1834 by the clerk Erland Erlandson, first crossed the area in the winter of 1838; the following summer he set off upriver from the post of George River (also called Fort Siveright, Fort George River and now Port-Nouveau-Québec). Travelling by the George Rivière he crossed the southern divide on the exploratory journey on which he discovered CHURCHILL FALLS.

IAN MACCALLUM

George Weston Limited, with head offices in Toronto, is a Canadian food company incorporated in 1928 to acquire the business and assets of a predecessor of the same name, which was incorporated in 1910. The company grew between 1938 and 1980 by acquiring various assets in the food industry, including Loblaw Groceterias Co Ltd and Donlands Dairy Ltd. Today, George Weston Limited is engaged in the wholesale and retail distribution of food and other products; it manufactures bakery, confectionery and dairy products and operates subsidiaries in Canada and the US. Its Loblaw Companies Limited division currently operates 292 supermarkets in Canada and 214 in the US. In 1983 it had annual sales or operating revenue of $7.8 billion (ranking 6th in Canada), assets of $2.2 billion (ranking 41st) and 60 000 employees. Wittington Investments (the Weston family) owns 57%. DEBORAH C. SAWYER

Sir George Williams University, *see* CONCORDIA UNIVERSITY.

Georges Bank is a large submarine bank (250 km by 150 km) at the edge of the Atlantic continental shelf between Cape Cod and Nova Scotia. Typical water depths are 50-80 m, but in some areas the water shoals to 10 m and less. Georges Bank is within the Bay of FUNDY-Gulf of Maine tidal system, and strong oscillatory tidal currents, typically 80-100 cm/s (1.6-2.0 knots), pass across the top of the bank, keeping the water column there well mixed even in summer. The average currents follow the contours of the bank, however, forming a clockwise gyre, and water on top of the bank remains there on average for several months during the summer. Georges Bank is one of the most biologically productive regions in the world's oceans, largely owing to the tidal mixing, which brings to the surface a continuous supply of regenerated nutrients from the sediments. The combination of high primary productivity and prolonged residence of the water leads to the buildup of high concentrations of PLANKTON on the bank. As a result, Georges Bank sustains large stocks of fish, such as herring, haddock and cod, as well as scallops.

Georges Bank has traditionally been fished by Canadian and American fishermen. In recent decades it was severely overfished by distant water trawling fleets, primarily from the Soviet Union and Poland. The Georges Bank herring, one of the world's largest herring stocks, with a biomass of approximately one million tonnes, virtually disappeared during this period. A boundary decision in Oct 1984 by the International Court at The Hague allocated five-sixths of the bank to the US. The easternmost sixth, awarded to Canada, is rich in groundfish and SCALLOPS. Properly managed, Georges Bank can sustain estimated annual fishery yields of about 420 000 tonnes. In recent years there has been exploratory drilling for gas and oil on the bank, but the size and value of the oil and gas reserves are not yet known, and the impact on the fisheries of exploiting these resources is not well understood. CHRIS GARRETT AND TONY KOSLOW

Georgetown, PEI, Town, pop 737 (1981c), inc 1912, the capital of Kings County, is on the province's eastern coast, 50 km SE of Charlottetown. Named for King George III, it is the site of an excellent harbour, in proximity to both the Gulf of ST LAWRENCE and NORTHUMBERLAND STR. In the 19th century, Georgetown became a principal Island shipbuilding and commercial centre. However, the town's economy was debilitated by the late 19th-century collapse of the shipbuilding industry. When railway and then highway construction increased Georgetown's coastal isolation, the centrally located community of MONTAGUE became the commercial centre of southern Kings. In this century Georgetown's story has been one of further decline. In 1983 the incomes of over half the residents were derived from unemployment insurance and welfare payments. Georgetown Seafoods and the modern shipyard are the principal sources of employment. W.S. KEIZER

Georgia, Strait of, body of water separating VANCOUVER I and mainland British Columbia S of QUADRA I. Part of a basin between 2 mountain ranges, the floor of the strait was deepened in the ice age by south-flowing glaciers. Coastal Salish have used sites on the strait for between 5000 and 10 000 years. In 1791, 2 Spanish navy ships under Francisco Eliza explored its coast. Capt George VANCOUVER followed in 1792, naming it the Gulf of Georgia, after George III, the British monarch. "Gulf" was changed to "strait" in 1865. Most of BC's population has clustered around the Strait of Georgia, especially in metropolitan Vancouver. It has year-round deep-sea shipping ports in Burrard Inlet, on the Fraser R estuary, at Roberts Bank, on Vancouver I's E coast, on Howe Sound and at Powell River. These are typically linked with railheads, and with forest-products mills or other manufacturing plants. The strait is also the main centre of the PACIFIC SALMON fishery, and its mild, rain-shadow climate makes it a popular marine recreation area in summer. PETER GRANT

Georgian Bay, NE arm of Lake HURON in S-central Ontario. It is shielded from the lake by the limestone spine of the NIAGARA ESCARPMENT, which extends in a great arc NW up the BRUCE PENINSULA. The bay is fed from Lk Superior via the North Channel, between Manitoulin I and the N shore, and independently by the Mississagi, Spanish, French, Magnetawan, Muskoka, Severn and Nottawasaga rivers. The strait between the Bruce Peninsula and MANITOULIN I is called Main Channel (25 km wide). In contrast to the soft, white limestone cliffs of the W shore,





Georgian Bay's scenic islands, coasts and waters make it one of Ontario's favourite recreation areas (*courtesy Parks Canada*).

the E shore is cut into the hard edge of the Canadian SHIELD, fractured into myriad bays, inlets and sounds, with thousands of islands strewn along the coasts. On the inner, SW curve of Nottawasaga Bay are numerous sandy beaches, the longest of which is Wasaga. Located around the bay (from SW to NE) are OWEN SOUND, COLLINGWOOD, Wasaga Beach, MIDLAND, Pt McNicoll, Victoria Harbour and PARRY SOUND; in summer local residents are greatly outnumbered by tourists.

BRÛLÉ was the first European to see the bay (perhaps as early as 1610) and CHAMPLAIN came via the FRENCH R (1615) to visit the Huron, who lived on a small peninsula along the SE shore (*see* HURONIA). Jesuit missionaries came to the area in the 1620s and BRÉBEUF was entrusted with founding a permanent mission in the area in 1634 (STE MARIE AMONG THE HURONS). The bay also has a natural water connection, sometimes called the Toronto Passage, to Lk Ontario via Lk Simcoe and the Nottawasaga R. It was used by the Indians and later during the WAR OF 1812, when a military base was opened at Penetanguishene. Settlement followed the building of a railway from Barrie to Collingwood in 1855. Free land grants opened the area in 1868, but the soil is generally unfavourable to farming. The key industry of the late 19th century was logging; in 1890 Midland was second in production only to Ottawa. By 1900 most of the forests had disappeared; the lumber industry died, leaving behind slashed-over terrain and a few local mills. The fishing industry lasted longer. Immense quantities of whitefish, trout and pickerel were shipped out by rail until the 1950s. By 1960 the industry was virtually ruined by the LAMPREY. Today there is a variety of secondary industry around the bay — textiles, cameras, shipbuilding. But the once-profitable grain-handling business diminished rapidly after the ST LAWRENCE SEAWAY opened.

Tourism began in the 1850s with the arrival of the railway and is now the main industry. Summer homes were built along the N shore in the 1880s, and thousands came after 1900 by train to Parry Sound and Midland, thence by boat to the islands to fish, sail and pitch tents — a pattern of vacationing repeated every year. The best-known areas are the N shore islands, the "Thirty Thousand Islands" on the E shore, Manitoulin I, the amusement-park atmosphere of Wasaga Beach, the yacht harbour at Tobermory and the Martyr's Shrine and reconstructions of Ste-Marie and a Huron village near Midland.

Called Lk Manitoulin by Capt William Fitzwilliam Owen, who charted the area 1815, the bay was later decreed part of Lk Huron and named for King George IV by Capt H.W. Bayfield's Admiralty Survey 1819-22. Nearly as large as Lk Ontario, it is one of the world's great bodies of fresh water. JAMES MARSH

Reading: J. Barry, *Georgian Bay: The Sixth Great Lake (1968)*.

Eroded limestone islands, caves and "flowerpot" formations of Georgian Bay Islands National Park (*courtesy Parks Canada*).



Georgian Bay Islands National Park (est 1929) comprises 50 islands located off the SE coast of GEORGIAN BAY. Two other islands, Flowerpot and Cove, are situated farther W off the tip of the BRUCE PENINSULA. The Precambrian granite islands of the E, which inspired many GROUP OF SEVEN paintings, are a stark contrast to the eroded limestone islands to the W, with their caves, "flowerpot" formations and rich maple-beech forests. Although small (24.1 km^2), the PARK protects several unusual species. Beausoleil I, the largest park island, is one of the last strongholds of the Massassauga rattlesnake, eastern Canada's only venomous snake. Other noteworthy species protected include the eastern fox snake, hognose snake, spotted turtle, calypso orchid and squawroot. The park has facilities for canoeing, hiking, cross-country skiing and swimming. Scuba diving is popular and the area has long been famous as a boating mecca.
LILLIAN STEWART

Geothermal Energy is the exploitable heat within the Earth. The interior of the planet is maintained at a high temperature by a vast store of heat, of which part remains from the formation of the Earth and part is continually generated by the decay of radioactive elements. Heat generated is roughly balanced by heat escaping through conduction to the surface, geysers and hot SPRINGS, and volcanic action. Some of this ENERGY becomes concentrated in deposits that can be tapped; research into geothermal energy seeks to discover new deposits of heat and to improve exploration and exploitation technology. Geothermal energy involves a relatively new technology compared to that developed for fuels such as oil or gas, but as these finite resources are used and become more expensive geothermal energy will grow in importance.

Most geothermal deposits involve a coincidence of water and heat. Surface water sinks into the ground, some of it penetrating deep into cracks or porous rocks where it may become trapped in large reservoirs for long periods. In stable, nonvolcanic parts of the Earth's crust, temperature increases in a downward direction at an average rate of about 25°C/km, and hot reservoirs are found only where porous rocks extend to depths that are hot under normal conditions. These are usually in large sedimentary basins, in the rocks that sometimes hold PETROLEUM deposits. In volcanic areas, water becomes intensely heated at shallow depth and some reservoirs become large deposits of exploitable energy. A few reservoirs, eg, Larderello in Italy, contain steam at about 235°C, but most contain water under high pressure at temperatures up to 400°C. When temperatures are higher than 200°C, reservoirs can be drilled for steam to drive turbines for production of electricity. Geothermal waters at lower temperatures can be used for many direct applications (eg, heating buildings, drying crops). Some hot rocks do not

have a convenient water stream to extract their heat and an artificial circulation system must be created. Such a system is being developed in the US at Los Alamos, where a pair of holes have been drilled, the rock between has been fractured to complete the circulation path, and electric power has been generated.

In Canada geothermal potential is found in the sedimentary rocks of the prairies and in a broad band bordering the oceans (*see* GEOLOGICAL REGIONS). The central area of the Canadian landmass, the Shield, is too old and cool to yield useful heat. The total potentially usable heat in hot water in the sediments of the prairies is equivalent to 3000 times Canada's total energy use in 1979, but only a small fraction of this heat is readily exploitable at current energy prices and with current technology. British Columbia's mountains contain about a dozen volcanic centres that may have geothermal deposits capable of producing ELECTRIC POWER. There are also hot dry-rock deposits, in volcanic centres and more widespread zones of intrusive rocks, and in small sedimentary basins that may be abnormally warm. One of the volcanic centres, Mt Meager, is being drilled by BC HYDRO for geothermal steam. Temperatures of about 250°C have been encountered, and the aim is a 50 MW pilot plant by the late 1980s. In the arctic islands, the Sverdrup Basin probably holds a large geothermal resource, but opportunities for using it are few. There is a deep sedimentary basin under PEI and the Gulf of St Lawrence, but little is known about its temperature and water content. The Atlantic margin of Canada also contains large granitic bodies, some with sufficient heat production from radioactivity to give high temperature at a depth of about 3 km.

The US, USSR, Italy, NZ and Iceland are already using geothermal energy for ELECTRIC-POWER GENERATION, residential and commercial heating, and agricultural and industrial processes. In volcanic areas, geothermal energy seems to be renewable, provided that extraction rates are carefully controlled. In sedimentary basins it is not renewable at a reasonable rate and parts of the reservoir can be cooled to a level from which it will recover only after a few hundred years. Hot water used for heating buildings or for other direct applications must be used near the source, as it cannot be transported economically more than 10-20 km. Much of the geothermal water contains dissolved chemicals, but it is easily reinjected into the ground after use, both for disposal and to keep up reservoir pressure. Harmful environmental effects are few — usually the result of failing to reinject cooled water. Surface disposal of water has been a problem at Cerro Prieto, Mexico, where large evaporation ponds are used. Subsidence (settling of the ground) has occurred at Wairakei, NZ, where water has been dumped into a river.

ALAN M. JESSOP

Reading: L. Rybach, *Geothermal Systems* (1981).

Geranium, annual, biennial or perennial PLANT of genus *Geranium*, family Geraniaceae [Gk geranos, "crane"], with opposite, palmate and often divided leaves. Flowers have all parts in fives: 5 green sepals; 5 pink or purple, rarely white, petals; 10 stamens, etc. Common name, "cranesbill," is derived from characteristic, beaked fruit, which explodes, when ripe, into 5 one-seeded parts which remain attached to a central column. About 275 species are known worldwide; in Canada, 7 species are native, 5 or 6 have been introduced. Bicknell's cranesbill (*G. bicknellii*), widespread across Canada in open woods and disturbed soils, is a dainty plant, 10-50 cm high, with small, paired, rose-coloured flowers. Spotted cranesbill (*G. maculatum*), a perennial plant, 20-60 cm tall, is found in woods, thickets and meadows in Ontario and Québec. It is quite showy with palmate leaves and large, rose-purple flowers. The underground stem (rhizome) is rich in tannin and gallic acid and produces an astringent, hence the common name alum root. Indians used the rhizome for diarrhea, dysentery, internal and external bleeding, mouth ulcers, sore throats. White geranium (*G. richardsonii*), distinguished by white flowers with purplish veins, grows to 40-80 cm and occupies moist open woods, thickets and alpine meadows from the YT to BC, east to Saskatchewan. Sticky purple geranium (*G. viscosissimum*), a showy, glandular plant with large, divided leaves and large, reddish purple flowers, grows up to 60 cm and is found in moist meadows in mountains and foothills and moist fescue prairie of BC, Alta and southern Sask. The familiar garden form is not a true geranium but belongs to genus *Pelargonium*, family Geraniaceae, and is native to South Africa.

BERYL HALLWORTH

Gérin, Léon, lawyer, farmer, federal civil servant, sociologist (b at Québec C 17 May 1863; d at Montréal 15 Jan 1951). The founder of empirical SOCIAL SCIENCES in French Canada, Gérin had an outstanding reputation because of his numerous well-documented studies of Québec's rural society. After graduation from law school at U de M (1885), Gérin went to Paris, where he registered at the Museum of Natural History. After meeting Edmond Demolins and the Reverend de Tourville, both disciples of Frédéric Le Play, Gérin left the museum and spent 6 months at the Ecole de science sociale. Returning to Canada in 1887, Gérin bought a farm and joined the Ottawa civil service. He soon became, through numerous and meticulous publications about rural Québec, a prestigious and prolific writer. He became a fellow of the RSC in 1898 and president of the French section in 1900. In 1933 he was elected RSC president and was awarded the Lorne Pierce Medal in 1941.

MARC-ADÉLARD TREMBLAY

Gérin-Lajoie, Antoine, journalist, lawyer (1848), public servant and writer (b at Yamachiche, LC 4 Aug 1824; d at Ottawa Aug 4 1882). As a student at Nicolet College, he wrote the poem "Un Canadien errant" (1842) and *Le Jeune Latour* (1844), the first Canadian tragedy. He was a founding member and president of the INSTITUT CANADIEN and one of its highly respected lecturers, a journalist for *La Minerve* (1845-47), the author of a very useful *Catéchisme politique* (1851), and a public servant. After being translator to the Assembly of the PROVINCE OF CANADA, he was assistant librarian at the Library of Parliament 1856-80 and chief compiler of its *Catalogue* (2 vols 1857-58). He helped found *Les* SOIRÉES CANADIENNES and *Le Foyer canadien*, of which he was the leading figure (1862-65). His most famous work is a 2-part novel: *Jean Rivard, le défricheur* (1862) and *Jean Rivard, économiste* (1864), which extols the virtue of clearing uncultivated land in Québec as a means of ensuring survival of the French Canadian nation. Part of his *Mémoires* (1885) and an important historical work, *Dix ans au Canada, de 1840 à 1850* (1888-91), were published posthumously.

RENÉ DIONNE

Gérin-Lajoie, Marie, née Lacoste, author, educator, organizer (b at Montréal 19 Oct 1867; d there 1 Nov 1945). Gérin-Lajoie combined Catholicism and family life with reform work, developing a concern for women's rights after she discovered women's legal disabilities from reading her father's law books. A founder of the Fédération nationale St-Jean-Baptiste (1907), bringing together francophone women from charitable and professional associations, she directed its activities for the next 20 years, working closely with local branches of the National Council of Women of Canada. She was a lecturer at U de Montréal and wrote *Traité de droit usuel* (1902) and *La Femme et le code civil* (1929). Although Gérin-Lajoie gave up her position as head of the francophone section of the Provincial Franchise Committee when the bishop of Montréal expressed disapproval of women voters (1922), she continued to agitate for women's rights. She testified before the Dorion Commission (1929) whose recommendations led to amendments to the Québec Civil Code.

MARGARET E. MCCALLUM

Germain, Jean-Claude, writer, theatre producer (b at Montréal 18 June 1939). While attending U de M (1957-59), he established the Théâtre Antonin-Artaud in 1958 and began work on a production of *Ubu roi* that had to be cancelled for lack of funds. He later wrote theatre reviews for the *Petit Journal* (1965-69), *Digest éclair* and *Dimensions* (1968-69), *l'Illetré* (1970-71) and *Maclean's* (1972-73).

Germain served as executive secretary of the Centre d'essai des auteurs dramatiques (1968-71) and in 1969 established the experimental Théâtre du même nom (TMN) where he clearly demonstrated his distance from the theories of the "Cartel" espoused by the THÉÂTRE DU NOUVEAU MONDE (TNM). The actors of Germain's company, known popularly as the Enfants de Chénier (1969-71) and later P'tits Enfants Laliberté (1971-73), combined with André Brassard's group (Théâtre de Montréal) and Jean-Pierre Saulnier's company (Apprentis-Sorciers) to form the Centre du théâtre d'aujourd'hui, of which Germain was general manager 1972-82. Since 1969, Germain has produced some 15 collective creations, made 4 adaptations and, since 1973, produced 8 of his own texts (not including scripts written for TV and reviews for Radio-Canada). He has published poetry in *L'Action nationale* (1966-67), 3 outlines for collective plays, 2 adaptations and a dozen of his own plays. He has published short essays on theatre in *Pays théâtral* (1977-80) and, since 1973, has taught at the National Theatre School. In 1977 he won the Victor-Morin Award.

ANDRÉ G. BOURASSA

German Writing German Canadians, Canada's third-largest ethnic group, hail from a variety of national and cultural backgrounds: GERMAN, Austrian, SWISS, MENNONITE and others. Common to them are their language (High or Low German, or a variety of dialects), the experience of leaving the Old World and finding roots in the New World, and that of learning the new language(s) and adapting to new customs. Their literature reflects their experience. First-generation writers generally perceive and portray the new country from their perspective of the old, and in their native tongue; the next generation, having acquired both the new cultural traditions and at least one of the official languages, contributes to one of Canada's mainstream literatures, usually English Canadian.

Chronology and locations of developing literary activity are related to settlement. In 1750 the first Germans arrived in Nova Scotia and established LUNENBURG. At the time of the American Revolution the LOYALISTS — among them some of German origin — moved N. During the 1830s Mennonites from Pennsylvania settled in the Berlin [Kitchener, Ont] area. Large waves of German immigration came from Europe to Ontario, 1830-80, and to western Canada, 1880-1910. The most significant influxes followed the 2 world wars, and during the same periods many Mennonites came, mainly to Manitoba.

The pioneers had little time for literature, but newspapers and periodicals provided an early forum for creative writing. One of the earliest publications, *Der Neu-Schottländische Calender* (1788-1801), featured anonymous poems and short prose. Among the numerous German-language newspapers, the *Berliner Journal* (Wa-

terloo) is of special interest for its humorous and entertaining dialect letters to the editor by John A. Rittinger. Spiritual leaders published religiously oriented didactic literature. The writings of Father Eugen Funcken (1831-88) and of Heinrich Rembe (1858-1927), for example, reflect strong influences of German classicism and romanticism, as does early Canadian Mennonite devotional didactic literature, which was written in Low German for a Mennonite audience. A significant departure in Mennonite literature is the recording of the experience of being uprooted from Russia, migrating to Canada and starting anew. Dietrich Neufeld's diary, *Ein Tagebuch aus dem Reiche des Totentanzes* (1921), and Hans Harder's *In Wologdas weissen Wäldern* (1934; tr *A Russian Dance of Death*, 1977, and *No Strangers in Exile*, 1979, respectively), and the novels of Gerhard Toews (pseudonym Georg de Brecht) deal with these chaotic times and events. Other important works are Arnold Dyck's educational, autobiographical novel *Verloren in der Steppe* (1944; tr *Lost in the Steppes*, 1974) and the vivid poetry of Gerhard Friesen (pseudonym Fritz Senn). Beginning in 1935, the periodical *Die Mennonitische Warte* encouraged literary activity. The anthologies *Harvest* (ed William de Fehr et al, 1974) and *Unter dem Nordlicht* (ed G.K. Epp, 1977) feature poetry and short prose in High and Low German and in English by more than 40 Mennonite contributors, along with introductory essays and bibliographies. Most significant in contemporary Mennonite literature is a new generation of writers born in Canada and writing in English, including Rudy WIEBE, Clint Toews, David Waltner-Toews, Menno Wiebe and Patrick Friesen.

Writers who had made their debut in German-speaking Europe continued to publish there. Else Seel (1894-1974) came from Berlin in 1927 to the BC wilderness, where she wrote poetry, short prose and a diary reminiscent of the work of Catharine Parr TRAILL and Susanna MOODIE. Walter Bauer (1904-76), well known as an author in Germany, came to Canada in 1952. His books on Canadian themes reflect his European view of Canada. A small part of his work is available in English translation: *The Price of Morning* (1968) and *A Different Sun* (1976; both tr Henry Beissel) and *A Slight Trace of Ash* (1976, tr H. Milnes). Swiss-born Hermann Böschenstein (1900-82), author of expressionist prose, wrote, besides scholarly publications on German literature, short stories and a novel dealing perceptively with the immigrant experience.

Some writers who were at home in both German and English made their mark in English Canadian literature: Felix Paul Greve, under his adopted name Frederick Philip GROVE, became one of Canada's most important realists with his portraits of prairie life; his work is deeply rooted in the literary traditions of German naturalism and neo-romanticism.

Three writers came to Canada during WWII via internment in England: Carl Weiselberger (1900-70), already known in Vienna, served as the art and music critic of the *Ottawa Citizen* after his internment, and wrote short stories and newspaper articles reflecting a refreshing enthusiasm for his new homeland. Henry KREISEL, born in Vienna, Austria, became a professor of English and has written short stories and 2 novels, *The Rich Man* (1948) and *The Betrayal* (1964), with central themes concerning Europe and Canada. Charles Wassermann (1924-78), reporter, broadcaster and writer, became an important intermediary between the Old World and the New.

The writers who came to Canada at an early age were most successful in adopting English as their creative medium: Henry Beissel, born in 1929 in Cologne, Germany, came to Canada in 1951 via England. His work dealing with Indian and Inuit themes, his epic *Cantos North* (1982) and his subjective *Kanada, Romantik und Wirklichkeit* (1981) are sensitive statements about the Canadian experience. Derk Wynand, born in 1944 in Bad Suderode, Germany, came to Canada in 1952 and became known as the translator of H.C. Artmann and as an author of modernist poetry and short prose in English. Andreas Schroeder, born in Hoheneggelsen, Germany, in 1946, was educated in Canada and is known as an editor and translator from German and an author of prose and poetry in English. Ulrich Schaffer, born in 1942 in Germany, came to Canada in 1953. Though he writes in both English and German, his audience is primarily in German-speaking western Europe. His writing, often inspired by the Canadian landscape, is sometimes reminiscent of Kafka. Those writers who continue to write in German well after their arrival in Canada invariably have to contend with the problems of both publication in a minority language and reaching an audience. Rolf Windthorst, born in 1909 in Dortmund, Germany, and living in Alberta since 1956, and Valentin Sawatsky, born in Ukraine in 1914 and living in Ontario since 1950 — to name but 2 of the more prolific writers — have not been able to find the readership their works may deserve.

The anthologies *Ahornblätter* (comp Heinz Kloss and A.B. Dyck, 1961) and *Nachrichten aus Ontario* (ed Hartmut Fröschle, 1981) feature samples of work by over 50 authors. The latter also contains a comprehensive introduction to German Canadian literature, a useful "Who's Who" and a selected bibliography. Critical attention to the writing of German Canadians is recent. The most important forums are the *German-Canadian Yearbook* (ed Hartmut Fröschle, 1973-), the proceedings of symposia on German Canadian studies and 2 series of critical editions and studies of German Canadiana. WALTER E. RIEDEL

Reading: K. Gürttler, ed, *Symposium* (4 vols to date, 1976-83); H. Loewen, ed, *Mennonite Images* (1980); W.E. Riedel, ed, *The Old World and the New* (1984).

Germanic Fraktur and Calligraphy Handwriting has served the needs of communication and recording in every literate culture and has been regarded as an essential tool of civilization. Frequently, however, lettering has been developed beyond the utilitarian level to an artistic form. The artistic calligraphy that flourished after the 17th century among the peoples of southern Germany, Alsace and Switzerland is known as *fraktur*. Related to the English word "fracture," the term suggests a lettering form with fractures or breaks in the script, which give an ornamental or decorative effect.



Anna Weber, *Birds and Checkered Sheep* (1875) (*private collection*).

MENNONITES migrating from Pennsylvania to Ontario between the 1780s and 1830s brought along this art form. It flourished chiefly in 3 areas of early Ontario: the Niagara Pen (Lincoln and Welland counties), upper York County (especially Markham and Vaughan townships) and Waterloo County. Beautifully decorated fraktur songbooks, as well as drawings and exercises, were made by Samuel Moyer and other Mennonite teachers at Vineland in Lincoln County during the early 1800s. In the Markham area of York County one interesting artist, Christian L. Hoover, took up the activity during a year of severe illness, making hand-lettered and decorated birth records for relatives and friends. The largest output occurred from the 1820s to the 1890s in the sizable Mennonite community of Waterloo County, where several artists produced colourful fraktur drawings and texts. Anna Weber, one of the few women to practise the art, appears to have been a lonely individual, suffering from poor health, who made delightful drawings of birds, trees and animals for friends and visitors and for children of families who looked after her in her later years.

The art has revived somewhat in recent years with its reintroduction into some Old Order Mennonite schools in the Waterloo area of southern Ontario, and with a growing interest by the public at large in relearning lost artistic forms. During its high point, in 19th-century Ontario, fraktur was one of Canada's most exuberant folk-art traditions. MICHAEL S. BIRD

Reading: Michael S. Bird and Terry Kobayashi, *A Splendid Harvest: Germanic Folk and Decorative Arts in Canada* (1981).

Drawing of bird and tulips from Lincoln County, artist unknown (*private collection*).



Germans Few Canadians of German-speaking origin are *Reichsdeutsche* (from Germany); most are *Auslandsdeutsche* (from other lands), and may include Roman Catholics, Jews, Mennonites, Lutherans or others, who originate from Estonia in the N to the Black Sea in the S, from Alsace in the W to the Caspian Sea in the E.

There are about 1.1 million Germans in Canada, comprising 6.3% of the population. The majority reside in NS (33 145), Québec (33 770), Ontario (373 390), Manitoba (108 140), Saskatchewan (161 700), Alberta (233 175) and BC (187 630).

Migration and Settlement The Thirty Years War, 1618-48, upset the balance of the German population and caused the first wave of migrants to the New World. Later, a small number of settlers of German origin, including some

demobilized soldiers who had served under the French king at Port-Royal, Louisbourg and Québec, established themselves in NEW FRANCE; in 1664 Hans Bernard, the first recorded German settler, purchased land near Québec. Between 1664 and 1700 the migration of civilians was overshadowed by the settlement of soldiers from the garrisons of New France. Between 1749 and 1752 about 2000 German newcomers landed at Halifax. They were Protestants and represented the first organized attempt to settle Germans in Canada. They had been recruited by the British government from principalities suffering from severe economic problems, religious persecution or war. In 1763 some 1600 of the immigrants were moved to Merligash (renamed LUNENBURG) where they became fishermen and boat builders.

Between 1760 and 1770 Germans from Europe and Pennsylvania settled in Annapolis County (NS) and in several other areas that later became part of New Brunswick. During and after the American Revolution, among the thousands of United Empire LOYALISTS who journeyed to British N America, were many persons of German origin who had settled earlier in Pennsylvania, New York and even Georgia. Some formed part of the group who sailed from New York to Halifax in 1783, the others either moved up the Hudson River Valley by Lk Champlain and down to Sorel or made their way over the Niagara frontier. These groups included ordinary civilians as well as members of militia regiments and German regiments who had fought for the British Crown. Of some 1200 discharged German soldiers of Brunswick regiments recruited in German principalities and sent to Canada to defend it against American invasion, several hundred settled in Lower and Upper Canada, New Brunswick and Nova Scotia, where they founded the Hessian Line and Waldeck Line settlements.

In 1792, after John Graves SIMCOE became lieutenant-governor of Upper Canada, native Americans who still sympathized with Great Britain were invited to take up free land in the new province, and many settlers of German origin did so. Between 1792 and 1837 German settlers also arrived in Canada from New Jersey and Pennsylvania. They were not of Dutch origin but nevertheless were known as "Pennsylvania Dutch." The majority were MENNONITES who sought not only free land but religious freedom and exemption from military service. Americans regarded Mennonites and other "plain folks" Germans with great suspicion because they had been conscientious objectors and had not been involved in the war. For these migrants the "German Company" purchased land in the Grand River Valley of Ontario, and Waterloo County became the centre of German settlement. Berlin (now KITCHENER) was the principal community. Settlers of German LUTHERAN and Catholic origin also settled in this area and Mennonites founded communities in the Niagara district and in York County, at Whitchurch. Settlers travelled from the US in their Conestoga wagons, which were antecedents of the prairie schooners of the North American West.

After 1830 many German Catholics and Amish people arrived directly from Europe, settling in Perth, Huron, Bruce and Grey counties. Others, chiefly from Prussia, settled along the Ottawa R in Renfrew County and in Québec's Pontiac County. At Confederation, about 200 000 people of German origin had settled in Canada, mostly in Ontario. About 1500 lived in Québec (mainly Montréal) and 47 000 in the Maritimes, including 20 000 in Lunenburg County (NS). The immigration from Germany, which continued until the 1870s, changed drastically with the prosperity of the newly established German empire; it was replaced by large numbers of German-speaking Mennonites from Ukraine who helped pioneer settlements on the prairies. After Canada acquired land from the Hudson's Bay Company the township system of settlement was adopted in 1871 and the Dominion Lands Act of 1872 facilitated homesteading. From 1872 onward, William Hespeler, an immigrant himself and a colonizer, contacted Mennonites and HUTTERITES who were intent upon leaving southern Ukraine because of changing Russian policies towards minorities. He persuaded a group of leaders to come and search for suitable land in Manitoba. The leaders received freedom from military service for their members, the right to educate their children and other concessions that led them to endorse migration to Canada. About 7000 Mennonites emigrated to Manitoba between 1874 and 1880, settling in the East Reserve — E of Ninerville, W of STEINBACH — and the West Reserve — E of Morden and W of Rosenfeld. Eastern Canadian settlers had doubted that the prairies could be settled, but the Mennonites confirmed that prairie soil was indeed fertile, and many of the colonizers prospered. From 1880 to 1900 thousands of settlers of German origin (many from Eastern and Southeastern Europe) settled in Manitoba, Saskatchewan and Alberta. Most settlements were along denominational lines. Mennonites lived in Swift Current and Rosthern, Lutherans in central Saskatchewan and Roman Catholics, after 1903, in the St Peters Colony, near Humboldt, and in the St Josephs Colony, near Tramping Lake. By 1914 about 35 000 Germans had settled in Manitoba, comprising 7.5% of the population; in Saskatchewan the number of immigrants with German origins jumped from under 5000 in 1901 to 100 000 in 1911, and German communities in Alberta, including the Josephsburg Colony (also called Medicine Hat) and those along the Calgary and Edmonton Railway had, by 1911, reached a population of about 41 000 people.

Although a small number of German settlers moved to BC under the auspices of the HBC, any sizable settlement dates from the Fraser River Valley gold rush of 1858 and a later one in the Cariboo Mts. Most of these Germans made comfortable livings as grocers, farmers, craftsmen, shopkeepers and brewers. By 1911 there were about 11 800 German-speaking persons in BC but a slump beginning in 1912 and WWI curbed German immigration.

WWI had a profound impact upon German Canadians. Until then, they were considered preferred immigrants, but with the outbreak of war the Canadian government restricted immigration. As a result of the war against Germany, Germans and other Europeans were vilified, arbitrarily interned, their properties confiscated and never accounted for and the use of their language restricted or banned altogether (*see* PREJUDICE AND DISCRIMINATION). Because Mennonites became one of the special targets of this new policy, about 6000 Old Colony Mennonites from Manitoba and Saskatchewan left Canada in the 1920s and settled in Chihuahua, Mexico, but retained their Canadian citizenship.

In 1918 a party of about 50 German-speaking Hutterites did immigrate to Canada from Dakota, settling in Manitoba and Alberta where their communal way of life often sparked conflict between their community and the government and local people. Germany did not acquire "favoured nation" status until 1927, but between 1919 and 1935 some 97 000 German-speaking immigrants arrived in Canada from Poland, Austria, Czechoslovakia and Germany. Some of the newcomers were artisans, shopkeepers and labourers; many were young men and unattached workers, who as nonpreferred migrants had to work on farms for an initial period of time. After a few years, these men drifted into the towns and cities in search of urban employment that would allow them to raise passage money to bring over their families. Some succeeded but the majority, because of the GREAT DEPRESSION, were unable to do so. Migration came to a virtual standstill during the 1930s and many migrants decided to go home. In the late 1930s there was a small flow of Sudeten Germans, who because of their Social Democratic political affiliation emigrated to escape Nazi persecution. Otherwise, Canada closed its doors to thousands of JEWS seeking refuge from Nazi rule (*see also* IMMIGRATION). After the British evacuation of Dunkirk, people of German or Austrian origin living in the UK were classified as "friendly aliens" and 6700 were sent to Canada for detention. By 1943 they had been released and 5200 remained in Canada.

The treatment of German Canadians during WWII was remarkably mild. While known Nazi sympathizers were interned for prolonged periods, other German Canadians were left alone. Only the property of German nationals was confiscated.

Between 1947 and 1950 immigration to Canada by Germans included many German-speaking refugees from Eastern Europe (ethnic Germans or *Volksdeutsche*), from Romania, Yugoslavia and the former Austria-Hungary. In 1950 a ban on immigration of German nationals was lifted. Between 1951 and 1960 some 250 000 German immigrants arrived in Canada, about 60% of whom remained in Canada permanently. In 1958 new immigration regulations, designed to maintain a lower level of immigration of any kind into Canada, were implemented. Since the 1970s the Old Colony Mennonites have slowly returned from Mexico and Latin America and an increased migration of German industrialists and investors has begun.

Social and Cultural Life The majority of German Canadians have acculturated in a selective fashion, retaining some of their ethnic traits but discarding others in favour of Canadian patterns. There is no unified German culture in Canada; instead there is religious and cultural pluralism. Most Canadians of German origin belong to the Protestant churches, but about 25% are Roman Catholic and 9% are Mennonites or Hutterites. The life of the early settlements revolved around the churches, which were responsible for language schools, care of the needy and recreational facilities.

The German Benevolent Society (est 1835 in Montréal) and the Germania Club (est 1864 in Hamilton) are the oldest surviving German Canadian clubs. After WWII new clubs were organized to help recently arrived immigrants or to promote cultural interests. One of the oldest Canadian musical societies, the Québec Harmonic Society (est 1820), was founded by the German Henri Glackemeyer, and many choir groups were formed before Confederation.

The national umbrella organization for German Canadians is the Trans-Canada Alliance of German Canadians, established 1951 in Kitchener to preserve the cultural heritage of German-speaking Canadians.

Festivals and celebrations are popular among Germans. The largest festival is Oktoberfest, now held in Kitchener. Christmas is also a major celebration. The custom of a lighted evergreen tree, which originated in Germany in the 16th century, was introduced into Canada in 1776 by Baroness von Riedesel.

The first German-language publication, *Halifax Zeitung*, appeared in the 1780s. Since 1951, 2 large newspaper chains, the Courier Nordwestern and the Reprich chain, have been established. German-language broadcasting is conducted on privately operated radio stations.

Governors general, one former prime minister (John DIEFENBAKER) and members of the federal and provincial governments have been German in origin, but considering the numbers of Ger-

man immigrants to Canada, Germans have not been proportionately represented in politics.

Economic Life Economically German Canadians are generally prosperous. They have retained the management of German-owned companies and are prominent in technical and professional occupations. Germans are also overrepresented in skilled trades and machine-working occupations and farming. German farmers began grape growing in the Niagara Peninsula. Canadians of German origin are underrepresented in public service, however, where the German component is slightly over 3%.

R.A. HELLING

Reading: W.R. Bell, *The Foreign Protestants and the Settlement of Nova Scotia* (1961); F.H. Epp, *Mennonites in Canada, 1786-1920* (1974); O. Gingerich, *The Amish of Canada* (1972); G. E. Reaman, *The Trail of the Black Walnut* (1957); H. Troper and I. Abella, *None Is Too Many* (1982).

Gerontology, the scientific study of AGING and its consequences, eg, social and economic problems precipitated by growing numbers of elderly in a population; psychological aspects of aging; physiological bases of aging; and general biological aspects of aging in all animal species.

Systematic Canadian research began in 1944 with the founding of the Gerontologic Research Unit at McGill University. During the 1950s the Canadian Welfare Council formed the Committee on Aging, which began research in social gerontology that continues under its successor, the Canadian Council on Social Development. The Ontario Geriatrics Research Society became the Canadian Geriatrics Research Society in 1975. Research was stimulated by provincial conferences on aging held in several provinces beginning in 1957 and continued through the early 1960s. In 1966 the final report of the Senate's Special Committee on Aging was published, the first provincial office on aging, in Ontario, was created and the Canadian Conference on Aging was held.

Increasing participation of Canadian gerontologists in international gerontology associations led to the establishment of the Canadian Association on Gerontology/Association canadienne de gérontologie (CAG/ACG) in 1971. By 1984 it had grown to about 1200 members in 5 divisions, representing subspecialty interests in social sciences, psychology, biology, health sciences and social welfare. The CAG/ACG is the major forum for gerontological research in Canada through its annual conferences and its *Canadian Journal on Aging*, est 1982. In addition, all provinces have provincial associations, 8 of which are affiliated with the CAG/ACG. Québec has 2 nonaffiliated organizations. Several related organizations with gerontological activities exist in many provinces and some of these, such as the Ontario Psychogeriatric Association, are actively involved in research.

Since the late 1970s, extensive research support has been provided for social gerontology by the Social Sciences and Humanities Research Council of Canada through its Strategic Grants Program in Population Aging. Health-related research, both geriatric and social, has received increased funding support in Ontario by the Gerontology Research Council of Ontario, est 1980. Significant in-house or contractual research concerned with income security and health-provision issues associated with the aging of the population has been generated by federal and provincial task forces and committees and by the Economic Council of Canada.

The need for research in gerontology has been most evident in relation to the economic aspects of population aging, especially PENSIONS policy and because older people use health services more extensively than do the young. Because age is a major basis on which we establish rights and obligations as well as informal expectations for behaviour, population aging will necessitate the adaptation of many social institutions, from the design of cities and transportation systems to reforms in FAMILY LAW. The expectation of a long life challenges the old and the young with whom they share familial and social relations. For these reasons, general interest in aging and research in gerontology has grown significantly over the past 50 years.

VICTOR W. MARSHALL

Gesner, Abraham, geologist, author, chemist, inventor (b near Cornwallis, NS 2 May 1797; d at Halifax 29 Apr 1864). Gesner invented kerosene oil and, because of his patents for distilling bituminous material, was a founder of the modern petroleum industry. He studied, described and mapped the distribution of rock formations in NS, NB and PEI. His father, Col Henry Gesner, was exiled from a large farm in NY state and moved to the Annapolis Valley. After elementary schooling in NS, Abraham enrolled as a medical student in London, Eng, in 1825, and graduated as a physician and surgeon. He returned to Parrsboro, NS, and began a medical practice and also continued to explore NS by boat, on horseback and on foot. He moved to Saint John, NB, 1838, and his 5 annual reports on the geology of NB (1839-43) established him as the first government geologist in a British colony. During this time he rediscovered the veins of solid bitumen in Albert County, which he used in experiments in distillation. He used his field collections to start the first natural history museum in Canada at the Mechanics' Institute, Saint John, NB, 1842, before returning to NS in 1843. Beginning about 1846 he developed experiments for distilling "coal oil" from solid hydrocarbons and coined the name kerosene for the lamp oil that he had perfected by 1853. He obtained patents in 1854 and a factory was set up under his guidance on Long Island, NY, to manufacture kerosene, which became standard lighting fuel in homes. In 1863 he sold his patents and returned to Halifax where he was appointed professor at Dalhousie.

Gesner wrote numerous scientific papers and reports and several books, the most important of which was *A Practical Treatise on Coal, Petroleum and Other Distilled Oils* (1861). His other inventions include one of the first effective wood preservatives, a process of asphalt paving for highways, briquettes made from compressed coal dust, and a machine for insulating electric wire.

Abraham Gesner, inventor who coined the name "kerosene" for the lamp oil he perfected (*courtesy Geological Survey of Canada/100798*).



Imperial Oil has provided a tribute at his grave in Halifax for he did "give the world a better light."

L.M. CUMMING

Gibson, George, "Mooney," baseball player (b at London, Ont 22 July 1880; d there 25 Jan 1967). Gibson signed a professional contract in 1903 and joined the Pittsburgh Pirates 2 years later. He had a strong throwing arm and led National League catchers in fielding percentage several times. He was a member of Pittsburgh's 1909 World Series champions and played in the majors until 1918. Known as a developer of young pitchers, Gibson later managed the Pirates (1920-22, 1932-34) and the Chicago Cubs (1925). He was named Canada's baseball player of the half century and in 1958 was the first baseball player elected to Canada's Sports Hall of Fame.

WILLIAM HUMBER

Gibson, Graeme, writer, cultural activist, teacher (b at London, Ont 9 Aug 1934). Although best known for his 3 novels, Gibson has also made national contributions through organizational initiatives. Educated at Western, in 1961 he began an 8-year career teaching English at Ryerson. He was instrumental in forming the WRITER'S UNION OF CANADA, which he chaired 1974-75. In 1973 he began work on a literary resources guide and was concurrently developing the Book and Periodical Development Council. The Writer's Development Trust was another group Gibson helped launch. His novels include *Five Legs* (1969), *Communion* (1971) and *Perpetual Motion* (1982). In 1971 he wrote a film script of Sinclair ROSS's *As for Me and My House*. He has also written travel articles, a book of interviews entitled *Eleven Canadian Novelists* (1973), was awarded the Writers Exchange Fellowship to Scotland (1978) and has been writer-in-residence at U Waterloo.

MARLENE ALT

Gibson, Sir John Morison, businessman, lawyer, politician (b at Toronto 1 Jan 1842; d at Hamilton, Ont 3 June 1929). A Liberal provincial politician known for his reformist views, Gibson was responsible for the 1893 Act for the prevention of cruelty to children, which led to the creation of Children's Aid societies in Ontario. His Hamilton-centered business interests encompassed industrial promotion, real-estate development, the provision of urban services such as utilities and streetcars, and the organization and operation of interurban electric railways. In the early 20th century, companies in which he was a principal dominated the hydroelectricity supply system and radial railway network of the Hamilton-Niagara region. A renowned rifleman and militia supporter, Gibson served as first president of the Canadian Red Cross 1896-1910 and was lt-gov of Ontario 1908-14.

CAROLYN GRAY

Gibson, Tom, painter, photographer (b at Edinburgh, Scot 11 Dec 1930). He documents, in a highly personal way, what he sees in the streets, his images revealing both the amusing and the alienating sides of urban life. Gibson settled in Toronto in 1952, enrolled at the Ontario Coll of Art and became part of a circle of artists including Graham COUGHTRY, William RONALD and Michael SNOW. By the mid-1960s he had left painting for photography. He moved to Montréal in the mid-1970s and began to teach photography at Concordia. Gibson's black-and-white photographs have been shown nationally and internationally and have appeared in magazines and books, including *Tom Gibson Signature 1* (National Film Board, 1975).

LOUISE ABBOTT

Gibson, William Wallace, aircraft inventor (b at Dalmellington, Scot 1876). After making a fortune in mining, Gibson built the first successful Canadian aircraft engine, and then the Twin-Plane aircraft, which first flew Sept 1910 near Victoria, BC, with a 60-hp gasoline engine. A second aircraft, the Multi-Plane (with 4 nar-

row sprucewood wings) is reported to have flown successfully the following year near Calgary before being wrecked in a crash. Broke, Gibson returned to mining and later moved to San Francisco. DONALD J.C. PHILLIPSON

Giguère, Roland, poet, painter, publisher (b at Montréal 4 May 1929). Recipient of the Paul-Émile Borduas Award in Visual Arts (1982) and a nominee for the coveted Prix David in literature that year, Giguère has, with the foundation of the Éditions Erta (1949), played a major role in the development of Québec's artistic life.

It was not until publication of his first collected volume of poems, *L'Age de la parole* (1965), that he gained recognition, being awarded the Prix France-Québec and the Grand Prix littéraire de la ville de Montréal. For political reasons Giguère refused in 1974 the Gov Gen's Award for *La Main au feu* (1973). His most recent collection is *Forêt vierge folle* (1978). Influenced by the surrealists, Giguère has always refused to equate poetry and the written word. To him, poetry is a way of life, a perpetual revolt in which the exterior world is invaded by the artist's interior world. JEAN-MARCEL DUCIAUME

Gilbert, Sir Humphrey, explorer (b near Dartmouth, Eng *c*1537; d at sea 9 Sept 1583). Gilbert was an early publicist for the idea of a NORTHWEST PASSAGE, publishing an influential *Discourse* (1576) on the subject, and his experience in colonizing Ireland suggested similar ventures farther afield. He received letters patent 11 June 1578 from Queen Elizabeth authorizing him to colonize the coast of N America. His first attempt, in 1578, was frustrated by poor organization, desertion and storms. Undaunted, he regrouped and set out again 11 June 1583 with 5 vessels (*Delight, Raleigh, Golden Hind, Swallow* and *Squirrel*); the queen tried to persuade Gilbert to stay behind, noting he was a man "of not good happ by sea." The *Raleigh* turned back, but the other 4 ships arrived off St John's Aug 3. Brandishing his letters patent, Gilbert entered the harbour Aug 5 and formally took possession of Newfoundland. He dispatched *Swallow* to England with the sick and malcontents and left St John's Aug 20, losing *Delight* in shoals off Sable I, and turned homeward in heavy seas. On the evening of Sept 9 Gilbert reportedly sat astern of *Squirrel* repeatedly calling out, "We are as neare to Heaven by sea as by land." Near midnight he and the *Squirrel* were "devoured and swallowed up of the Sea." The *Golden Hind* reached Dartmouth Sept 22.

Vain, tempestuous, even cruel, Gilbert was typical of the early adventurers who became obsessed with America. His own exploits were failures but his persuasive, if faulty, advocacy of a Northwest Passage spurred endless fascination, and although his seizure of Newfoundland seemed a formality, nobody seriously disputed it and the colony became the first English possession in the New World. JAMES MARSH

Gilbert, Kenneth, harpsichordist, organist, musicologist (b at Montréal 16 Dec 1931). After winning the Québec government's Prix d'Europe for organ in 1953, he moved to the forefront of virtuosity and scholarship. His new editions of early keyboard music (notably of Couperin's and Rameau's complete harpsichord works, and Scarlatti's sonatas) have won the admiration of musicologists worldwide. A strong advocate of classical organ design, he spearheaded the return to mechanical action in many new installations across Canada. Since 1965 Gilbert has performed almost exclusively on the harpsichord, appearing in N America and Europe as soloist, chamber musician and recitalist. International critics have praised highly his many records, among them the complete harpsichord works of Couperin (1970-71) and Rameau (1976). BARCLAY MCMILLAN

Gill, Charles, painter, teacher (b at Sorel, Qué 21 Oct 1871; d at Montréal 16 Oct 1918). He began to study design in Nicolet with Abbé Thomas Maurault and continued his art studies in Montréal with William Raphael before enrolling in William BRYMNER's courses at the Art Gallery school. Encouraged by American painter George de Forest Brush, he began in 1889, at age 18, a long stay in Paris. He studied at the École des Beaux-Arts in Paris and frequented the literary circles of Montmartre and the Latin Quarter, making friends with Alphonse Allais and Paul Verlaine. In 1892 he came home to win the contract for a large canvas, *La Visitation*, intended for the Sacré-Coeur Chapel of Notre-Dame de Montréal. He became professor of design at the École Normale Jacques-Cartier, teaching concurrently at the Monument National and the École des Arts et Métiers. Around 1895 Gill helped found the École littéraire de Montréal, with Louvigny de Montigny, and soon became a brilliant writer, regularly publishing his stories, poems, and art critiques and commentaries in such periodicals as *Le Canada, La Presse* and *Le Nationaliste*. He died a victim of the 1918 INFLUENZA epidemic. His sister Marie published his poetry in 2 volumes — *Le Cap éternité* and *Les Étoiles filantes*.
MICHEL CHAMPAGNE

Gill, Robert, theatre director, teacher (b at Spokane, Wash 19 July 1911; d at Toronto 10 Aug 1974). He studied and later taught at Pittsburgh's Carnegie Tech and was active with Pittsburgh Playhouse and Opera Soc, and Woodstock (NY) Playhouse. He was Hart House Theatre director, U of T, from 1945 to 1965, and trained a generation of actors and directors that helped launch Canada's professional theatre, including William HUTT, Kate REID, Charmion King, Donald SUTHERLAND and Barbara Hamilton. He was instrumental in founding the Straw Hat Players in Muskoka (1947) and Toronto's Crest Theatre (1954). He also taught at the Royal Conservatory of Music, Toronto, the Banff School of Fine Arts, Banff, Alta, and at UBC. DAVID GARDNER

Gilmour, Clyde, broadcaster, critic (b at Calgary 8 June 1912). An influential film and record columnist who has written for a number of newspapers and magazines, Gilmour is best known as a radio personality. He was named a member of the Order of Canada in 1975 in recognition of the national appeal of "Gilmour's Albums," broadcast weekly on CBC Radio since 1956. BARCLAY MCMILLAN

Gimli, Man, Town, pop 1550 (1981c), inc 1946, is located on the W shore of Lk WINNIPEG, 85 km N of Winnipeg. The mother colony of several N American Icelandic settlements, Gimli developed after a series of natural disasters forced ICELANDERS to leave their island 1874-76. Some 200 arrived near Gimli in 1875 to begin New Iceland, a tract of land outside the boundaries of Manitoba reserved for their use by the Dominion government. The settlers experienced extreme hardships — a smallpox epidemic, flooding, financial problems, religious differences — which led to out-migrations, but they also developed schools, a newspaper, a fishing industry and a self-governing colony with a sophisticated constitution. New Iceland came under Manitoba's jurisdiction 1881, and by the late 1890s the area was receiving Ukrainian, Polish, German and Hungarian immigrants. Farming, fishing and mink ranching shaped Gimli's early economy, but an air-force base established during WWII was a major boost. When the base closed in 1971 an industrial park was formed and the town's recreation resources were revitalized to offset the loss. Gimli has several cottage developments and summer camps nearby and hosts the annual Icelandic Festival of Manitoba. It is also a National Research Council base for stratospheric studies. Gimli was named for "the great hall of heaven" in Norse mythology.
D.M. LYON

Ginger Group, an independent group of members of Parliament who in 1924 split from the PROGRESSIVE PARTY because they did not support a party structure that inhibited an MP's ability to act solely as the representative of his constituents. The group, named after the Tory MPs who in 1917 opposed the MILITARY SERVICE ACT, was initially composed of UNITED FARMERS OF ALBERTA representatives G.C. Coote, Robert Gardiner, E.J. Garland, D.M. Kennedy and Henry Spencer, and UNITED FARMERS OF ONTARIO representative Agnes MACPHAIL. Later, working with Labour MPs J.S. WOODSWORTH, William IRVINE, A.A. HEAPS and Angus MacInnis, it included Ontario MPs W.C. GOOD and Preston Elliott, Alberta Independent Joseph Shaw, Milton Campbell from Saskatchewan and W.J. Ward from Manitoba. The Ginger Group declined along with the Progressive Party; some members later helped found the CO-OPERATIVE COMMONWEALTH FEDERATION.

Ginseng, herbaceous perennial PLANT of genus *Panax*, ginseng family (Araliaceae). Six species are known, 2 from N America, 4 from E Asia. Plants grow to 30 cm and have a large, fleshy, often forked root. Although there seems to be no scientific evidence of medicinal value, ginseng has a long history of medical use, continuing today. The Chinese, in particular, considered its dried root immensely valuable in prolonging life, vitality and sexual potency. American ginseng (*P. quinquefolius*) occurs in woods of central and eastern N America; however, local demand has resulted in its becoming very rare in the wild. It was once exported to China, but the Chinese found it inferior to their own product. Dwarf ginseng (*P. trifolius*) grows in moist woods from Ontario to the Maritimes. Ginseng (*P. pseudo ginseng*), native to Korea and Manchuria, is now cultivated quite extensively in eastern Canada. GILLIAN FORD

Girard, Alice M., nursing teacher (b at Waterbury, Conn 11 Nov 1907). After arriving in Canada as a young girl, she completed her schooling in Montréal and began a career as a public-health nurse. Later a nursing educator, she eventually was appointed dean of the Faculty of Nursing at the Université de Montréal. The first woman dean at a French-language university in Canada, she held the position until her retirement in 1973. A member of the Hall Royal Commission on Health Services, she served as president of the Canadian Nurses' Assn 1958-60 and in 1965 was the first Canadian president of the International Council of Nurses. D. FRANCIS

Girard, Marc-Amable, notary, politician, premier of Manitoba (b at Varennes, Lower Canada 25 Apr 1822; d at St-Boniface, Man 12 Sept 1892). A Conservative and disciple of George-Étienne CARTIER, Girard came to Manitoba 1870 to uphold French language, religious and political rights as guaranteed by the Manitoba Act. He served on the Executive Council 1870-72 and in the Assembly 1870-83. In 1871 he was appointed to the Canadian Senate. Girard became premier of Manitoba June 1874, the first French Canadian to hold that post, but resigned later that year. He served in John NORQUAY's Cabinet 1879-83. Girard was a man of compromise, respected for his personal charm and integrity, but he lacked the leadership necessary to promote French Canadian political interests during a critical transition. DIANE PAYMENT

Girl Guides Official operation in Canada dates from Jan 1910 when the 1st St Catharines Co was registered by the Girl Guide Organization founded in GB in 1909 by Lord Baden-Powell. Canadian headquarters were established in Toronto in 1912; 5 years later a Canadian Council

was federally incorporated and in 1961 the organization became known as Girl Guides of Canada/Guides du Canada. In 1983, 234 763 girls across Canada between the ages of 6 and 17 were enrolled in Guides' various branches under the direction of 40 857 volunteer leaders.

The philosophy of the organization is expressed in the promise that Guides have made since 1909 to do their duty to God, monarch and country, to help others at all times and to obey the Guide law. This 10-point law and the motto "Be Prepared" reflect the organization's aim of training girls to fulfil their roles as responsible citizens and family members. The guiding program requires girls at different levels to pass a series of tests and to earn badges in a wide variety of fields. Camping and nature activities have always been an important element of guiding.

Membership is open to all girls who accept the principles of the Guide promise and law. Canada's involvement in the World Assn of Girl Guides and Girl Scouts brings Canadian Guides into contact with girls throughout the world and opens up avenues of international exchange. National headquarters and archives are located in Toronto. PATRICIA G. DIRKS

Reading: Girl Guides of Canada/Guides du Canada Annual Report for 1982; Policy, Organization and Rules, Girl Guides of Canada/Guides du Canada (1981).

Girouard, Sir Édouard Percy Cranwill, railway builder, governor (b at Montréal 26 Jan 1867; d at London, Eng 26 Sept 1932). In 1888 he was commissioned in the Royal Engineers and was in charge of the Sudan railways 1896-98. His construction of a line bypassing the Nile cataracts in the Sudan made possible Kitchener's victory at Omdurman. He then ran railways in South Africa, 1899-1904. Girouard served as high commissioner and then governor of northern Nigeria, 1907-09, and governor of the British East Africa Protectorate (Kenya), 1909-12. In Nigeria, the effects of his policies created a major impediment to Nigerian unity. In Kenya, his views on land alienation conflicted with those of the British government, and he resigned under a cloud. From 1913 to 1932, except for a brief period of munitions procurement and railway organization in Belgium during the war, he was a director of the armaments firm Armstrong Whitworth. RICHARD STUART

Girty, Simon, frontiersman, LOYALIST, Indian agent (b near Harrisburg, Pa 1741; d at Malden, UC 18 Feb 1818). The legendary "white savage" of American frontier lore, he was an early Loyalist settler in Upper Canada. Girty lived several years in Indian captivity as a boy, and later became a scout and interpreter. During the AMERICAN REVOLUTION he joined the British Indian Department at Detroit and accompanied Indian raiding parties south. He was greatly feared by American pioneers but stories of his cruelty are exaggerated. In 1784 Girty settled on a farm at Malden. He continued to support Indian resistance against American expansion in the Ohio Valley until 1796 when the US took possession of Detroit. He is portrayed as a villain in romantic American novels and in Stephen Vincent Benét's "The Devil and Daniel Webster" (1937). He was the model for Sampson Gattrie in John RICHARDSON's novel *The Canadian Brothers* (1840). EDWARD BUTTS

Gisborne, Frederick Newton, telegraph engineer (b at Broughton, Eng 8 Mar 1824; d at Ottawa 30 Aug 1892). At the age of 32, Gisborne completed the first submarine telegraph line in N America, joining Newfoundland across the Cabot Str with the mainland. Gisborne immigrated to Canada in 1845, became a telegraph operator and soon manager of the NS Telegraph Co. He created a company to link St John's with NB. Though nearly ruined in 1853 by the cost of building a land line across 640 km of Newfoundland wilderness, he was refinanced by Cyrus Field, the American industrialist. Together they completed the Nfld telegraph, from Cape Ray to Cape Breton, in 1856. Field went on to tackle the N Atlantic, succeeding in 1866 after 3 earlier cables broke. Gisborne became superintendent of the Canadian goverment telegraph service in 1879. He was a charter member of the RSC in 1882 and held many patents for his own inventions. DONALD J.C. PHILLIPSON

Gjoa Haven, NWT, UP, pop 523 (1981c), is located on the SE coast of KING WILLIAM I. off the mainland Arctic coast, 1062 air km NE of YELLOWKNIFE. The area is the traditional territory of the NETSILIK INUIT. It derived its name from Roald AMUNDSEN, the first person to navigate the NORTHWEST PASSAGE. He wintered there and called the site after his ship, *Gjoa*. Trapping, hunting and carving are the sources of livelihood of the mostly Inuit population. The community is noted for its production of distinctive Inuit wall hangings. Channels and bays in the area are icebound for most of the year. ANNELIES POOL

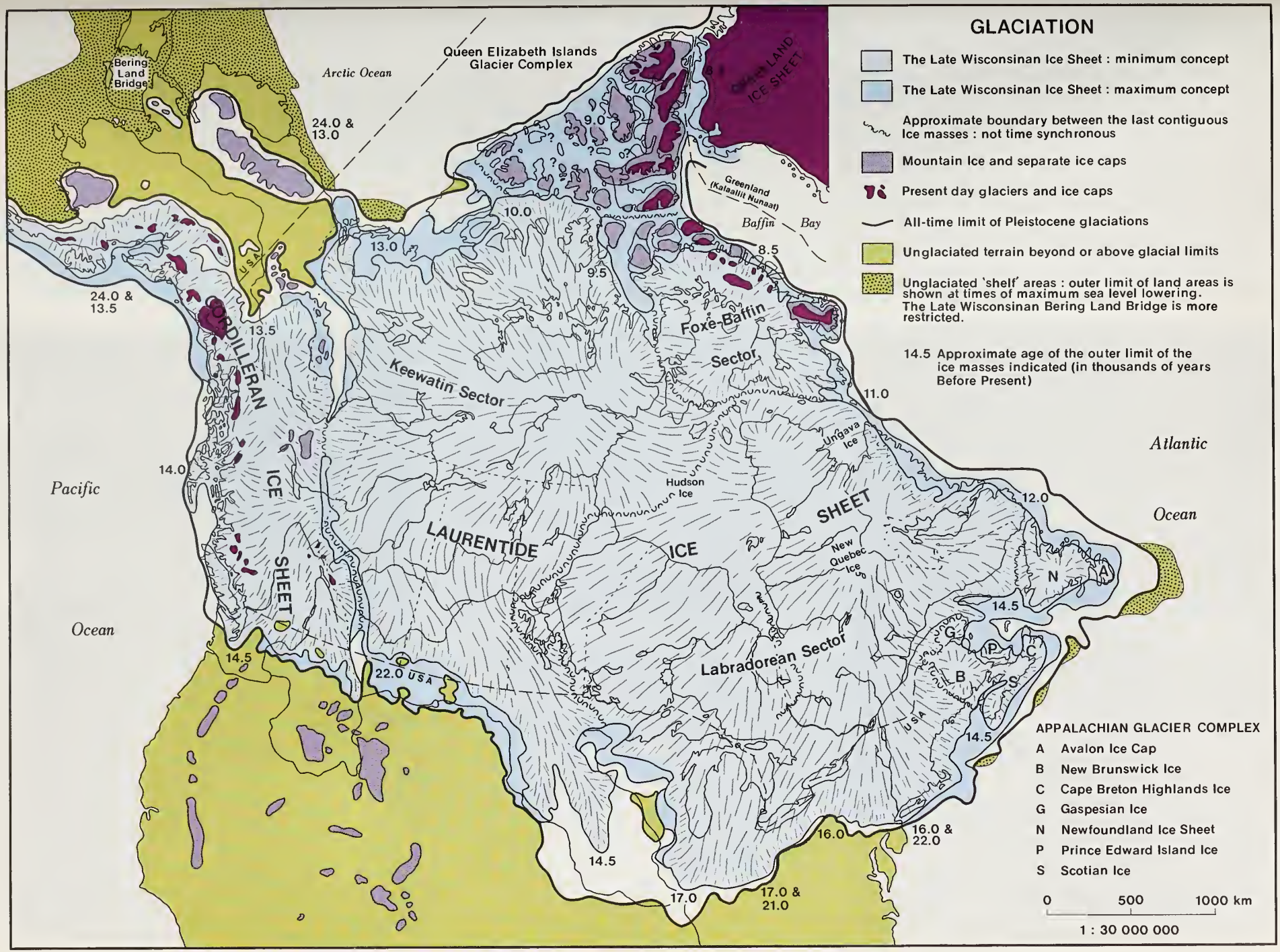
Glace Bay, NS, Town, pop 21 466 (1981c), inc 1901, is located on the E coast of CAPE BRETON I. Facing into the sun and the Atlantic Ocean, the location was known to the Micmac as *Wasokusegwom* ("bright home") and to the French, who mined coal for LOUISBOURG from the cliffs, as "Baie de Glace," a reference to annual drift ice from the Gulf of St Lawrence. The Dominion Coal Co (1893) made Glace Bay a boom town, and the municipality emerged from the smaller 19th-century colliery settlements. Immigrant workers came from Britain and Europe, but most of the population was drawn from rural Cape Breton, the Maritimes and Newfoundland. To exploit the rich bituminous coal seams underlying the district and dipping under the ocean floor, Dominion Coal operated 11 collieries within the town, including some of the largest and most productive coal mines in N America. Although the coal company dominated the local economy, by the 1920s Glace Bay was a union stronghold: the coal miners had a powerful influence on community life, and "company town" gave way to "labour town." The declining economic importance of coal led to Dominion Coal's withdrawal in 1967; the publicly owned Cape Breton Development Corp operated the town's one remaining colliery until 1984. Despite high unemployment and out-migration, and costly disappointments such as the heavy-water plant constructed in the 1970s, Glace Bay stands fast, proud of past achievements and hopeful of a change in its fortunes. The Miners' Memorial Museum is a tribute to the people of Glace Bay and the surrounding coal towns. DAVID FRANK

Glaciation is defined as the formation, movement and recession of GLACIERS. At present glaciers cover about 10% of the world's land area (14.9 million km^2). Most of this area is under the Antarctic and Greenland ice sheets; only about 700 000 km^2 is covered by the thousands of glaciers in the remainder of the world. Glaciation has been much more extensive in the past than it is today, occurring mostly as large, continental ice sheets. During expansion and recession of glaciers, the processes of EROSION and deposition may occur. Erosion by glaciers takes place mainly by abrasion and quarrying. Abrasion occurs when fine particles and fragments held in the ice, at or near the base of a glacier, move across the underlying material, commonly bedrock. This process can striate and polish fragments in the ice and the underlying bedrock. In addition, abrasion may form elongated, gutterlike channels (flutings) in the bedrock. Quarrying, the removal of blocks of bedrock by overriding ice, usually occurs where the bedrock is easily fractured, or where planes of weakness, such as joints, are present. *Roches moutonnées*, large, knoblike bedrock features with streamlined sides tapering up-glacier, and steep, abruptly broken sides down-glacier, result from abrasion and quarrying. Relatively more erosion and removal of material takes place in valley glaciers, where the ice is confined by topography, than in the less constrained ICE CAPS and ice sheets. U-shaped valleys, such as the Bow Valley in the Rocky Mts, are formed where glacial erosion has deepened and widened preexisting river valleys.

As erosion takes place in one area, deposition may occur in another. Forms such as DRUMLINS (streamlined, oval mounds commonly 15-25 m high and about 1500 m long) and certain kinds of ground MORAINE (low-relief, undulating terrain commonly up to 6 m high) can form under moving ice. However, most glacier deposition takes place near the terminus (boundary) during retreat of the ice. Features which can occur include hummocky moraine, high-relief forms up to about 10 m high, consisting of mounds, ridges and doughnut-shaped knobs; series of arcuate (bow-shaped) ridges of varying heights and lengths, named (according to their form, origin and position) cross-valley, ribbed, washboard, De Geer, push, ice-thrusted and recessional moraines; single, prominent ridges marking the limit of a glacial advance, called end or terminal moraines; and ground moraine. Most of these features contain a high percentage of glacial till. Till, in the strictest sense, is unstratified, unsorted material deposited directly from a glacier. It usually consists of a heterogeneous mixture of clay, silt, sand, pebbles, cobbles and boulders, with most constituents closely reflecting the composition of local bedrock. Commonly, larger particles are angular to well-rounded, striated, and show a preferred orientation. Till can be subdivided into several types depending on its location in the ice and how it was deposited.

Glaciers are also directly or indirectly responsible for various other deposits. Meltwater, originating on the surface, inside a glacier, or at its base, may form braided streams beyond the glacier margin. These streams display an interconnecting network of shallow channels which carry and deposit gravel and sand. Gravel is an important industrial resource in Canada, and some of the largest deposits have resulted from glacier-derived braided streams. An outstanding modern example is the Donjek R, YT, fed from the Donjek Glacier in the St Elias Range. Kames and ESKERS (knoblike features and sinuous ridges, respectively) result from the deposition of SAND AND GRAVEL by glacial streams. Glacially associated lake deposits form large plains that cover wide areas of Canada. The lakes were formed by direct damming by the glacier or by impedances to preexisting drainage. Manitoba's glacial Lake AGASSIZ is an outstanding example of a glacially dammed lake. Most sediments deposited in glacial lakes consist of silt and clay, which commonly form varves, ie, pairs of coarse and fine layers deposited in one year. Beach ridges composed of gravel and sand occur along the margins of some former glacial lakes. The absence of vegetation in recently deglaciated areas and the exposure of unconsolidated sand and silt (such as occurs in interchannel areas of braided RIVERS and former lake beds) allow wind to form sand dunes and deposit loess. Dunes are formed by the shifting of sand by saltation and traction; loess deposits, consisting of fine sand and silt, originate from suspended material that may have been carried hundreds of kilometres (*see* AEOLIAN LANDFORM).

The areal extent and succession of glacial deposits indicate how far and how often glaciers expanded in the past. Most is known about glacial activity of the past 2-3 million years, although evidence indicates that glaciation took


GLACIATION
The Late Wisconsinan Ice Sheet : minimum concept
The Late Wisconsinan Ice Sheet : maximum concept
Approximate boundary between the last contiguous Ice masses : not time synchronous
Mountain Ice and separate ice caps
Present day glaciers and ice caps
All-time limit of Pleistocene glaciations
Unglaciated terrain beyond or above glacial limits
Unglaciated 'shelf' areas : outer limit of land areas is shown at times of maximum sea level lowering. The Late Wisconsinan Bering Land Bridge is more restricted.
14.5 Approximate age of the outer limit of the ice masses indicated (in thousands of years Before Present)
Bering Land Bridge
Arctic Ocean
Queen Elizabeth Islands Glacier Complex
GREENLAND ICE SHEET
Greenland (Kalaallit Nunaat)
Baffin Bay
Atlantic Ocean
Pacific Ocean
CORDILLERAN ICE SHEET
LAURENTIDE ICE SHEET
Keewatin Sector
Foxe-Baffin Sector
Labradorean Sector
Hudson Ice
Ungava Ice
New Quebec Ice
USA
24.0 & 13.0
24.0 & 13.5
13.5
14.0
14.5
22.0
10.0
13.0
9.0
9.5
8.5
11.0
12.0
16.0
16.0 & 22.0
14.5
17.0
17.0 & 21.0
APPALACHIAN GLACIER COMPLEX
A Avalon Ice Cap
B New Brunswick Ice
C Cape Breton Highlands Ice
G Gaspesian Ice
N Newfoundland Ice Sheet
P Prince Edward Island Ice
S Scotian Ice
0 500 1000 km
1 : 30 000 000



Athabasca Glacier (*photo by J.A. Kraulis/First Light*).

place several times during GEOLOGICAL HISTORY. During the Pleistocene ICE AGE, as much as 30% of the Earth was covered by glaciers. Glaciers formed and expanded in mountainous regions throughout the world. In northern latitudes (eg, Canada and northern Europe) ice caps developed, expanding to ice sheets. About 97% of Canada was covered; hence, this country contains more glaciated terrain than any other.

The number of major glaciations that occurred during the Ice Age is open to question. Traditionally, 4 glaciations were recognized, each lasting approximately 100 000 years, separated by long, warmer periods. From oldest to youngest, these are known in N America as Nebraskan, Kansan, Illinoian and Wisconsinan. Within these major glaciations, minor glacier retreats and advances are recognized. New evidence and reinterpretation of old data suggest that ice did expand and retreat many times, but the complexity of the data is such that it is not even possible to say with certainty that there actually were 4 major glaciations. Much is known about the Wisconsinan, less about previous glaciations. Since the Wisconsinan was the latest glaciation, evidence (eg, moraines) is relatively well preserved. In addition, the time of the Wisconsinan glaciation can be estimated, mainly through radiocarbon dating of organic matter from below, within and above Wisconsinan glacial deposits (*see* GEOLOGICAL DATING). Although radiocarbon dating is by far the most important method for determining when glaciers expanded, it is useful only for material less than about 70 000 years old.

As can be seen from a map, the farthest limits of glaciation in Canada took place before the late Wisconsinan. It is not known whether this was during an early portion of the Wisconsinan or represented an earlier major glaciation such as the Illinoian. It is evident, however, that during the Pleistocene, ice never flowed far beyond these limits and, in general, conformed roughly with the configuration of the latest glaciation. Glaciers never extended into the northern YT and parts of the western NWT. In addition, the highest peaks of western Canada and the higher hills on the prairies (eg, the CYPRESS HILLS) have never been glaciated (*see* NUNATAK). Although the climate was severe enough to support glaciers, there was not enough moisture to nourish their expansion.

Enough information is available from glacial and associated deposits and from radiocarbon-dated organic samples to give a reasonable account of the Wisconsinan glacier complex in Canada. Sometime after about 100 000 years ago, ice caps formed and expanded in several parts of Canada. Major areas of accumulation included the Keewatin Sector, Labradorian Sector and the Foxe-Baffin Sector. Minor ice caps formed in the Atlantic provinces and the arctic islands. In time, these ice caps coalesced forming the Laurentide Ice Sheet. Apparently, at about the same time, valley glaciers expanded in the western mountains and, in time, formed the Cordilleran Ice Sheet. There is conflicting evidence about how far the ice sheets expanded initially. At least one retreat occurred before the final onslaught which probably began about 25 000 years ago and reached the areas illustrated on the map. The maximum limit reached by the late Wisconsinan ice sheets is under debate. In addition, there is evidence that the time of maximum expansion of the ice sheets varied from region to region. The Laurentide Ice Sheet probably had a maximum ice thickness close to 4000 m; that of the Cordilleran Ice Sheet may have been close to 2000 m.

As recession of the ice sheets took place, most of the glacial landforms seen today across Canada were formed. There were minor readvances during the overall retreat, but in general the retreat was relatively rapid, with ice withdrawn from most of Canada by 10 000 years ago. Since that time, glacial and other landforms have been modified by various agents such as WATER and WIND. However, these changes have been minor, and the preservation of the present glacial landscape is ensured for thousands of years to come.

N.W. RUTTER



A coulee or meltwater channel of a continental glacier on the Alberta plain (*photo by Tom W. Parkin/Pathfinder*).

Glacier Large mass of ice, formed at least in part on land, which shows evidence of present or former movement. It is formed by the compaction and recrystallization of snow into ice crystals and commonly contains air, water and rock debris as well. Movement is downslope or outward in all directions because of stress caused by the weight of the ice. Internal deformation and basal slippage of ice is common. Glaciers may end on land, in the ocean (as an ice shelf) or in a lake (*see* ICE CAP; GLACIATION).

N.W. RUTTER

Glacier National Park (est 1886, 1350 km^2) was carved from the rugged Selkirk and Purcell mountains of BC by more than 400 GLACIERS. Its sheer valley walls have been scarred by countless AVALANCHES caused by heavy snowfalls. Underground rivers have created unique CAVE systems. Half of the PARK is alpine TUNDRA, where meadows burst into flower only for a few short weeks each year. Below the meadows, stands of Engelmann spruce and alpine fir descend to the interior rain forest of western red cedar and western hemlock. High mountains, deep snow and long winters make a harsh environment for wildlife. Some species, eg, mountain goat, are able to withstand the rigorous conditions year-round. Others, eg, hoary marmot, hibernate in winter. Glacier is famous for its black and grizzly bears, which find abundant forage on the park's slopes. The rugged Selkirk Mts were a barrier to travellers until the discovery of ROGERS PASS in 1881. Development of the pass as a link in the building of the first transcontinental railway and, in later years, the Trans-Canada Highway has played a major role in the park's history. The mountains offer a dramatic backdrop for campers and a challenge for hikers and climbers.

LILLIAN STEWART

Gladstone, Man, Town, pop 964 (1981c), inc 1882, is located on the Whitemud R, 138 km NW of Winnipeg and 30 km W of the southern tip of Lake Manitoba. Ontario farmers seeking new land settled in 1871 at the Third Crossing where the North Saskatchewan Trail crossed the Whitemud for the third time. The community — known first as Palestine and later as Gladstone after the noted British PM — was on the fringe of prairie settlement, and became a take-off point for pioneers travelling farther W. A population and land boom occurred, sparked by construction of a railway link with Portage la Prairie, but soon collapsed, leaving the town in debt. Today, Gladstone serves the surrounding mixed farming district and has an important cattle-auction mart. D.M. LYON

Gladstone, James, or Akay-na-muka, meaning "Many guns," Canada's first native senator (b at Mountain Hill, North-West Territories 21 May 1887; d at Fernie, BC 4 Sept 1971). Gladstone, a member of the BLOOD tribe, devoted most of his life to the betterment of Canadian Indians. He was president of the Indian Assn of Alta (IAA) and 3 times was a delegate to Ottawa to discuss proposed changes in the INDIAN ACT. He played a prominent part in the fight for better eduation, greater respect for treaty rights, and participation of Indians in their own administration. On 1 Feb 1958 he was appointed to the Senate of Canada and in his maiden speech he spoke in Blackfoot "to place in the official debates a few words in the language of my people, the Blackfoot Indians, as a recognition of the first Canadians." In the Senate, Gladstone spoke strongly on issues that affected natives; he sat on the 1959 joint committee to investigate Indian affairs. JAMES DEMPSEY

Glass The first, known Canadian glass factory or glasshouse, the Mallorytown Glass Works, began operation in 1839 and closed in 1840. Glassmaking involved a large investment in raw materials, equipment and salaries. The smallest glasshouses employed 15-20 men producing glass from a 5-pot furnace; additional workers were needed to perform ancillary functions (eg, cutting firewood, unpacking raw materials, packing finished products). Thus, it is not surprising that the early period of glassmaking in Canada (1839-80) was one of changing partnerships and of firms going into and out of business. Throughout the 19th century imported glass set the fashion and competitive standard. Between 1840 and 1860, 5 Canadian glass factories manufactured the most useful glass products — common green window glass and bottles. They marketed to a population of 2.5 million people.

Manufactured and Pattern Glass The Canada Glass Works at St Jean, Canada East (now Québec), 1845-51, and the Ottawa Glass Works at Como, 1847-57, were window-glass factories located on water routes leading to Montréal. From this distribution centre, sales were advertised as far away as Hamilton. Window glass was made by blowing an elongated, hollow tube. Both ends were cut off and the tube was slit lengthwise and opened out into a flat sheet which was cut into various pane sizes. The largest windowpane available measured about 30 by 48 inches (76 by 102 cm).

Bottles might be free blown but, more often, were mold blown, using iron molds. A general line of bottles, made after 1851 by the Como factory and the Foster Brothers Glass Works, St Jean (about 1855-58), would include aquamarine medicine bottles, soda or mineral water-bottles, whisky flasks, ale and wine bottles, square, tapered case bottles to fit travelling cases, and large demijohns for storing liquids, made in black (really a very dark green) glass.

The 4 major companies operating between



Soda water bottle (left) and fruit jar (right) from the Hamilton Glass Works, 1865-96 (*courtesy Royal Ontario Museum*).

1860 and 1880 made bottles, jars and lamp chimneys as staple products. All were located near shipping facilities or the railway lines laid down in the 1850s. The Canada Glass Works, Hudson, Qué, 1864-72, and the Hamilton Glass Co, Hamilton, Ont, 1865-96, were "green" glasshouses. Green glass, used for window glass and bottles, ranges in colour from aquamarine through green, olive green and amber. The colour results from iron impurities in the sand, the major raw ingredient used in glassmaking. The St Lawrence Glass Co, Montréal, 1867-73, and the Burlington Glass Co, Hamilton, Ont, 1874-98, were flint houses. "Flint" or colourless glass, used for finer glass lamps and tablewares, is made by adding a decolorizing agent that masks out the natural green colour. After 1864, an improved formula for a good-quality colourless glass reduced the costs of raw materials by one-third. This development opened the druggists' bottle trade to flint glasshouses. It also greatly expanded the market for cheaper, pressed flint-glass lamps and tablewares.

Druggists' bottles were mold blown in green, amber and flint glass in sizes ranging from individual doses of 1 or 2 ounces (28 or 56 mL) to a 16-ounce (about 450 mL) size. By the mid-1870s all N American druggists'-ware manufacturers were making round, oval, square and rectangular mold shapes. On special orders, bottle molds would be lettered with the name of the retail druggist or the patent medicine. A cheaper method used a letter plate that could be inserted into a standard mold shape.

Cut-glass rose bowl from the Gundy-Clapperton Co Ltd, Toronto, c1905-20 (*courtesy Royal Ontario Museum*).



At first, soda-water bottles were egg shaped, a style introduced in England as early as 1814. In 1870 a modified version with a flat bottom was patented and, beginning in the early 1870s, a cylindrical bottle was also made with rounded shoulders and base or with a small flattened base, allowing the bottle to stand upright. These bottles were used by the growing number of late-19th-century bottlers of sweetened SOFT DRINKS and ginger beer. Whisky flasks and bottles were made up for distilleries. The BREWING INDUSTRY required cylindrical, mold-blown black or amber bottles for its ale, beer and porter. Although some custom-lettered molds were made up for Canadian breweries, most used plain bottles identified with paper labels bearing trademarked designs and names.

A mold-blown glass preserve jar was first patented by John Mason in the US in 1858. It had a wide mouth with spiral threading blown into the glass at the neck that created a tight seal with a metal screw-cap lid. This improvement over pottery jars and the advantage of visible contents encouraged home canning. The 2 Hamilton factories and the one at Hudson, Qué, all marketed one or 2 jar styles; the Hamilton ones were identified by the glass-company name blown into the glass.

The 2 flint factories (St Lawrence Glass Co and Burlington Glass Co) made lamps and lamp chimneys, as did the Hudson factory. The fragility of the chimneys, which required a daily washing, created a high-volume trade. The St Lawrence Co also made pressed flint-glass tablewares. The molten glass was pressed into patterned molds by a plunger that forced the glass into all parts of the mold. This process produced identical pieces very quickly and cheaply. By the 1860s heavy geometric designs, imitating cut glass, were in favour. Tableware sets included covered compotes and bowls, nappies, sugar and cream sets, spoon holders, tumblers, goblets, water pitchers, salt cellars and casters.

During the period 1880-1900, bottles, jars and chimneys continued to be staple products of the green and flint Hamilton factories, of several smaller firms established in the 1890s and of the 3 major new factories: the green and flint glassworks of the North American Glass Co (later Diamond, Diamond Flint, Dominion, Domglas), Montréal, 1880 to the present; the flint factory of the Nova Scotia Glass Co, New Glasgow, NS, 1881-92; and the Sydenham Glass Co, Wallaceburg, Ont, 1894-1913.

In druggists' bottles, some Canadian shapes were probably introduced in the 1890s. They were named for the city in which the factory was located or for the glass company. Jars were lettered with the glass-company name or with a trademarked name suggesting quality, eg, "Crown" or "Best." By the 1880s the number of pieces offered in a tableware set had expanded and commonly included several sizes of plate, bread plate, footed cake plate or salver, butter dish, mug, celery vase, relish dish, and quart and half-gallon jugs. The new designs of the 1880s were delicately molded flowers, birds, berries, leaves, crests, scrolls, commemorative events and fine, shallow-pressed geometric patterns made by the flint factories. By the 1890s patterns were more deeply pressed, imitating the current fashions in cut glass, or with bolder patterns of leaf or fruit. Panelled patterns were also popular. After the mid-1890s, pressed emerald green glass and white and blue (pale turquoise)

opal pressed glass became popular. By 1900 Canadian firms supplied half of the Canadian market of 5.5 million people with bottles, lamps and tablewares.

From 1900 to 1932 pressed glass patterns continued to imitate the pinwheels, stars and floral designs of cut glass. They were made by the Diamond Flint/Dominion Glass Co, Montréal, and by that company's tableware and illuminating plant in Toronto, the Jefferson Glass Co, from 1913-25. By the mid-1920s imitation cut patterns were becoming less popular, as new, delicately molded floral designs in pale pink, green, yellow and blue glass replaced them. By 1932, the Dominion Glass Co phased out production of most of its earlier tablewares, concentrating on hotel wares and on several simple, geometric patterns in the new pastel shades. As in the 19th century, bottles and jars were a staple and, after 1932, became the major production line of both the Dominion Glass Co and the Consumers Glass Co, Montréal, from 1917 to the present. After 1907 large orders were produced by the newly introduced automatic bottle-blowing machinery.

Cut Glass Between 1867 and 1900, the 5 Canadian flint-glass manufacturers concentrated on making the cheaper grades of glass bottles, lamp chimneys and pressed tablewares. All of them employed cutters to decorate their wares. From surviving examples, this earliest cut glass was engraved. The engraver used fine copper wheels and abrasives to cut minute, shallow lines in the glass. Usually, no final polishing was done and the designs appear with the opaque, greyish surface made by the engraving wheel. This technique was used for adding monograms to goblets and special presentation pitchers, or decoration to tableware sets, lamp chimneys and door lights. Fern fronds, wreaths of leaves, and sometimes grape vines and flowers, all reduced to a stylized simple form, were the most common decorative motifs.

The making of the more expensive and more deeply cut glass tablewares began in Canada about 1895. Between 1900 and 1930, 4 major firms made cut glass: George Phillips, Montréal, 1904-71; Gowans, Kent, Toronto, about 1900-18; Gundy-Clapperton, 1904-20, later Clapperton, 1920-72; and Roden Bros, Toronto, about 1907-54. One of the largest, the Gundy-Clapperton firm, employed 50 cutters in 1912. In addition, some 15 other glass-cutting firms were in operation during the period. They were concentrated in Toronto and Montréal, or located in Ontario centres (eg, Ottawa, Lakefield, Wallaceburg, Waterford) and in Winnipeg, Calgary and Vancouver. Some of these operations were one- or 2-man cutting shops. Many of the highly skilled glass cutters, including George Phillips and Harry Clapperton, came from the US.

High-quality lead-glass blanks, ie, the undecorated pieces for cutting, were imported from the Val St Lambert factory in Belgium; the Baccarat firm in France; Libbey Glass Co, Toledo, Ohio; O.C. Dorflinger & Sons, White Mills, Pa; and Mt Washington Glass Co, New Bedford, Mass.

In the larger cutting shops, cut glass was usually produced by a team of cutters, each with his specialty. The "rougher," using a stone wheel and fine abrasive, followed the designer's marks that outlined the decoration and made the first deep cuts in the glass. At this stage, there was always the danger of cutting too deeply and ruining the piece. The work was then passed on to a "smoother," who also used a stone wheel to smooth the first deep cuts and added the shallower lines of the design. Cutting gave the cut areas a dull, opaque surface. By the time the Canadian firms were in operation, the final polishing was no longer done with a wooden wheel and fine pumice. Instead, the glass was dipped in a bath of sulphuric and hydrofluoric acid, which returned a clear, sparkling finish to the cut areas. The process had been invented in the 1890s and helped cut production costs. In smaller shops, the whole cutting process would be carried out by one man.

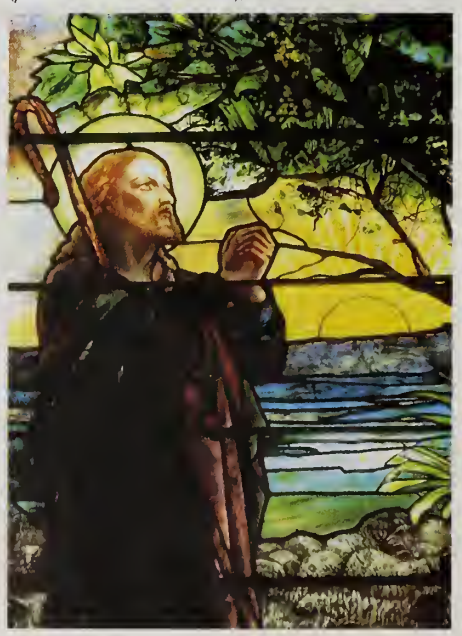
The Canadian firms used the hob stars, pinwheels and stars that became popular in the American industry in the late 1880s and 1890s, and the more recent stylized flower and leaf patterns. They created many of their own designs of a brilliant beauty, with such names as Primrose, Oak, Tulip (Gundy-Clapperton); Cornflower, Poppy and Sunflower (Roden Bros); Maple Leaf (Gowans, Kent); as well as many geometric patterns. The Toronto firms marked many of their pieces permanently with an acid-etched trademark: Gundy-Clapperton with "GCCO" in the leaves of a cloverleaf; Clapperton with a "C" in a cloverleaf; Roden Bros with an Old English "R" flanked by lions; and Gowans, Kent with the word "ELITE" in a maple leaf in a circle.

By about 1930 the smaller glass-cutting shops in Canada had vanished. They faced stiff competition from the larger firms, and their disappearance coincided with a decline in the demand for elaborately cut glass. A new style of lighter blown glass with highly polished, shallow-cut delicate floral and leaf patterns found favour in the market. From 1930 to 1972 firms such as Phillips and Clapperton followed much simpler geometric designs in cutting. One firm, W.J. Hughes, Toronto, specialized in cutting one pattern, Cornflower, which they first made in 1914 and still produce. Other new firms, such as the Mayfair Glass Co, Montréal, and the Crystal Glass Co and Monogram Glass Co, both of Toronto, produced the new light cut wares in patterns such as Carnation, Laurel and Grapes, Marguerite and Comet. JANET HOLMES

Glass, Stained Despite a number of technical developments, Canadian 20th-century stained-glass craftspeople have continued largely with the traditional technique of hand-made glass set and soldered in a matrix of lead strips (cames). However, *dalle-de-verre*, or cast slab glass, silicon adhesives and epoxy resins, sandblasting devices and a range of new tools and machinery have reduced fabrication time and extended the range of technical and aesthetic possibilities. Stained glass in Canada is of 4 major types. The oldest type, dating from the 1850s in this country, involves production of memorial windows in the Gothic-revival style by companies belonging to the religious art industry. A second type, also influenced by historical styles, is the work of studios devoted to recreating or restoring art nouveau, Edwardian or art deco windows for period houses, restaurants or bars. More recent directions (from the early 1970s) include the development of the stained-glass hobbyist and the emergence of the artist-craftsman of the studio-glass movement.

Of particular benefit to the hobbyist has been the development of a comprehensive Canada-wide distribution network for stained-glass tools and supplies. Courses, mostly at the elementary level, have become widely available through schools, colleges, youth organizations and studios. Accordingly, stained glass has become an inexpensive, accessible part-time leisure activity for thousands of Canadians.

Influenced by postwar developments in stained-glass design in Germany and England, and encouraged by the energy of the stained-glass renaissance in the US in the late 1960s, a number of Canadian artists have turned to stained glass as a medium for contemporary artistic expression. Although primarily concerned with architectural applications, many of these artist-craftsmen (so-called because they both design and fabricate) also began to produce autonomous works that could be exhibited independent of an architectural setting. Thus, exhibitions of stained glass, once a rarity in Canada, now occur frequently. In 1976, Canada's first association of stained-glass artists and craftsmen was founded in Toronto. Supported by members from all parts of the country, Artists In Stained Glass encourages the development of stained glass as a contemporary ART form. ROBERT JEKYLL



Stained glass window, "The Good Shepherd" (1935), in St Paul's Anglican Cathedral, London, Ont. It is one of a series and the only one signed by Louis C. Tiffany (*photo © Hartill Art Associates*).

Glassco, John, poet, translator (b at Montréal 19 Dec 1909; d there 29 Jan 1981). Glassco will be remembered for his brilliant autobiography, his elegant, classical poems and for his translations. He came from a respectable Montréal family but escaped at 20 to Paris, where he lived for 3 wild, exhilarating years. This period is recalled in *Memoirs of Montparnasse*, mostly written after his return to Canada in 1932 with a near-fatal illness, but not published until 1970. It is a dazzling book: elegant, witty, precocious, outrageous, combining a supreme evocation of Paris in the 1920s with a profound examination of the author's own fascinating character. Glassco's later years were spent mostly in Montréal and rural Québec. He wrote poetry (his *Selected Poems* won the Gov Gen's Award in 1971) and some fiction, collected in *The Fatal Woman* (1974). He also wrote, with customary elegance and wit, what he himself called "aphrodisiac works . . . as an article of commerce." His translations of French Canadian poetry are, along with F.R. SCOTT's, the finest yet to appear — his greatest achievement being the *Complete Poems of Saint-Denys-Garneau* (1975). STEPHEN SCOBIE

Glassco, William Grant, director, producer (b at Québec City 30 Aug 1935). As artistic director of TARRAGON THEATRE in Toronto (1971-81), Bill Glassco contributed to the development of Canadian theatre and drama by producing the works of numerous Canadian playwrights. Besides premiering plays by established writers such as James REANEY (*Donnelly Trilogy*), Glassco worked closely with emerging playwrights to develop their dramatic texts and employed leading Canadian actors to premiere new scripts. The works of playwrights such as David Freeman and David French were first staged at Tarragon. Glassco also introduced the works of leading Québec playwrights, particularly Michel TREMBLAY, at the Tarragon. ANTON WAGNER

Glenbow Museum, founded in Calgary in 1954, is one of Canada's foremost museums of art and western history. It was created by oilman and philanthropist Eric L. HARVIE as an outgrowth of his personal interest in collecting memorabilia. In 1966 its assets were donated to the people of Alberta and the Glenbow-Alberta Institute was formed to administer the huge collections of artifacts, paintings, books and documents. In 1976 the government of Alberta constructed a large 8-storey structure in downtown Calgary, providing 8361 m^2 of exhibition space. This has permitted the displaying of world-class exhibitions as well as its own unique collections dealing with western Canadian history, native peoples and other related topics.

The Glenbow's holdings are among the largest in Canada. It has some 22 000 works of art, the largest nongovernment collection of western Canadiana books and manuscripts in existence, and major holdings of pioneer, ethnic, military, and Indian artifacts. Included in its art collections are works by such well known figures as Paul KANE, Carl Rungius, Belmore Browne, W.J. PHILLIPS, F.A. VERNER, Albert Bierstadt and A.F. Kenderdine.

With its reputation as a lively and active institution, the Glenbow has carried out an extensive publishing program producing many books and catalogues on subjects of western Canadian art and history. DONNA LIVINGSTONE

Glengarry School Days: A Story of the Early Days in Glengarry, by Ralph Connor (Charles William GORDON), was published in Toronto, New York and London, 1902. Connor's sketches of school life in Glengarry County are imbued with a deeply felt religious attitude and with his reverence for the eastern Ontario landscape. His schoolboys come under the influence, first, of the universally loved and respected Archie Munro, and then of John Craven, who, through his contact with the minister's wife, is transformed from a talented but disreputable young teacher into a man filled with faith and bound for the ministry. *Glengarry School Days* sets out, with energy and good will, a clear design of moral and religious imperatives for the formation of good character; Connor's stories celebrate his SCOTS figures' hardy self-reliance, their deep respect for what they understand as God's law, and the ordered vigour of the lives they make in the light of their faith. NEIL BESNER

Glenie, James, army officer, politician (b at Fife, Scot 1750; d at London, Eng 23 Nov 1817). After service in Québec during the AMERICAN REVOLUTION Glenie resigned his army commission and settled in New Brunswick (1787). Already he had a reputation as an opinionated and prickly officer blessed with intellectual ability and engineering talent. His involvement in the masting trade and frustration over several land schemes brought him into conflict with Lt-Gov Thomas CARLETON and the LOYALIST élite. First elected to the NB Assembly in 1789, Glenie, part of the Assembly rights faction, became an outspoken critic of the governor and Council, and contributed substantially to the political deadlock of 1795-99. While Glenie's attacks did make the Loyalist political culture more accommodating, his abrasive and relentless opposition alienated friends as well as foes. By the early 1800s moderate assemblymen had come to terms with Carleton and the Council, but Glenie's criticisms continued, although now frequently lacking majority support in the Assembly. By 1805 Glenie withdrew to England to eke out a living through appointments and by employing his considerable talents as a mathematician, but he died in poverty. WILLIAM G. GODFREY

Globe and Mail, Toronto, was founded in 1936 when George McCullagh united 2 influential and historically important dailies, the *Globe* and the *Mail and Empire*. From the beginning, the new newspaper took on the character of the old *Globe*.

George BROWN launched the *Globe* in 1844 with the support of a group of Reformers. Although at first a party journal, the *Globe* quickly became required reading for the educated and business community in Toronto and the surrounding countryside through a shrewd mixture of news, features, forceful editorials and technological innovation. By 1853 the 4-page paper had become a daily, with a weekly edition for out-of-town subscribers; in 1876 Brown commissioned early morning trains to Hamilton and later London, and absorbed mailing costs for the daily *Globe*. As new presses and cheap paper enabled the journal to expand in size, the first women's section was added in 1882 and, within a decade, drawings and photoengravings. By 1900 the *Globe* was established as a quality paper attractive to advertisers, and with a combined circulation for all editions of 69 545. Just after the turn of the century it added the words "Canada's National Newspaper" to its masthead and began its pursuit of readers in all parts of the country. Meanwhile, the *Mail* had been established as a Conservative party organ in 1872 and, in 1895, absorbed another Tory paper, the *Empire*. In 1900 the *Mail and Empire* boasted a circulation of 61 720.

The *Globe and Mail* became the flagship of FP Publications' chain of NEWSPAPERS in 1965 and, in 1980, was bought by the THOMSON GROUP. It has become a journal of record as well as of the business, political and cultural communities. As a "writer's newspaper," the *Globe and Mail* has given skilled journalists such as Jeffery Simpson and John Fraser the opportunity to practise their craft. In 1984 circulation stood at 330 000, and the national edition, including the influential Report on Business, was beamed by Anik satellite to printing facilities in Moncton, Ottawa, Brandon, Calgary and Vancouver. Staff reporters were based in 8 Canadian cities and abroad in London, Washington, Peking and Harare. RICHARD J. DOYLE

Globe Theatre, Regina, was founded by Ken and Sue Kramer in Aug 1966 with assistance from the CANADA COUNCIL and various provincial boards. Canada's first professional children's theatre, it travelled to schools across the province presenting a variety of programs that appealed to different age groups. Parental response to the plays was so enthusiastic that in 1967 the Kramers established an adult theatre in Regina. After many moves, in 1980 the Globe acquired a 400-seat facility in a renovated downtown historic building. Unique among Canadian theatrical companies, the Globe has a writer-in-residence, Rex Deverell, whose plays such as *Black Powder* and *Medicare* deal with regional political issues and history. Plays by George RYGA, James REANEY, Rick Salutin and W.O. MITCHELL have also been performed. In 1983-84 the Globe, still under the artistic directorship of Ken Kramer, presented a season that included Shakespeare, Shaw, Alan Ayckbourn, Molière and *Mandarin Oranges* by Deverell. In 1982-83 over 30 000 patrons attended performances across the province. CHARLOTTE STEVENSON

Glooscap, the culture hero, transformer of the Eastern Woodlands Indians. Huge in size and powers, Glooscap is said to have created natural features such as the Annapolis Valley, in the process often having to overcome his evil twin brother who wanted rivers to be crooked and mountains impassable. Glooscap slept across NS, using as his pillow PEI, known to the natives as Abegweit, meaning "Cradled on the Waves." CAROLE H CARPENTER

Glyde, Henry George, painter, art educator (b at Luton, Eng 18 June 1906). Glyde was trained at the Royal Coll of Art, London (1926-30). In 1935 he became head of the art department at Calgary's Institute of Technology and Art, beginning 30 years as a force in post-secondary art education in Alberta. In 1937 he began instructing at the BANFF CENTRE SCHOOL OF FINE ARTS and in 1946 he established the fine-art department at U of A, which he directed until 1966. Glyde's most significant works are oils and murals depicting a type of social realism. These works are a valuable documentary of urban and rural prairie life. His murals are classical, the colours sombre, and the figure groupings mythological and symbolic in mood and content. The emphasis on structural realities has carried over to his interpretation of the Alberta landscape and to his portrayal of the BC coast. KATHLEEN LAVERTY

Gnatcatcher, Blue-Gray (*Polioptila caerulea*, family Muscicapidae, subfamily Sylviinae), tiny, migratory, insectivorous songbird, the sole representative in Canada of the tropical New World tribe, Polioptilini (13 species). It is slender-bodied, blue-grey above, whitish below, with a long, black tail. It is rare in Canada, breeding only in southern Ontario in open, broad-leaved deciduous woodland with brushy undergrowth. Nesting occurs late May to mid July. Clutch includes 4-5 eggs. Song is high-pitched and squeaky; more commonly heard is a buzzy call note. J.C. BARLOW

Goat Farming Goats (family Bovidae, genus *Capra*), ruminant MAMMALS with backwardly arching hollow horns, short tail and usually straight hair, are related to SHEEP but are of slighter build. Goats were domesticated as early as 7000 BC and have provided humans with food (milk, cheese, butter), leather and mohair. They were probably introduced with sheep by early settlers in NEW FRANCE. Goats are now raised in every province except Newfoundland, but are most popular in Ontario (about 50% of the goats registered in 1983 were in that province), BC (21%) and Québec (11%).

There are 4 kinds of breeding operations: for industrial milk production (milk is sold to processing plants for cheese making), for farm cheese production (sold by the producer), for meat production (meat is a by-product for milk producers but some breeders specialize in the production of slaughter goats) and for mohair wool production. Goats fall into 3 categories: nonregistered (grade) goat, the pedigree is either unknown or unregistered, or its parents are not registered; registered goat (Canadian), the mother's pedigree is unknown or unregistered but the father's pedigree is registered; registered goat, the pedigree can be traced back to the first goats imported to Canada. Five milk breeds are important in Canada: Alpine (of the 54 132 goats registered in Canada to 31 Dec 1983, 1764 were Alpine), Nubian or Anglo-Nubian (1618), Saanen (1028), Toggenburg (1003) and La Mancha (106). Two breeds, Angora and Cashmere, are raised mainly for wool. In goat breeding, each animal is identified and a register is kept of its birth date, breed and sex, identification number, breeding, kidding and weaning dates, vaccinations, antivermin treatments and milk-control reports.

The doe matures at 3 months but must not be bred before it is 7-9 months old; it reproduces once a year. Artificial insemination enables a large number of females to be impregnated with the sperm of a highly bred buck. The average gestation period is 5 months (153 days). The doe has 2 mammary glands. Diet, lactation stage, number of lactations, health and herd management are the major factors influencing milk production. Genetic improvement of the goat population is essential. Selection involves eliminating imperfect animals and keeping well-

formed ones (body, hooves, pelvis, limbs, udders). A table for classifying the physical conformation of goats has been developed by the Canadian Goat Society, Durham, Ont. Genetic selection also includes breeding characteristics (eating habits, fertility, prolificness) and milk-production characteristics, both quantitative and qualitative. Quantitatively, production increases 200 kg between the first and third lactations; this level is maintained between the third and seventh lactations and then declines. Qualitative aspects involve the levels of nitrogen and bytyrin in the milk.

Goats are fed twice daily; fodder makes up 72% of the daily intake of dry feed. Goats are very selective and like leaves and young sprouts. They prefer rolled cereals or concentrated nutrients in tablet form over finely ground grains. Like other ruminants they can digest foods rich in cellulose and then metabolize the volatile fatty acids. Goats are gregarious animals and prefer to live in groups. JEAN-PAUL LEMAY

Godbout, Jacques, novelist, essayist, filmmaker, poet (b at Montréal 27 Nov 1933). One of the most important writers of his generation, Godbout strongly influenced post-1960 Québec intellectual life. After studies at Coll Brébeuf and Université de Montréal, he taught French in Ethiopia. He joined the NATIONAL FILM BOARD (1958) as producer and scriptwriter. Co-founder of *Liberté* (1959), the Mouvement laique de la langue française (1962) and the Union des écrivains québecois (1977), Godbout was active in the QUIET REVOLUTION, constantly analysing society through contributions to various periodicals. His most important essays, demonstrating his penetrating mind and concern for democratic values, were collected in *Le Réformiste* (1975). Godbout's films include 4 full-length features (*Yul 871, Kid Sentiment, Ixe 13, La Gammik*) and more than 15 documentaries. He has written 6 novels: *L'Aquarium* (1962), *Le Couteau sur la table* (1965; trans *Knife on the Table,* 1968), *Salut Galarneau!* (1967; trans *Hail Galarneau!,* 1970), *D'amour, P.Q.* (1972), *L'Isle au dragon* (1976) and *Les Têtes à Papineau* (1981). ANDRÉ SMITH

Godbout, Joseph-Adélard, agronomist, professor, premier of Québec (b at St-Éloi, Qué 24 Sept 1892; d at Montréal 18 Sept 1956). He was educated at Ste-Anne-de-la-Pocatière and the Massachusetts Agricultural Coll and taught agriculture at Ste-Anne-de-la-Pocatière 1918-30. Elected Liberal MNA for L'Islet in 1929, he was minister of agriculture in the L.A. TASCHEREAU administration 1930-36. He became premier in Aug 1936 upon the unexpected resignation of Taschereau under the violent attacks of the new Union Nationale leader Maurice DUPLESSIS. His party was defeated in the 1936 elections, but despite his own defeat he remained Liberal Party leader thanks to the assistance of federal Liberal minister Ernest LAPOINTE. Heavy support from the federal Liberal Party enabled him to regain power in the 1939 elections. Because of his close ties with the federal party, Godbout did not strongly oppose the military CONSCRIPTION imposed in 1944 following a Canada-wide referendum. He also accepted the federal government's appropriation of various revenue sources that until then had belonged to the provinces. Despite some socially progressive bills, including one granting women the right to vote (1941), Godbout's party was defeated in 1944; he lost his own seat in 1948. The next year he was made senator for Montarville. DANIEL LATOUCHE

Goderich, Ont, Town, pop 7322 (1981c), seat of Huron County, inc 1850, located on a bluff above Lk Huron at the mouth of the Maitland R, 130 km NE of SARNIA. The site, with its small natural harbour, was discovered 1827 by the CANADA CO'S William "Tiger" DUNLOP. It was named for Lord Goderich, British PM 1827-28.



Goderich, Ont. The townsite, laid out in 1829, has wide, tree-lined streets radiating from a central octagonal square (*photo by John deVisser/Masterfile*).

A trail chopped 97 km through the bush provided access in 1828. The townsite was laid out 1829 with the idea that Goderich would become the entrepôt for the Canada Co's 400 000 ha Huron Tract. The town had wide, tree-lined streets which radiate from a central octagonal square like the spokes of a wheel. Development fell short of expectations, and while the town became the terminus of a railway from Buffalo in 1858, it commanded only local trade. In 1866 the discovery of salt by a company drilling for oil gave Goderich a major industry. Since the 1870s it has remained stable, growing slightly with the development of the resort industry. The massive stones of the historic HURON COUNTY JAIL (1839) contrast with its graceful design; the exercise yards are enclosed by an octagonal wall. HUGH JOHNSTON

Godfrey, Dave, writer, publisher, academic (b at Winnipeg 9 Aug 1938). Godfrey's books include *The New Ancestors* (Gov Gen's Award 1971), a powerful and complex novel set in Africa, where the author served with CUSO, and several collections of highly stylized short stories. An activist in Canadian cultural politics beginning in the late 1960s, he was co-founder of both the House of Anansi and New Press, and at present runs Press Porcépic with his wife, writer Ellen Godfrey. He studied at U of T, Iowa and Stanford, and currently teaches creative writing and publishing at U of Victoria. JOHN MOSS

Goforth, Jonathan, Presbyterian missionary (b at Thorndale, Canada W 10 Feb 1859; d at Wallaceburg, Ont 8 Oct 1936). Inspired by G.L. Mackay's work in Formosa (Taiwan), Goforth left farming to study at Knox College, U of T, graduating in 1886. The following year he was sent to Honan Province, China. Thanks to his policy of identifying with Chinese culture, friendly officials helped the 14 Canadian missionaries and dependents in Honan escape during the Boxer Rebellion. After the uprising the mission grew rapidly. Goforth refused to join the UNITED CHURCH OF CANADA in 1925 and started a mission in Manchuria. JOHN S. MOIR

Golab, Anthony Charles, Tony, "Golden Boy," football player (b at Windsor, Ont 17 Jan 1919). Golab was a hard-charging, versatile player with the Ottawa Rough Riders. He joined the Sarnia Imperials (ORFU) in 1938 and the Ottawa Rough Riders in 1939, where he won the Jeff Russell Trophy as most valuable player in 1941. As an RCAF flight lieutenant and pilot during WWII he was shot down and wounded. He returned to Ottawa to play until 1949, his spirited style making him a fan favourite. Golab, who played offence and defence, appeared in 4 GREY CUP games. FRANK COSENTINO

Gold (Au), heavy, rare, very malleable and ductile metal which melts at 1063°C. Native gold ordinarily contains up to 16% silver. Electrum is gold containing unusually high percentages of silver (20-40%). Pyrite or fool's gold, an iron MINERAL distinguishable from gold by its brittleness and hardness, is frequently mistaken for gold because of its colour. Although a rare element, gold occurs in nature widely distributed in small amounts. The chief source is the so-called hypothermal gold-quartz veins where gold, pyrite and other sulphides were deposited from ascending, mineral-bearing solutions (*see* IGNEOUS ROCK). The gold is mechanically, not chemically, mixed with the sulphides; therefore, when the sulphides are oxidized, the gold is freed. It is recovered by amalgamation with MERCURY or by treatment in a cyanide solution to form a soluble cyanide (*see* METALLURGY). When gold-bearing veins are weathered, gold may be washed into neighbouring streams where, because of its high specific gravity, it separates from lighter sands and gravels and concentrates to form placer deposits.

Gold was one of the first metals used by humans. In prehistoric times it was widely valued for artistic and ornamental purposes, and magical powers were attributed to it. It later acquired the status of currency (*see* MINTING; COINAGE), and although no longer commonly used as currency, it is interchangeable with any currency and most countries maintain some portion of their international reserves as gold (*see* GOLD STANDARD). Gold has several industrial uses. Being chemically inert, it has long been popular in dentistry for crowns and caps. Resistance to corrosion and good electrical conductivity make it useful in precision electronic equipment (*see* ELECTRONICS INDUSTRY). When applied as a thin film, it improves the thermal properties of window glass; the Royal Bank building in Toronto is an example of a large-scale use for this purpose. The major industrial use remains in JEWELLERY fabrication. Because it is soft, gold is commonly alloyed with other metals, eg, copper and silver, and it is combined with platinum to form white gold. The karat number indicates the amount of gold in the alloy: 24 karat is pure gold; 18 karat is 18 parts gold, 6 parts other metals.

Early exploration of what is now Canada was partly motivated by the hopes of France and England that they would discover hoards of gold, like those seized by the Spaniards in Mexico and Peru. Several adventurers, such as Martin FROBISHER in 1577 and 1578, returned to Europe expectantly with loads of worthless ore. The first gold found in Canada was in small placer deposits in the Eastern Townships of Québec and in central NS. Beginning with the Fraser River GOLD RUSH (1858), a series of discoveries in interior BC transformed that colony's history. The famous KLONDIKE GOLD RUSH (1897-99) attracted prospectors to the YT from all over the world. An enormous "dome" of gold was discovered near Porcupine Lk, northern Ontario, in 1909. At KIRKLAND LAKE, Ont, Harry OAKES developed the deepest gold mine in N America, and certainly the richest ever controlled by one man — it yielded over $265 million. WWII stimulated a boom in gold mining, and for a time gold was Canada's leading mineral product. By about 1970, costs of production from Canadian mines had increased until most mines had to close and gold production declined to 25% of peak levels. However, in recent years a dramatic increase in gold prices, combined with the discovery of large new gold deposits, particularly in the Hemlo district of northwestern Ontario (the largest discovery since Timmins in 1905) and Val d'Or, Qué, has led to increased production and a renewed importance of gold to the Canadian economy. In 1983 Canada was the world's 3rd-largest gold producer, far behind the Republic of South Africa and the USSR. Canadian production was 70 746 kg valued at $1.2 billion. S.A. HAMILTON

Gold Rushes in British North America began in the Queen Charlotte Is (BC) in 1852. Britain responded to the threat of encroachment by American gold seekers by placing the islands under the jurisdiction of Gov James DOUGLAS of the colony of Vancouver's I. In Aug 1857 gold was found on the Fraser R, and Douglas, anticipating a rush, assumed jurisdiction of the mainland in Dec. Approximately 25 000 individuals, most of them American, took part in the Fraser gold rush of 1858; by July the population of Victoria (the seat of government and a supply centre) had grown from several hundred to about 6000. The influx of men transformed the fur-trade territory into a mining frontier and altered the native Indians' position: once regarded as partners in the FUR TRADE, they became obstacles to prospectors and settlement. The rush led to the creation of the colony of BRITISH COLUMBIA on 19 Nov 1858 with Douglas as governor, and was followed by the establishment of commercial activities, transport companies and routes, places of entertainment and a postal service.

As the gold supply dwindled on the lower Fraser, prospectors travelled farther inland in search of shallow diggings. In 1860 gold was found near Cariboo Lk. The finds on the Cariboo creeks, such as those of William Dietz ("Dutch Bill") on Williams Creek, led to the Cariboo gold rush of 1862. Unlike the predominantly Californian rush of 1858, this one saw gold seekers from Britain, the Canadas, Europe and other parts of the US. Two men associated with the Cariboo were Billy Barker the pioneer of deep diggings, and John "Cariboo" Cameron, who had acquired more than $150 000 by Oct 1863. This rush led to the building of an arterial highway for BC (*see* CARIBOO ROAD) and to the population's becoming less American. The mainland population desired its own governor and government, and obtained both in 1864.

Gold was found on the Stikine and Peace rivers in 1861 and 1862, but the resulting small rushes were overshadowed by that of the Cariboo. The search for gold led to rushes to Wild Horse Creek in the Kootenays in 1864 and to Big Bend in 1865-66. The depression resulting from the gold industry's falling revenue gave rise to a demand for retrenchment and to an exodus of population, and resulted in the 1866 union of the colonies of Vancouver I and BC. Joining CONFEDERATION in 1871 was the political solution for a population seeking to escape heavy taxation to pay the colony's debt and the costs of an overstaffed government. The economic growth of BC after the end of the mining boom was based on links forged by the CPR.

In 1869 the Omineca R and its tributaries drew miners northward in search of individual wealth (mining in the older areas had become more technical, and capital and labour intensive, and companies were formed to meet higher operational costs) and the rush to this region reached its height in 1871. The Cassiar district in the Liard R basin in northern BC was productive 1872-80 and the operations there were a link between the gold rushes of BC and those of the Yukon and Alaska.

The Yukon R basin, which the Alaska-Canada boundary divided, was the principal gold-bearing district in the North, and the American system of miners' meetings was used to regulate mining and maintain law and order. The Canadian government sent Insp Constantine of the NORTH-WEST MOUNTED POLICE to Canadian territory in 1894, and the following year he became agent at FORTY MILE with wide powers and 20 policemen to assist him. In 1896 gold was found on Bonanza Creek and news of its discovery led to the KLONDIKE GOLD RUSH. The influx of people prompted the Canadian government to establish the Yukon Territory (1898).

The Klondike rush was the last major gold rush, for by the end of the century the era of individuals participating in the independent extraction of gold had largely passed. Gold had been found near Madoc, Canada East, in the late 1840s and along the Nova Scotia coast in 1862. The construction of the CPR, ONTARIO NORTHLAND and other lines within the Canadian SHIELD resulted in the sometimes accidental discovery of several large, valuable mineral deposits in Québec, Ontario and Manitoba, and the associated discovery of gold. Prospecting for silver-cobalt in 1906 led to the discovery of gold at Larder Lake, Ont. But these discoveries were quickly taken over by companies with the ability to mine and transport minerals on a large scale. *See* MINING.

JERRY SHELEST

Reading: R.J.W. Douglas, ed, *Geology and Economic Minerals of Canada* (1976); W.P. Morrell, *The Gold Rushes* (1968).



The Neversweat Company tunnel, Williams Creek in the Cariboo country, 1868 (*courtesy Public Archives of Canada/C-173/F. Dally*).

Gold Standard, monetary system in which a currency unit (the Canadian dollar, for example) is defined in relation to a certain quantity of gold, and in which the monetary authority (central bank) agrees to buy and sell gold freely at this price. International gold flows are unrestricted and international payments are balanced by gold movements. Canada was officially on the gold standard after 1851, but followed most other nations in abandoning it in 1914. A version of the standard was reestablished in 1926 but permanently abandoned in 1931. The gold standard restrained governments from expanding credit, keeping international creditors happy, but it also meant that economic instability in one country was transmitted to others by gold movements. Modern nations have been loath to subjugate their domestic economies to the vagaries of world economic conditions, although a return to the gold standard has been advocated in the US and elsewhere as a means of disciplining monetary authorities.

JAMES MELVIN

Goldbloom, Alton, pediatrician, educator, author (b at Montréal 23 Sept 1890; d there 3 Feb 1968). A 1916 McGill medical graduate, Goldbloom pioneered modern pediatrics in Québec and eastern Canada. Following internships, including 2 years in New York, he began to practise in Montréal (1920). He played a leading role in developing the Montréal Children's Hospital and the Dept of Pediatrics at McGill. His book, *The Care of the Child* (1928), was translated into French and Dutch. In 1959 *Small Patients: The Autobiography of a Children's Doctor* was published. Goldbloom's wit and encyclopedic knowledge made him a popular lecturer.

HAROLD SEGALL

Golden, BC, Town, pop 3476 (1982e), inc 1957, is located on the COLUMBIA R and Trans-Canada Hwy, 260 km W of Calgary, Alta. It is situated between the Selkirk Mtn Range and Glacier National Park on the W and between the Rocky Mtns and Yoho National Park on the E. In the 19th century the area was known as the Cache, or Kicking Horse Flats, but in 1883, during construction of the CPR, the community was named Golden City as a counterpart to Silver City (Castle Mtn, Alta). The town owes its start to the railway, still its principal employer. The region around Golden also supports several sawmills and plywood plants and some mining. Before construction of the Rogers Pass section of the Trans-Canada Hwy in the early 1960s, Golden was the eastern end of the Big Bend Hwy which followed the big bend of the Columbia between Revelstoke and Golden. Tourist traffic on the Trans-Canada Hwy, especially in the summer season, is also important to the economy.

JOHN R. STEWART

Golden Dog (*le chien d'or*), stone bas-relief bearing the figure of a dog gnawing a bone, with the inscription: "Je suis un chien qui ronge lo [l'os]/En le rongeant je prend mon repos/Un tems viendra qui nest pas venu/Que je morderay qui maura mordu" ("I am a dog that gnaws a bone/In gnawing it I take my rest/A time will come which is not yet/When I shall bite him who has bitten me"). The stone was built into a house erected by Timothée Roussel in Québec City in 1688. It may have been set there by Roussel or by Nicholas Philibert, who bought the house in 1734 and may have used the image to protest the corrupt practices of Intendant François BIGOT. In 1871 the house was destroyed to make way for a post office, and the stone was moved to the new building's portico. The many legends connected with the Golden Dog all turn on revenge and end in tragedy. One version was the basis for William Kirby's *Golden Dog.*

Golden Dog (Le Chien d'Or), A Legend of Quebec, The, by William Kirby, appeared in New York and Montréal, 1877. The first edition contained many errors, and the supposedly "authorized" edition, *The Golden Dog (Le Chien d'Or), A Romance of the Days of Louis Quinze in Quebec* (Boston, 1897), was, according to Kirby, "a poor mutilated thing." The many other editions and

abridgements are also textually unreliable. The novel's action takes place just before the fall of New France, when the supporters of the popular Chien d'Or trading house, headed by the bourgeois Philibert, struggle against the decadent and corrupt Grand Company of the Intendant BIGOT. Two ill-fated romances are interwoven: that of Amélie de Repentigny with Philibert's son, Pierre; and that of Le Gardeur (Amélie's brother) with the self-seeking Angélique des Meloises, who eventually persuades him to kill Philibert. This action precipitates the collapse of the colony. The novel mixes Gothic and historical romance with Québecois history and legend; it also provides insight into 19th-century English Canadian perceptions of French Canada's past. *The Golden Dog* was translated into French by Léon-Pamphile LeMay as *Le Chien d'Or: légende canadienne* (Montréal, 1884; rev 1926).

NEIL BESNER

Golden Hinde, elev 2200 m, is the highest mountain on VANCOUVER I, located near the Island's centre in Strathcona Pk. The peak was known as Rooster's Comb until R.P. Bishop submitted to the Geographic Board of Canada (confirmed 1939) the present name (after the ship of Sir Francis DRAKE, who may have reached this latitude and sighted the mountain). It was possibly discovered in July 1896 during the Bolton-Laing survey of the Island. GLEN BOLES

Goldenrod, genus *Solidago*, showy, perennial, herbaceous PLANT of the Compositae or Asteraceae family. Nearly 100 species have been described, chiefly from N America. Thirty-two species occur in Canada, 6 of which are distributed transcontinentally. Eastern Canada (Ontario to NS) has 11 species, with an additional 6 species found only in southern Ontario (the richest part of Canada for varieties of goldenrod). Goldenrods grow in dry, sterile to moist, rich soils, in prairie and wooded locations, and from the brackish seashore to high mountain elevations. The stems are usually simple, bearing distinctly toothed or lobed leaves. The flower cluster is usually a large, loose plume of several hundred heads, each a small "daisy" — a central mass of small, tubular florets surrounded by radiating, strap-shaped florets. The flowers are yellow and bloom in mid-to-late summer and autumn. The calyx tube, firmly attached to the ovary of individual florets, is crowned by fine hairs that form a parachute at the top of the tiny, dry, ripened fruit and aid in wind dispersal. Goldenrod is wrongly blamed for hay fever caused by RAGWEED pollen.

Goldhamer, Charles, painter (b at Philadelphia, Penn 21 Aug 1903; d at Toronto 27 Jan 1985). He was commissioned as one of Canada's official war artists, and his candidly observed charcoal drawings of burned Canadian airmen in an English hospital are some of the most horrific images of WWII. After the war, for a time, he was married to British comedienne Anna Russell. For 42 years he was in the art department of Toronto's Central Technical School (he retired as chairman 1969). His use of demonstrations and working directly are a style of teaching he learned from Arthur LISMER, his own teacher at the Ontario College of Art (1922-26). Like other painters in the 1930s, especially his friend Fritz BRANDTNER, Goldhamer found a base in Baie St Paul, painting habitants in Charlevoix County. His work in Québec, often in watercolour, was the start of his reputation. Fresh and sparkling, it recorded the area's rolling terrain. Sometimes his watercolours — like those of Carl SCHAEFER and Charles COMFORT — recall the work of American artists Charles Burchfield and Charles Sheeler. JOAN MURRAY

Goldsmith, Oliver, poet, civil servant (b at St Andrews, NB 6 July 1794; d at Liverpool, Eng 23 June 1861). The son of Loyalists and grandnephew of Irish poet Oliver Goldsmith, he was employed for most of his life in the commissariat of the British army at Halifax. His long poem, *The Rising Village*, originally published in England (1825) and later revised in Canada (1834), was the first book-length poem published by an English Canadian. In heroic couplets, Goldsmith depicts the progress of settlement and civilization in a Maritime community, but subtly cautions that the settlers must remain vigilant and loyal to Britain — lest the wilderness reassert its chaos and the lawless youth rebel in a (perhaps) American revolutionary spirit. Of interest is *The Autobiography of Oliver Goldsmith* discovered by W.E. Myatt and published with his notes in 1943. GERALD LYNCH

Golf is an outdoor game played with a small hard ball and a set of clubs with iron or wooden heads. The object of the game is to make one's way round a specially laid out course in as few strokes as possible, hitting the ball from certain starting points, or tees, to specific targets, which are holes set in the ground. Most golf courses have 18 holes. The name "golf" probably derives from the German *kolbe*, meaning "club." The game's ancestry is obscure, but golf as we know it was first played in Scotland in the last half of the 15th century, although the Scottish Parliament by 1491 had passed 3 edicts ordering that it be banned, reasoning that interest in it kept people from more practical pursuits and interfered with military activities. Golf spread, nonetheless, and when native Scots emigrated to Canada, they took what came to be known as the "Royal and Ancient Game" with them.

The first golf club in Canada was the Montreal Golf Club, founded in Nov 1873 by Scotsman Alexander Dennistoun; he was also the first president and the captain of the club. He was joined in his efforts by John G. and David D. Sidey, Scottish brothers who had immigrated to Canada. The first course for the Montréal club was over property called Fletcher's Field, owned by the city of Montréal. In 1884, Queen Victoria, through the Earl of Derby, bestowed upon the club the "Royal" prefix. The Quebec Golf Club (now Royal Quebec Golf Club) was founded in 1874. Play was over Cove Field between the Citadel and the Plains of Abraham. Canada's third course belonged to the Toronto Golf Club, founded in 1876. The fourth was the Brantford (Ont) Golf Club, begun in 1879. One of its members, Ralph H. Reville, began Canada's first golf magazine, *Canadian Golfer*, in 1915. The magazine continued under Reville's direction through 1932 and became the primary source for early Canadian golf history. Canada's first 18-hole course was the Victoria Golf Club, started in 1893; until then golfers had played over 9 holes. In 1894 the Winnipeg Golf Club was founded, followed by the Halifax Golf Club and the Edmonton Country Club in 1896, the Calgary Golf and Country Club in 1897 and the Vancouver Golf Club in 1898. By the turn of the century, golf was firmly established in Canada. The first municipally owned and operated golf course was conducted by the city of Edmonton in 1912, and within a short time there was hardly a town in Canada that did not have a golf course. Today, Canada has numerous outstanding courses, with the National Golf Club in Woodbridge, Ont, and Glen Abbey Golf Club in Oakville, Ont, generally considered the best championship courses.

Seeking competition and camaraderie, club members began to play against one another. The first interclub match was held on Cove Field in Québec City in 1876 and the host team defeated Montréal by 12 holes. The first interprovincial match was played at the Ottawa Country Club in 1893 between teams from Ontario and Québec. The Canadian Golf Assn, later to become the Royal Canadian Golf Assn (RCGA), was formed in 1894, spurred on by the efforts of A. Simpson, secretary to the Royal Ottawa (formerly Ottawa) Golf Club. The RCGA aimed to promote and develop golf in Canada, to protect the mutual interests of its members, establish consistency in the handicapping, or rating, of golfers, and to conduct national championships. In 1895 it conducted the first Canadian amateur championship, at the Royal Ottawa course. The winner was T.H. Harley, a Scotsman who had moved to Kingston, Ont.

At first, the RCGA conducted national championships for men and women. The first Canadian Ladies' Open amateur was held in 1901 at Royal Montreal and was won by member Lily Young. In 1913, Florence Harvey, a member of the Hamilton (Ont) Golf Club founded the Canadian Ladies' Golf Union. She had recently competed in England and, observing the good work of the Ladies' Golf Union there, saw no reason why a similar organization could not exist in Canada. By 1924 the CLGU, now the Canadian Ladies' Golf Assn, was ready to take over its own championship and the RCGA relinquished

Kananaskis Golf Club, one of Canada's newest and most spectacular courses *(courtesy Kananaskis Country)*.



control. The CLGA adopted similar objectives in women's golf to those of the RCGA in men's.

As more novice golfers joined clubs across Canada, the need for instructors was met by the many Scots who had been working at Canadian clubs and were adept at golf. They brought a knowledge of the game's principles and transmitted them to their members. By 1911 there were so many club professionals that they formed the Canadian Professional Golfers' Assn. Their inaugural championship was held in 1912 at the Mississauga Golf Club, near Toronto. Earlier the first Canadian Open had been conducted by the RCGA in 1904. It was won by J.H. Oke, an Englishman who had spent some time in Canada, but 7 of the next 10 Opens were taken by professionals firmly ensconced at Canadian clubs. George Cumming, professional to the Toronto Golf Club 1900-50, brothers Charles and Albert Murray of the Royal Montreal and Outremont (Qué) clubs, and Karl Keffer of Royal Ottawa starred in that decade of tournaments. It became obvious that professionals could both teach and play golf. Eventually these roles were divided, as memberships swelled and competition became so fierce that anybody who wanted to play for a living had to be devoted to practice and competition.

At the same time, Canadian amateurs were also busily engaged in their sport. George S. LYON, a former cricketer who played golf at the Rosedale and Lambton clubs in Toronto, won the Canadian amateur title 8 times between 1898 and 1914, as well as the 1904 Olympic golf event. C. Ross (Sandy) Somerville of the London Hunt Club won it 6 times 1926-37; and Ada MACKENZIE, founder of the Ladies' Golf and Tennis Club in Thornhill, Ont, won the Canadian ladies' amateur title 5 times 1919-35. They were later joined as top amateurs by Marlene Stewart STREIT, 11-time ladies' amateur champion, ladies' British Open amateur champion (1953) and US women's amateur champion (1956); and Gary Cowan of Kitchener, Ont, winner of the US men's amateur in 1966 and 1971. During Somerville's tenure as Canada's top amateur (he also won the US men's amateur in 1932), the interprovincial team matches for the Willingdon Cup had been inaugurated in conjunction with the Canadian amateur. The matches began in 1927 when Governor General Viscount Willingdon presented the cup to the RCGA. Four-man teams have competed annually for the trophy after emerging from provincial playdowns. As the top golfers edged into middle age, senior championships arose to fill the need for competition and Lyon himself took the first 6 events held by the Canadian Senior Golf Assn from 1918 to 1923.

On the professional side, the Canadian Open became one of the most sought-after titles in golf as players from Canada, the US and around the world competed for prizes that rose to $425 000 in the early 1980s. Until 1936 the Open was played for the Rivermead Cup; from 1936 to 1970 the Seagram Gold Cup was at stake; and after 1971 competition was for the Peter Jackson Trophy. On the US men's pro tour, Canadian Stan LEONARD won 3 events 1957-60, while George KNUDSON had won 8 by the time he turned to teaching in the late 1970s; he had also won the 1968 World Cup with Al Balding. On the women's tour, Sandra POST of Oakville, Ont, won the Ladies Professional Golf Assn championship on her first year on the tour and won more money than any Canadian professional, male or female. In 1980 Dan Halldorson and Jim Nelford won the World Cup of professional golf for Canada; that same year Halldorson won on the US tour and in 1981 Dave Barr of Kelowna, BC, did the same. In 1984 Nelford, Halldorson and Barr were all among the top 100 money winners on the US tour.

More than 1000 clubs belonged to the RCGA by the early 1980s. Junior golf had been strong since the first Canadian junior was held in 1938. The best junior women golfers had competed for the Canadian junior girls' championship since 1955. Stimulated by the prize money available in golf around the world and encouraged by the RCGA, the CLGA, and provincial golf associations, junior golfers began to look to golf as a career and to attend college on golf scholarships. In 1979 the Canadian Golf Foundation, an arm of the RCGA, was founded to act as a clearing house for Canadian golf information. In 1982 the foundation offered scholarships for eligible Canadians to attend college.

The long tradition of golf as a participant sport, the pleasant environment in which it is played, and the long life of the sport for individuals ensure that it will remain a popular hobby. There is something in golf that keeps people interested — perhaps the personal test of ability — and despite severely increasing land costs, escalating fees for play, and the reputation of the game as a sport exclusive to the leisured and moneyed class, golf has endured for centuries.

LORNE RUBENSTEIN

Good, William Charles, farmer, co-operative and agrarian leader (b near Brantford, Ont 24 Feb 1876; d at Paris, Ont 16 Nov 1967). A student of social and religious issues and a member of a family long involved in farm organizations, Good was on the executive of the Farmers' Assn in 1904. In 1907 he helped amalgamate the association with the Dominion Grange and became president of the new organization in 1912. A proponent of the need for farmer unity, Good, with E.A. PARTRIDGE and E.C. DRURY, drafted the constitution of the Canadian Council of Agriculture in 1909. In 1914 he helped organize the United Farmers of Ontario and the United Farmers Co-operative. Good was a leader of the PROGRESSIVE PARTY and sat as an Independent-Progressive in the Commons 1921-25, where he advocated electoral reform, banking reform, temperance and tariff reform. Elected president of the Co-operative Union of Canada in 1921, he held that post until 1945. Philosophically committed to a co-operative world view, he encouraged all forms of co-operative organizations (*see* CO-OPERATIVE MOVEMENT). IAN MACPHERSON

Goodeve, Sir Charles Frederick, scientist, research director (b at Neepawa, Man 21 Feb 1904; d at London, Eng 7 Apr 1980). After beginning research in electrochemistry at U of Man, Goodeve won a scholarship to University Coll, London, Eng. He joined its staff in 1930 and was elected a fellow of the Royal Soc of London in 1940. He had joined the RCN Volunteer Reserve at Manitoba, transferred to the RNVR (being promoted to lt-cdr in 1936) and tried to convince university colleagues to get personal experience of military problems. In 1940 he invented the method of degaussing ships to render them immune to magnetic mines, and subsequently commanded a special Royal Navy research unit. He was knighted and granted £7500 in 1946 for his wartime inventions. From 1945 to 1969 he was director of the British Iron and Steel Research Assn and introduced operational research methods into industry. While making his career in England, Goodeve sought to promote Anglo-Canadian co-operation in science by exchanges of personnel with the Defence Research Board and NATIONAL RESEARCH COUNCIL.

DONALD J.C. PHILLIPSON

Goodridge, Augustus Frederick, businessman, politician (b at Paignton, Eng 1839; d at St John's 16 Feb 1920). He became prime minister of Newfoundland in Apr 1894 when William WHITEWAY's sizable majority resigned after charges of corrupt election practices were brought against it. Goodridge was first elected as a Conservative in 1880, became leader of the Opposition in 1884 and was made a Cabinet minister before his brief and chaotic term as prime minister. His resignation on 12 Dec 1894 followed upon the financial collapse of 2 principal Newfoundland banks. ROBERT D PITT

Goodwin, Betty Roodish, artist (b at Montréal 19 Mar 1923). Her career has been characterized by a quest for atmosphere and effect, but the medium she uses divides it into 2 periods. Initially her training at Sir George Williams followed by a trip to Europe in 1958-59, placed her among modern artists who seek to combine crowd scenes and geometrization. After she worked with painter-engraver Yves GAUCHER in 1968-69, her attitude towards her medium changed and she began to try to evoke the essence of the material world's imaginative force. In her series working with vests from 1969 and after 1972 with tarpaulins, she uses transparency, thickness and texture to capture the power of her worn and battered objects. As the scale of objects changed during these years, her attention focused on light, movement and on time as an element of communication. In a subsequent series of installations, *P.S. One*, New York (1977-79), *rue Mentana*, Montréal (1977-79), in the Pluralities exhibition, National Gallery of Canada (1980), and, as part of the OKanada exhibition in Berlin (1983), structured space, uneven planes, light and coloured pigment play a fundamental role. LAURIER LACROIX

Goose, member of a widespread group of WATERFOWL ranging in size from the giant Canada goose (*Branta canadensis maximus*) to the diminutive cackling goose (*B. c. minima*). The term goose is applied to many species of waterfowl in the Southern Hemisphere, but the only true geese are found in N America, Europe and Asia. Geese belong to 2 main groups, true geese (genus *Anser*) and Brant geese (*Branta*). Some taxonomists subdivide geese into additional groups, eg, Hawaiian goose or nene (*Nesochen*), emperor goose (*Philacte*) of Alaska, bar-headed goose (*Eulabia*) of Tibet and India, or snow geese (*Chen*). Their taxonomy at the specific and subspecific level is very complicated, especially in the races of the Canada goose and bean goose (*Anser fabilis*). There are 7 species of geese in N America, most of which breed in the boreal forest and TUNDRA. The Canada goose may have as many as 50 distinct races and variations, ranging in size from the cackling goose of Alaska (1 kg) to the Canada goose of Manitoba (10 kg); all have the same general pattern of black neck and head with a white throat patch. Brant geese (*B. bernicla*) are divided into 4 populations: those from the eastern QUEEN ELIZABETH IS winter in Ireland; those from the western Queen Elizabeth Is in Puget Sound and the lower BC mainland; those on the coastal tundra of the NWT in Baja, California; and those from FOXE BASIN off the coast of New Jersey. The lesser and greater white-fronted geese (*Anser erythropus* and *A. albifrons*, respectively) are circumpolar, breeding in the arctic tundra. Snow geese (*Chen caerulescens*) breed in the High Arctic and Ross's geese (*C. rossii*) in the Low Arctic. Geese in Canada are intermediate in size between swans and ducks. Males are called ganders; juveniles, goslings. Geese are believed to mate for life. Members of various species may nest singly or in colonies. Usually 3-6 eggs are laid (range 2-9) in a nest of plant debris, moss, etc, lined with down. Both parents care for young. F.G. COOCH

Gordon, Andrew Robertson, physical chemist, educator (b at Toronto June 26 1896; d there 29 July 1967). He was an officer in the Canadian Field Artillery in WWI and was appointed to the faculty of the Department of Chemistry of U of T in 1925. He was widely recognized for his pioneering research on the calculation of chemical properties by quantum statistical mechanics and in 1946 received an OBE for research and

advice during WWII. He made significant contributions to the theory of electrolytic solutions. Head of the Department of Chemistry 1946-60, he was a founding member of the Defence Research Board and founding director of ATOMIC ENERGY OF CANADA LTD. He greatly improved the stature of graduate studies as dean of graduate studies, U of T, 1953-64. D.J. LE ROY

Gordon, Sir Charles Blair, banker, manufacturer (b at Montréal 22 Nov 1867; d there 30 July 1939). Five years after beginning work in a dry-goods store, Gordon formed the Standard Shirt Co and in 1904 oversaw the organization of Dominion Textiles. He became company president 1909 and was a founder and president of Dominion Glass. Recognized as a consummate organizer and a shrewd financier, Gordon's career paralleled the consolidation of Canadian business and the rise of Montréal as Canada's banking centre. His long-standing association with the BANK OF MONTREAL was marked by his appointment as a director 1913 and president 1927. During WWI, Gordon served on the IMPERIAL MUNITIONS BOARD in Ottawa and with the British War Mission in Washington. He received a knighthood for his contributions. P.E. RIDER

Gordon, Charles William, pen name Ralph Connor, clergyman, novelist (b in Glengarry Cy, Canada W 13 Sept 1860; d at Winnipeg 31 Oct 1937). The most successful Canadian novelist in the early 20th century, Gordon used literature as a pulpit to preach his energetic branch of "red-blooded Christianity." Educated at U of T and Edinburgh, he was ordained a Presbyterian minister in 1890 and undertook mission work for 4 years in the Banff, Alta, area before becoming a pastor in Winnipeg. In 1897, as a fund-raising effort, he published some short stories about mission work in the West, and with their success he began producing best-selling western novels such as *The Sky Pilot* (1899) and *The Prospector* (1904) as well as several novels set in Glengarry Cy. His early novels are fast-paced, sentimental melodramas, with stereotyped characters dramatizing the conflict between good and evil in frontier settings presided over by exemplary churchmen. The greatest influence on Gordon after his mother was Dr James ROBERTSON, the Presbyterian superintendent of missions in the West, whose biography Gordon wrote in 1908.

During WWI, after serving in France as chaplain to the Canadian forces, Major Gordon toured the US speaking in favour of American participation in the war. His novels then and afterwards were broader in scope and setting, more bluntly didactic in applying theology to modern society, and less popular than his westerns. Returning to Winnipeg, he chaired the Manitoba Council of Industry for 4 years after the 1919 WINNIPEG GENERAL STRIKE and negotiated in numerous labour disputes. In 1921 he became moderator of the Presbyterian Church in Canada and helped form the UNITED CHURCH in 1925. His autobiography, *Postscript to Adventure,* was published posthumously in 1938. TERRENCE CRAIG

Reading: Ralph Connor, *The Man from Glengarry* (2nd ed, 1960) and *Glengarry School Days* (2nd ed, 1975).

Gordon, Crawford, business executive, public servant (b at Winnipeg 26 Dec 1914; d at New York City, NY 26 Jan 1967). Educated at private schools and McGill, Gordon worked in the Dept of Munitions and Supply during WWII. At the end of the war he became C.D. HOWE's director of industrial reconversion. After a stint in private industry Gordon returned to government service in 1951 as co-ordinator of production for the Dept of Defence. Sent to the A.V. Roe aircraft plant at Malton, Ont, to improve production of the AVRO CF-100 fighter, Gordon was president and general manager of the company 1951-59. He presided over the development of the CF-105 (AVRO ARROW), cancelled by the government in 1959. ROBERT BOTHWELL

Gordon, Donald, banker, business executive (b at Old Meldrum, Scot 11 Dec 1901; d at Montréal 2 May 1969). Gordon left Scotland when young and joined the Bank of Nova Scotia, working up through the ranks while attending night school. He was rewarded with promotions to head office and eventually to the Toronto branch. In 1935 he was recruited as secretary of the new Bank of Canada and in 1938 became deputy governor. When war broke out Gordon was assigned to the Foreign Exchange Control Board and in 1941 was made chairman of the Wartime Prices and Trade Board, a job at which he was highly successful. In 1947 he returned to the Bank of Canada, leaving again in 1950 to become president and chairman of the CNR. Gordon presided over a difficult period of labour troubles, a declining share of passenger traffic, the expense of modernization and demands to appoint more French Canadians to senior management. He claimed that he had done all that he could with what was available and in response was burned in effigy in Montréal. Gordon retired in 1967 to become president of Brinco and chairman of the CHURCHILL FALLS power project. ROBERT BOTHWELL

Gordon, John King (b at Winnipeg 6 Dec 1900), son of Charles GORDON (pen name Ralph Connor). After studying at U of Manitoba, Oxford and Union Theological Seminary, Gordon taught at United Church Theological College in Montréal and was active in the Fellowship for a Christian Social Order, the LEAGUE FOR SOCIAL RECONSTRUCTION and the CO-OPERATIVE COMMONWEALTH FEDERATION. In New York C he was managing editor of *The Nation* (1944-47) and joined the staff of the UN, serving it in critical times in Korea, the Middle East and the Congo. After 1962 he taught international relations at the universities of Alberta and Ottawa, was chairman of the Canadian University Service Overseas (CUSO), president of the United Nations Assn and an adviser to the International Development Research Centre. JOHN W. HOLMES

Gordon, Walter Lockhart, public servant, politician, author (b at Toronto 27 Jan 1906). Gordon was educated at Upper Canada College and RMC, becoming a partner in the accounting firm Clarkson, Gordon and Co in 1935. During WWII he served in the Bank of Canada and the Ministry of Finance; in 1946 he chaired the Royal Commission on Administrative Classifications in the Public Service, and in 1955-57 the Royal Commission on CANADA'S ECONOMIC PROSPECTS. Gordon's concern for Canadian economic independence led him into the Liberal Party after L.B. PEARSON became leader in 1958; in May 1963 Gordon became minister of finance in the Pearson government. His 1963 budget proposal for a tax on takeovers of Canadian firms was withdrawn under pressure, and his influence in Cabinet waned until his resignation following the general election of Nov 1965. He returned to Cabinet as president of the privy council in 1967 to oversee the Watkins Task Force on the Structure of Canadian Industry, and resigned after completion of the report in Mar 1968. In the 1970s he inspired the COMMITTEE FOR AN INDEPENDENT CANADA; in the 1980s he gave leadership to the movement for nuclear arms control and disarmament. DENIS SMITH

Reading: Walter Gordon, *A Political Memoir* (1977); Denis Smith, *Gentle Patriot* (1973).

Gore, Francis, colonial administrator (b at Blackheath [London], Eng 1769; d at Brighton, Eng 3 Nov 1852). The third lt-gov of Upper Canada, he came to the colony after a brief career in the army and as lt-gov of Bermuda. His first term (1806-11) was marred by bitter quarrels with Judge Robert Thorpe and Surveyor General Charles B. Wyatt, which ended in their suspension from office. He was absent on leave during the WAR OF 1812. His second term (1815-17) closed with his prorogation of the Assembly, which had objected to his ban on the issuing of land patents to American immigrants, was impatient with delays in obtaining compensation for wartime damage to private property and was dissatisfied with his slow administration. Before that, he had got on well with the Assembly and had secured bills to build roads, reorganize the militia and found schools. He returned to England to become a deputy teller of the Exchequer. S.R. MEALING

Gorman, Charles, speed skater (b at Saint John, NB 6 July 1897; d at St Martins, NB 11 Feb 1940). Despite suffering a shrapnel wound in one leg during WWI, Charlie Gorman's international success earned him the title of "the man with the million dollar legs." Developing a long, sweeping stride, he won the 1924 US amateur title and the world championship 2 weeks later. He lost both in 1925 but defeated Clas Thunberg, the 1924 Olympic champion, to reclaim his world title the next year. On his retirement in 1928 he held 7 world records. J. THOMAS WEST

Gosford, Archibald Acheson, 2nd Earl of, colonial administrator (b in Ire 1 Aug 1776; d at Markethill, Ire 27 Mar 1849). Scion of a prominent Anglo-Irish family, he was an outspoken opponent of the ORANGE ORDER and strongly supported a policy of conciliation in Ireland. After a parliamentary career he was appointed gov gen of British N America in 1835 and placed in charge of a commission of inquiry into the crisis in LOWER CANADA. A number of its recommendations were embodied in the Russell Resolutions in 1837. From 1835 to 1837 Gosford vainly sought to satisfy the Assembly of LC without alienating the colony's anglophone minority, but his efforts at conciliation did divide the PATRIOTE party and helped limit the support given the REBELLIONS OF 1837. He resigned after violence began and returned to England. His tragedy was that he had been sent to govern Lower Canada at a time when a peaceful solution to the crisis there was no longer possible. P.A. BUCKNER

Reading: F. Ouellet, *Lower Canada* (1980).

Gosling, William Gilbert, merchant, politician, author (b at Paget, Bermuda 8 Sept 1863; d there 5 Nov 1930). Gosling came to Newfoundland in 1881 as a clerk with a fish-exporting firm. Known for his literary interests, Gosling organized an urban-reform movement in St John's in 1913. As a result the city's elective council was replaced by a 12-man commission which drafted a new municipal charter under Gosling's chairmanship. Although the legislature initially refused to pass the charter, Gosling was elected mayor in June 1916. During his tenure he promoted public housing, tax reforms and the formation of the Child Welfare Assn. He finally got the legislature to pass the charter in 1921 — the basis of present municipal government in St John's — and withdrew from public life. He wrote *A History of Labrador* (1910) and a biography of Sir Humphrey GILBERT (1911). His extensive collection of books formed the basis of the city's first public library. MELVIN BAKER

Goss, William Arthur Scott, civic employee and photographer (b at London, Ont 4 Mar 1881; d at Toronto 1 June 1940). As official photographer for Toronto 1911-40, he produced over 30 000 photographs documenting a period of dramatic expansion in the city's history. These photographs are characterized by their realism and technical brilliance. An exponent of "pictorialism," in which photography was employed for artistic ends, Goss came into contact with many Canadian artists, including the GROUP OF

SEVEN. His pictorialist, soft-lens portraits and landscapes received critical acclaim both in Canada and abroad. VICTOR RUSSELL

Gosse, Philip Henry, naturalist, religious writer (b at Worcester, Eng 6 Apr 1810; d at St Mary Church, near Torquay, Eng 23 Aug 1888). The foremost popularizer of natural history in mid-Victorian England and leader of a Brethren community in Devonshire, he made his decision to devote his life to the study of nature and the practice of evangelical Christianity during years spent in Canada. Gosse left Poole, Eng, in 1827 to work for 8 years as a clerk in a merchant's countinghouse at Carbonear, Nfld. Then in 1835 he attempted to farm just N of Compton in Lower Canada. The experiment proved a failure and he left Canada in 1838. Although Gosse's sojourn did not influence significantly his achievements, he has a place in the history of Canadian science. He was the first person to investigate systematically and record the entomology of Newfoundland. *The Canadian Naturalist* (1840; repr 1971) was Gosse's popular book on the flora and fauna of the Eastern Townships. Characteristically accurate and original in its ecological descriptions, though weak in taxonomy, the work provided first lessons for later generations of Canadian naturalists. DOUGLAS WERTHEIMER

Gotlieb, Allan Ezra, public servant (b at Winnipeg 28 Feb 1928). A Rhodes scholar and international lawyer with a reputation for intellectual toughness, Gotlieb joined the Department of External Affairs in 1957, and was assistant undersecretary and legal adviser 1967-68. He was deputy minister of the new Dept of Communications 1968-73 and of Manpower and Immigration 1973-76. A member of P.E. TRUDEAU's inner circle, he returned to External Affairs as undersecretary 1977-81 and was then appointed ambassador to Washington. He is the author of *Disarmament and International Law* (1965) and *Canadian Treaty-Making* (1968).
ANNE HILLMER AND NORMAN HILLMER

Gotlieb, Calvin Carl, "Kelly," professor of COMPUTER SCIENCE (b at Toronto 27 Mar 1921). A pioneer in the computer industry, Gotlieb received a PhD in physics from U of T in 1947 and was hired by the university as a researcher and lecturer. A founding member of the university's computation centre in 1948, he began teaching computer science in 1951 through the physics department. In time his interest shifted from hardware to computer applications and software and eventually to the socioeconomic implications of computer technology. He was instrumental in founding the Computing and Data Processing Assn of Canada (now the Canadian Information Processing Soc) in 1958 and the Co-operative on Information Technology between U of T and Waterloo in 1982. An expert in mathematical, business and scientific applications, he has been consulted on social issues, timetables, graph theory, international development, and seaway calculations since 1950. J. KNELMAN

Gotlieb, Phyllis Fay, née Bloom, writer (b at Toronto 25 May 1926). She has published 4 vols of poetry, 5 verse plays (commissioned by the CBC), several science-fiction stories and 4 science-fiction novels. Her first novel, *Sunburst* (1964), has been translated into Dutch, French, Norwegian and German; the second, *O Master Caliban,* into German and Japanese. In 1980 she began an epic science-fiction trilogy about cat aliens. Her poetry blends fantasy and metaphysics and many of her poems, particularly the early ones, evoke her Jewish roots. She is the author of "Hasidic influences in the work of A.M. Klein," an in-depth analysis of one aspect of Klein's writing. SHARON DRACHE

Gotlieb, Sondra, author (b at Winnipeg 30 Dec 1936). Educated in Winnipeg, she has published 2 novels: *True Confections* (1978), subtitled *Or How My family Arranged My Marriage,* which won the Stephen Leacock Medal for Humour, and *First Lady, Last Lady* (1981), a lively tale of diplomatic life. Gotlieb also writes nonfiction: *The Gourmet's Canada* (1972), *Cross Canada Cooking* (1976), and has written articles for *Saturday Night, Maclean's, Chatelaine* and the *New York Times.*
SHARON DRACHE

Goudge, Thomas Anderson, philosopher (b at Halifax 19 Jan 1910). A student of G.S. BRETT at Toronto (PhD 1937), he spent a year at Harvard during a time of intense interest in mathematical logic and philosophy of science. Appointed to U of T (1938), he introduced these subjects into a curriculum focused on the history of philosophy. While chairman, expanding enrolment allowed him to appoint people to work in these and other areas of contemporary interest. His publications include a study of *The Thought of C.S. Peirce* (1950), a logician, philosopher of science and early pragmatist, and *The Ascent of Life* (1961), which maintains that evolutionary biology explains the world in a manner unlike, for example, that of physics.
THOMAS MATHIEN

Gouin, Sir Jean-Lomer, lawyer, politician, premier of Québec (b at Grondines, Canada E 19 Mar 1861; d at Québec City 28 Mar 1929), was the father of Paul GOUIN, founder and leader of the Action libérale nationale. Of modest origins but well connected following his marriage to the daughter of Prem Honoré MERCIER, Gouin began his career in Montréal civic politics, joining the provincial Cabinet in 1900. He became premier in 1905, continuing and defending his predecessor S.N. PARENT's policy of industrial development against a concerted attack by Henri BOURASSA. Although welcoming foreign investment to develop Québec's resources, Gouin was anxious that French Canadians should share the benefits of industrialization. He became a committed educational reformer, eventually serving as president of Université de Montréal and chairman of 2 enquiries into public education in the 1920s.

Like other Québec Liberals, Gouin felt betrayed when the federal government imposed CONSCRIPTION in WWI but reaffirmed his commitment to Confederation in the "Francoeur Debate" of 1918 and ran for Parliament in 1921. Minister of justice 1921-24 in Mackenzie KING's Cabinet, he functioned primarily as spokesman for tariff-protected industries, contributing to an impression that he had become a tool of powerful financial interests. Disillusioned, the author of Québec's dramatic emergence as an industrialized province soon retired from politics. He became lt-gov of Québec in 1929.
BERNARD L. VIGOD

Gouin, Paul, lawyer, politician (b at Montréal 20 May 1898; d there 4 Dec 1976), son of Lomer GOUIN and grandson of Honoré MERCIER, both former prime ministers of Québec. In 1934 Gouin established the ACTION LIBÉRALE NATIONALE which attracted reform-minded Liberals and nationalists opposed to the policies of the TASCHEREAU administration. Prior to the 1935 elections, Gouin formed an alliance with Conservative party leader Maurice DUPLESSIS; he soon became disenchantd with Duplessis, however, and left the coalition before the 1936 elections which Duplessis's Union nationale won handily. Most of Gouin's followers abandoned him to follow Duplessis. After the demise of the ALN, Gouin contributed to the foundation of the BLOC POPULAIRE CANADIEN in 1942.
RICHARD JONES

Gouin, Réservoir, 1570 km², elev 404 m, max length 102 km, average depth 5 m, third-largest "lake" (really a collection of hundreds of small lakes containing innumerable islands) in Québec, is located in S-central Québec, equidistant from Ottawa, Montréal and Québec City. It was created in 1918 at the upper reaches of Rivière ST-MAURICE by the Québec Streams Commission. The dammed area, fed by numerous small lakes and streams, allows power developments on the St-Maurice by controlling the flow of water. The reservoir was named after Sir Jean-Lomer GOUIN, premier of Québec 1905-20, who created the Québec Streams Commission. DAVID EVANS

Gould, Glenn Herbert, pianist, writer, broadcast and recording artist (b at Toronto 25 Sept 1932; d there 4 Oct 1982). Dissatisfied with the concert medium, he abandoned a thriving international concert career for performances using recorded-sound technology. His work had a unique importance in music and communications.



Glenn Gould in rehearsal, Toronto, Ont, 1974 (*courtesy Public Archives of Canada/PA-137052/Walter Curtin*).

Gould received his musical education at the ROYAL CONSERVATORY OF MUSIC, Toronto, where his piano teacher was Alberto Guerrero. He was concerto soloist with the Toronto Symphony at age 14. Solo concerts, appearances with many Canadian orchestras, and CBC network broadcasts, as well as his championing of nonstandard piano fare (Bach, the 16th-century English keyboardists, moderns such as Hindemith and Schoenberg) placed him among Canada's leading musical performers when still in his early twenties. Débuts in Washington, DC, and in New York C in Jan 1955, and his first US recording later that year (Bach's *Goldberg Variations*), brought immediate international attention. Concerts and orchestral engagements in the US, England, Austria, Germany, Israel and the USSR (where he was one of the first Canadians to tour) followed, along with regular recordings. He was summer music co-director at the STRATFORD FESTIVAL 1961-64.

Then in 1964 Gould retired from the concert stage, preferring the possibilities inherent in recording technology over "live" performance with what he called its "non-take-two" limitations and frequent sports-arena atmosphere. It was an unprecedented — and rigidly kept — resolve, but not a surprising one for this exceptional and unorthodox figure. Gould's pianism was marked by uncanny linear detail and strong drive. His classical realizations were often provocative, and occasionally eccentric, in tempo and articulation. The music's contrapuntal fabric held for him far more importance than its sensuous appeal. His recorded repertoire includes virtually all the Bach and Beethoven keyboard works, much Mozart, much early-to-middle 20th-century music, but few 19th-century piano staples.

His later personal appearances in public were rare, but his career expanded into TV and radio documentaries (on both musical subjects — eg, the conductor Stokowski, one of his idols — and nonmusical ones — eg, *The Idea of North*, prompted by a train trip to Churchill, Man). His literary flair, already familiar from radio scripts and record sleeve notes, broadened in significant articles and reviews (*Globe and Mail, New York Times Magazine, High Fidelity, Piano Quarterly*) on everything from concert life and technology to admired popular stars (Barbra Streisand, Petula Clark). He also created backgrounds for several US and Canadian films. He received the Harriet Cohen Bach Medal (1959) and the Molson Prize (1968). Geoffrey Payzant's *Glenn Gould: Music and Mind* (1978) is an in-depth account of Gould's singular views on musical aesthetics.

In 1981 Gould recorded the Bach "Goldbergs" a second time, announcing this as his farewell to piano-solo recordings. He began experimental taping sessions as conductor with small ensembles, intending to make this his new concentration. The day after his 50th birthday he suffered a severe stroke from which he never recovered. JOHN BECKWITH

Goulden, Cyril Harold, geneticist (b at Bridgend, Wales 2 June 1897; d at Ottawa 4 Feb 1981). Son of a homesteader, Goulden took the course for farmers at U of Sask and went on to a PhD in plant breeding before becoming chief cereal breeder at the Dominion Rust Laboratory, Winnipeg, in 1925 (*see* J.H. CRAIGIE). He succeeded L.H. NEWMAN as Dominion Cerealist in 1948 and later became assistant deputy minister for research in the Dept of Agriculture. Contrary to early genetic theory, wheat resistance to rust diseases was controlled not by a single gene but by the interaction of several — which made both plant genetics and its application to farming much more difficult. A natural mathematician, Goulden took up the new speciality of biostatistics (and wrote the first N American textbook on the subject in 1937 for the students he taught at U of Man). As head of cereal breeding at Winnipeg for 23 years, Goulden was responsible for the creation of Renown, Regent and Redman wheats, suitable for the Canadian climate and possessing various rust-resistant qualities. DONALD J.C. PHILLIPSON

Goulding, George Henry, track and field athlete (b at Hull, Eng Nov 1885; d at Toronto 3 Feb 1966). Originally attracted to marathon racing with the Toronto Central YMCA, he began "heel-and-toe" (walk) racing on a whim, first appearing internationally at the 1908 London Olympics; he placed 4th in the 3500 m walk. At the 1912 Stockholm Olympics he won gold in the 10 000 m walk. Turning to invitational track meets in Canada, Britain and the US, he won 300 races at distances from 1 to 40 miles. He competed in many stunt races, winning against a man driving a horse and buggy and against a 4-man US relay team, and attracted thousands of spectators wherever he competed. TED BARRIS

Goulet, Robert Gerard, baritone, actor (b at Lawrence, Mass 26 Nov 1933). His rich voice and expert showmanship have gained him critical acclaim and popularity in Canada and the US. After training in Edmonton and Toronto, Goulet sang minor roles in the CANADIAN OPERA CO and made his CBC-TV debut in 1954. Appearances with CBC, "Theatre Under The Stars," and STRATFORD FESTIVAL followed. Goulet's realization of the role of Sir Lancelot in Lerner and Loewe's *Camelot* (Toronto and New York, 1960) was an immediate triumph and led to a successful career in the US in the 1970s, mostly as nightclub entertainer. ANN SCHAU

Gourlay, Robert Fleming, polemicist, reformer (b at Craigrothie, Scot 24 Mar 1778; d at Edinburgh, Scot 1 Aug 1863). A successful farmer and writer who fell into financial difficulties, he came to UPPER CANADA in 1817 to take up land he owned in Dereham Township and to write an immigrant's guide. The questionnaire and township meetings that he arranged to get information being thought radical, he was refused the grant of land on which he had planned to settle families from Scotland. He attacked the FAMILY COMPACT and became its most celebrated victim. Twice acquitted of libel, he was banished for sedition in 1819 after a trial in which it became clear that his mental health had failed. He published more than 80 titles, most of them vituperative defences of his own conduct. His 2-vol *Statistical Account of Upper Canada* (1822) is the most systematic contemporary survey of the province. In the introduction he condemned the government of Upper Canada, especially John STRACHAN. He thought that general ownership of land was the only sound basis for society and proposed a land tax to fund immigrants. His later advocacy of a union of British N America was written from an asylum in England. In the US in 1837 he condemned W.L. MACKENZIE's rebellions. He believed in petitioning and withholding supply as constitutional methods of achieving reform. His banishment was rescinded in 1839, and he returned to Upper Canada in 1856. After failing to be elected in 1858, he went back to Scotland. S.R. MEALING

Reading: R.F. Gourlay, *Statistical Account of Upper Canada*, ed S.R. Mealing (1974); L.D. Milani, *Robert Gourlay, Gadfly* (1971).

Gouverneur (governor), the French monarch's official representative in NEW FRANCE. The office, created before a complete system of government had been established, was always granted to a member of the nobility by royal commission, and the appointment could be withdrawn at any time. The governor had to account for his administration annually to the minister of marine (*see* MINISTÈRE DE LA MARINE), who was responsible for the colonies. The governor had far-reaching powers, most importantly external affairs (relations with the native nations and with the British colonies) and military matters. As commander in chief of the army, he determined peace or war. He and the INTENDANT jointly supervised the colony's development, handled SEIGNEURIAL land grants and controlled the FUR TRADE. Through his prestige, power and advice, the governor played a major political and social role. Samuel de CHAMPLAIN has often been considered New France's first governor; the most celebrated ones of later years were FRONTENAC, Philippe de Rigaud de VAUDREUIL, and his son Pierre de Rigaud de VAUDREUIL. *See* GOVERNOR GENERAL. JACQUES MATHIEU



Igor Gouzenko was a cipher clerk at the Soviet embassy in Ottawa. He defected in 1945 and provided information confirming the operation of a Soviet spy ring in Canada (*courtesy Public Archives of Canada/PA-129625/ Montreal Star*).

Gouzenko, Igor Sergeievich, intelligence officer, author (b at Rogachov, USSR 13 Jan 1919; d near Toronto late June 1982). At the beginning of WWII Gouzenko took intelligence training and in 1943 was appointed cipher clerk at the Soviet legation in Ottawa, where he learned that Soviet intelligence operated several spy networks in Canada. Disenchanted with Soviet life and politics, he decided to defect when he learned in 1945 that he and his family were to be sent home. On 5 Sept Gouzenko left the embassy with documents illustrating Soviet espionage activities. Initially, no one in Ottawa took him seriously; only on 7 Sept, following an abortive Soviet attempt to recapture him, were he and his family given protective custody. When it became evident that a widespread espionage network was operating, Mackenzie KING's government authorized the arrest of 12 suspects. After interrogation, they were brought before a royal commission. Gouzenko's testimony and documents impressed the commissioners, who confirmed in July 1946 that a spy ring had been operating in Canada, aimed at, among other things, the secrets of the atomic bomb. A number of suspects were subsequently convicted and imprisoned.

Gouzenko was given a new identity and for the rest of his life he and his family had police protection. He produced a memoir, *This Was My Choice* (1948), and a novel, *Fall of a Titan*, which received the Gov Gen's Award (1954). From time to time he emerged from the shadows, always wearing a protective mask, which for most Canadians became his trademark. Even his death, apparently from natural causes, was surrounded in secrecy. ROBERT BOTHWELL

Government in its narrow sense may refer to the group of ministers comprising the CABINET, as in "the Mulroney government" or "the Lougheed government." It may mean the whole STATE apparatus including the Cabinet, the legislature, the courts, the civil service, the armed forces and so on, as in "Why doesn't the government do something about it?" or "Too much government in our lives." A third meaning has to do with the achievement and exercise of power. A government is different from other organizations in society because of its ability to make rules for the whole society. This results from its control of the police and the army, but also from a recognition by the citizens of the government's legitimacy.

Organization of Government In Canada the government's legitimacy derives from the CONSTITUTION. Powers of government are divided among its branches — legislature, executive and JUDICIARY. In the legislature elected representatives adopt laws and vote on taxes and other revenues. The executive proposes legislation, presents budgets to the legislature and implements laws. The judiciary is the final interpreter of the laws.

In a democracy it is not sufficient that the legislature members be elected (excepting the SENATE); in the parliamentary tradition inherited from Great Britain the ministers of the executive must resign when they fail to retain the confidence of the majority of the members of the legislature. The courts must be free to interpret the laws without interference from Cabinet ministers or members of the legislature. In recent decades this balance has been threatened by the growth of the executive, partly the result of the complexities of expanding state power. Federally and provincially the executive has 3 separate parts. The head of state is the Queen's representative: federally, the GOVERNOR GENERAL; provincially, the LIEUTENANT-GOVERNORS. He or she must approve laws and important executive decisions before they come into effect. However, by convention, if the Cabinet has the support of a majority of the legislature the head of state's role is purely formal. The second part of the executive is the Cabinet, comprising the prime minister (leader of the majority party) and ministers chosen by him from among the leading members of his party in the legislature. Most ministers will be appointed to head a government department, but some will be given coordinating posts and others will have special duties, eg, government leader in the legislature. The third and largest part of the executive is the administration — the government departments, armed forces and various autonomous bodies. While departments are the basic organs of administration, answering through their minister to the legislature, the autonomous bodies, eg, CROWN CORPORATIONS and regulatory commissions, have more limited roles. Other boards run government insurance and loan schemes; ADMINISTRATIVE TRIBUNALS are used in areas such as income tax, immigration and social services.

Levels of Government, Centralization and Decentralization Although national, provincial and municipal levels of government exist in Canada, only the first 2 have clear powers which other levels cannot usurp (*see* DISTRIBUTION OF POWERS). MUNICIPAL GOVERNMENTS have only those powers that are granted to them by their provincial governments; one of the important changes in Canadian government since 1867 has been the assumption by the national and provincial governments of functions once belonging to municipalities. (Centralization is the concentration of decision-making authority in a national or higher-level government, while DECENTRALIZATION, on the other hand, is the distribution of such authority to regional or local governments.)

Changing Role of Government In 1867 the BRITISH NORTH AMERICA ACT assigned to the federal government authority or jurisdiction over defence and external affairs, criminal law, money and banking, trade, transportation, citizenship and Indian affairs. The provinces were to be responsible for education, civil law (including property and civil rights), health and welfare, natural resources and local government. The 2 levels of government were assigned joint jurisdiction over agriculture and immigration and, as it evolved, over most revenue sources. Changing social and economic conditions and ideas about the proper role of government have brought one level and then the other into prominence. In the 19th century, although the predominant philosophy was laissez-faire or nonintervention by government in economic life, the federal government used its control of the tariff to encourage industry in the East and used a combination of land and money grants to private companies to build railways, first the Intercolonial to the Maritimes, then the Canadian Pacific to the West. The provinces also plunged into support for railway building, but they were engaged in an almost constant struggle with the federal government to establish their claim to adequate powers and revenues. From 1900 to 1930 (excepting WWI), the provinces dominated as prosperity brought rising revenues to their governments. They built dams and highways and extended school and health services. The new urban, industrial and commercial life led to government regulation of health and safety, trade practices, highway traffic, etc — all provincial responsibilities. War and depression, however, brought the federal government again to the fore. In both world wars it not only directed the defence effort but used the powers given to the Cabinet by the War Measures Act to direct the economy. It took the leading part in organizing relief measures during the GREAT DEPRESSION. Various joint federal-provincial programs were created for public works and "back to the land" projects, as well as for the provision of direct relief.

Following the royal commission on DOMINION-PROVINCIAL RELATIONS (1940) the federal government proposed that it assume direct responsibility for regulating the economy and for the most important social insurance programs in exchange for the lion's share of government revenues. The provinces rejected this proposal at a conference in 1941, but many of the ideas were introduced piecemeal. By constitutional amendment, with the consent of the provinces, the federal government was given responsibility for unemployment insurance in 1941 and old-age pensions in 1950. Also with provincial consent, family allowances were created by federal law in 1944 and the CANADA PENSION PLAN in 1966. Conditional financial grants (or shared-cost programs) were used increasingly in the postwar period by the federal government to prod the provinces to action in fields such as highway construction (the Trans-Canada Highway), postsecondary and university education, unemployment assistance, hospital insurance and health insurance.

Because of these initiatives and because of international tension after WWII, the provinces did not achieve until the 1960s the kind of primacy they enjoyed in the 1920s. While many foreign observers find Canada a very decentralized state with many powers vested in the provinces, the latter continue to feel that the federal government interferes in the discharge of their responsibilities. For its part, as costs soared in the late 1970s, the federal government tried to find ways to limit its expenses, especially in health and higher education programs.

Controlling the Administrative State With the growth of the WELFARE STATE and increasing government management of the economy, the administrations of all levels of government have expanded and become increasingly difficult to control. The number of people working directly or indirectly for one level of government or another represents about 25% of the labour force. The size and complexity of government departments have challenged the principle of ministerial responsibility. Members of Parliament have a full-time job trying to oversee the activities of the government and the administration. The role of the courts is being taken over in many cases by administrative tribunals.

Since the mid-1960s different solutions to these difficulties have been suggested. Cabinets have created their own planning and coordinating staffs, usually grouped around the prime minister or the Treasury Board. The Cabinet has often developed a specialized committee structure to do the detailed work, leaving only broad questions of policy for plenary sessions. The legislatures have also created committees whose members specialize in the affairs of one or 2 departments. They have streamlined their procedures and introduced small research budgets to allow Opposition parties to conduct their own studies. The measures taken to control government power include the establishment of OMBUDSMEN. FREEDOM OF INFORMATION laws have made some government information open to public scrutiny, and the CANADIAN CHARTER OF RIGHTS AND FREEDOMS will enable the courts to invalidate laws or administrative actions infringing on basic personal freedoms or rights.

J.I. Gow

Reading: Audrey D. Doerr, *The Machinery of Government in Canada* (1981); J. McMenemy, *The Language of Canadian Politics* (1980); J.R. Mallory, *The Structure of Canadian Government* (1971).

Government Building Government has always been the most important patron of ARCHITECTURE in Canada, and this role has increased rapidly over the past few decades. As its duties and responsibilities expand, so do its building needs. Today all levels of government contribute to all aspects of our built environment. Courthouses, schools, hospitals, military buildings, firehalls, market halls, factories, theatres, museums, police stations, recreational buildings and housing are required for the varied functions of government. The buildings most readily identified with government are those housing the central legislative and administrative portions of the political system. On the municipal level, government is identified with city hall and on the provincial level with buildings housing the legislature. The federal government is identified by the federal buildings in Ottawa and by hundreds of post offices, customs houses and office buildings in all parts of the country.

Design of government buildings varies according to the changing institutions and functions of the state as well as the changing architectural tastes. Despite this diversity, common themes or characteristics can be identified regardless of the date of construction. Government buildings tend to be constructed of enduring materials, commonly stone or brick, which impart a sense of weight, permanence and stability. Scale varies according to function, but generally government buildings are designed to dominate their surroundings, thereby visually establishing their central role in the community. Only in Québec was this position of dominance challenged by the church. In style, government buildings conform to current tastes in design, but government architecture has traditionally incorporated symmetrical elevations and balanced compositions. These aesthetic qualities reinforce values of order, reason and balance considered appropriate to the state. More significantly, government buildings are not generally noted for their architectural daring. As a symbol of the established state and its political traditions, governments prefer archi-



Early government buildings, such as Government House, Fredericton, NB, drew upon 18th-century Palladian traditions, a classical mode of building. These impressive buildings reinforced the presence of British rule (*courtesy Public Archives of Canada/C-3558*).

tecture that is contemporary but also reflects accepted standards.

The earliest government buildings in Canada were erected in the early 17th century for the French settlements in NEW FRANCE and ACADIA. A legislative council building, called the Sénéchaussée, was built in Québec in the mid-17th century, but the most important government building was the Château Saint-Louis, the residence of the governor. Typical of the initial phases of settlement, the first Château Saint-Louis was a simple, unpretentious structure. Located within the military compound on top of Cap Diamond, it differed little in design from the surrounding military buildings. Only its larger scale and prominent setting overlooking the cliffs visually distinguished it from its immediate surroundings.

In 1663 New France was named a province of France, and the local government became directly responsible to the Crown. This new status marked the colony's transition from a rough military and commercial outpost of empire into a permanent centre of French culture and society. This growing maturity was soon reflected in its major government buildings. In 1692 plans were drawn up for a new Château Saint-Louis. Built of stone, 2 storeys in height with a steeply pitched roof, symmetrical plan and impressive central frontispiece, it resembled French palaces of the 17th century. The palatial quality of key government buildings in New France was equally evident in the 1715 design of the palace of the INTENDANT. Like the Château Saint-Louis it was a 2-storey, dressed-stone building with a mansard roof, a U-shaped plan with a projecting frontispiece and 2 end pavilions. The palace contained a large assembly room for the meetings of the legislative council as well as numerous private apartments, a chapel, stables and beautifully landscaped gardens.

After the fall of New France the influx of United Empire LOYALISTS following the American Revolution greatly consolidated the British presence. At the end of the 18th century centres of colonial government had been established in St John's, Halifax, Fredericton, Charlottetown, Québec City and York (Toronto). The major government buildings were the residence of the governor, and the legislative buildings which housed both the legislative council and the legislative assembly.

The first 4 decades of the 19th century were a period of growth and stabilization for these British settlements. In the Atlantic colonies this change was reflected in the construction of a number of imposing public edifices, including new governor's residences in Halifax (1800-05), Fredericton (1826-28) and St John's (1827-31), and a series of legislative buildings or province houses in Halifax (1811-19), Charlottetown (1839-48) and St John's (1847-50). These buildings have much in common. All were designed by architects or builders trained in Britain either as civilians or as officers of the Royal Engineers. They drew upon the well-established, 18th-century, British Palladian tradition, a classically inspired mode of building which featured a symmetrical plan, often with flanking wings or projecting pavilions, and a large central portico set upon a rusticated or arcaded base. The imposing visual impact of these dignified classical buildings was greatly enhanced by their use of finely dressed stone. Their weight and mass set them apart from the surrounding buildings, which were predominantly of wood, and reinforced the idea of these buildings as the keystones of British rule.

During the same period Upper and Lower Canada were reluctant to spend large sums on lavish architecture, although several plans had been submitted for public buildings. Because the Canadas were so vulnerable to attack from the US, budgetary priority was given to military works in the form of canal systems and fortifications. The government institutions of Upper Canada were first housed in a long range of military buildings on the lakefront, and later in a slightly more refined but still fairly modest one-storey brick structure (1831) situated on Front Street in York. In Lower Canada, the legislature met in the old episcopal palace of the French regime (Québec) which had been refurbished in a more anglicized style in 1831. The construction of permanent government buildings was further delayed by the Union of the Canadas in 1841 and by the failure of the new government to choose a permanent site as the capital.

In 1857 Ottawa was selected as the seat of government for the United Canadas and work then began on the construction of an appropriate home for the colonial parliament. A fanciful Gothic design for a Parliament Building and 2 departmental blocks in the same style was selected in 1859. The picturesque design with its irregular skyline, rich textures, polychromatic stonework and intricate medieval detailing differed substantially from the cold, reserved classicism of the earlier legislature buildings in the Atlantic colonies; but in many respects the Ottawa buildings share a common visual language consistent with other government architecture in Canada. The use of stone and the grand scale visually dominated and overpowered the town which surrounded it. Despite the fanciful quality of the detail, the architects consciously avoided the usual asymmetry of the Gothic style and imposed a formal, symmetrical composition on the overall plan and elevation. Like the earlier legislature buildings, the design of the Ottawa PARLIAMENT BUILDINGS was self-consciously British. Inspired by the example of the new Parliament Buildings in London, begun in 1836, and by the prevailing perception of the Gothic style as being the only truly British style, a Gothic design for the Ottawa buildings reconfirmed the cultural and political bonds with Britain that set Canada apart from the American republic.

The establishment of a federal government in 1867 created a demand for public buildings across the country. Although many existing post offices and customs houses had been inherited from the old colonial institutions, the new government recognized the need to project a fresh and dynamic image by constructing substantial public buildings. This initial federal building program was dominated by the Second Empire style, characterized by a high mansard roof and by ornately carved classical ornamentation. It was a rich style, evocative of wealth, confidence and a sense of grandeur. This style was applied to some 24 post offices and customs houses erected under the direction of the Dept of Public Works in the 15 years following Confederation, thereby imposing a unified architectural theme on federal buildings across the country.

From Confederation to the end of WWI the appearance of federal architecture changed with changing architectural fashions. In the early 1880s the now outdated Second Empire style gave way to a late Victorian Romanesque vocabulary with its heavy stonework, round arches and massive, off-centre clock towers. This general profile of public building became so strongly associated with the federal government that it persisted into the 1920s and even into the early 1930s. Gradually, however, this type was replaced by the Beaux-Arts style of the 1910s and 1920s. But despite these changes in style, federal buildings continued to be visually consistent. Their solid stone or brick construction and their prominent setting established an imposing presence in the community and the repetition of related design types across the country created recognizable symbols of the federal government.

The 1930s marked a transitional phase in federal architecture. Stylistically this era was characterized by an aesthetic compromise between traditional classicism and the modern movement. Federal buildings retained the formal,

Post office, Galt [Cambridge], Ont. Early post offices formed the visual core of many towns across Canada (*courtesy Public Archives of Canada/PA31834*).



symmetrical composition and the sense of mass and weight; but in place of the traditional decorative vocabulary a modernistic language was used featuring austere stylized forms, clean crisp lines and sculptural motifs based on contemporary iconography. In the 1930s a new type of federal building was introduced. Whereas previously the regional departments of the federal government consisted primarily of the post office, customs house and perhaps the Inland Revenue Department, during the Depression the regional activities of the federal government expanded. In large urban centres such as Halifax, Toronto, Winnipeg and Regina, the government constructed a number of "Dominion" or "Federal" buildings which were large, multistoried buildings housing a variety of federal offices under one roof. This architecture reflected the new corporate structure of government.

Confederation had also created the secondary, provincial level of government, but the provinces were slower to express themselves architecturally. In the established eastern provinces most legislatures continued to use existing colonial buildings, and the provinces of NS and PEI continue to do so today. In the late 1870s Québec and NB were the first to construct new legislature buildings, both of which imitated the federal example by employing the mansarded Second Empire style. The newly founded province of Manitoba also received a fairly substantial legislature building, built by the federal government as part of the Confederation agreement. It was later replaced by a legislature building of the province's own design.

At Confederation the western regions were still relatively undeveloped. This was evident in their unassuming government architecture. Only BC, whose origins as a colony dated from the mid-19th century, had a sizable legislature building. This curious structure, known locally as the "Birdcage," was built 1859-64. It consisted of a series of separate structures grouped in an ordered symmetrical composition which imposed the sense of visual formality characteristic of government architecture; but its light, rather exotic design with an intricate pattern of half-timbering, ornate eave brackets and bellcast roof lacked dignity and decorum. "The Birdcage" was replaced in 1898 and destroyed by fire in 1957.

The second phase of provincial architecture dates from the turn of the 20th century when both the provinces of Ontario and BC constructed their own lavish legislature buildings which reflected the eclectic tastes of the late Victorian era. The picturesque synthesis of Romanesque, medieval and classical motifs of the BC Legislature Buildings represents the extravagant example of this period. The Prairie provinces adopted a very different style of building. Constructed during the height of the Beaux-Arts fashion, all 3 legislature buildings (Edmonton 1908-12, Regina 1908-12, Winnipeg 1913-29) were designed in the grand classical manner, with monumental porticos, crisp stonework and massive central domes. The strong association between provincial architecture and an austere classicism continued well into the post-WWII period. In 1959 Newfoundland constructed a new provincial legislature building. Although modernistic in its absence of historical details and its vertical strip windows, its symmetrical plan recalls the classical formalism of the earlier provincial buildings.



The Saskatchewan Legislative Building, Regina, like all legislature buildings of the 3 Prairie provinces, was designed in the grand classical manner, at the height of the beaux-arts fashion (*photo by Jim Merrithew*).

After WWII conventional architecture gave way to the modern age and a new language of bold geometric masses formed of steel, concrete and glass. Since that time there have been no new legislature buildings, with the exception of Newfoundland, but governments have been actively building. The expansion of government activities led to the need for a range of building types more specialized in function. Often these buildings have a lower profile than previous government architecture. For example, over the past 30 years the federal post office has gradually moved out of its old buildings, which had formed the visual core of so many towns, into small, open structures that quietly merge into the streetscape rather than control it. In the provincial and federal capitals the public service has grown at a rapid pace creating a vast demand for new office accommodation. The buildings constructed to meet this need often lack the sense of monumentality and grandeur that sets them apart from surrounding structures. Governments now occupy glass and concrete office towers that are indistinguishable from those of any other large corporation, as the new federal office buildings in Hull exemplify.

High-profile architecture represents the smallest but most prominent category of government building: monumental architecture whose scale, materials and setting distinguish it from its surroundings. The recently built courthouse in Vancouver, designed by Arthur ERICKSON, with the daring and dramatic slope of its glass wall, or the 1961 Confederation Centre in Charlottetown, featuring a monolithic, almost primitive form of stone slab construction, are both high profile. Though the language of architecture has changed substantially from the early 19th century, these modern buildings still serve as visual anchors to the community and as symbols of provincial and national pride. JANET WRIGHT

The monumental portico and crisp stonework of the Manitoba Legislative Building, Winnipeg (*photo by Bill Brooks/Masterfile*).



Government Organization, Royal Commission on (Glassco Commission), was appointed in 1960 under J. Grant Glassco, a prominent businessman and chartered accountant, to inquire into the organization and methods of the departments and agencies of the federal government. It investigated 23 departments, the armed forces, 21 statutory boards and 42 corporations. The commissioners also visited the UK and the US. Taking testimony from the former US president, Herbert Hoover, the commissioners earned themselves the sobriquet "the Canadian Hoover commission," after the aggressive inquiries conducted by Hoover into the American administrative structure. The 5-volume commission report (released 1962-63) recommended that government should "let the managers manage", that departments should be free of inappropriate central control and should be allowed to devise management methods suited to their needs; that TREASURY BOARD should be reorganized to control and harmonize government operations; and that senior officials should rotate from department to department. A special Bureau of Government Organization was created to implement the recommendations, many of which were put into practice through the Transfer of Duties Act and later consolidated in the Government Organization Act (1966). Most observers acknowledge that the Glassco reforms did not work, particularly regarding the role of Treasury Board; that the commission did not address the operations of the executive and Parliament; and that the result was a growth of CENTRAL AGENCIES lacking effective control and unity. S.L. SUTHERLAND

Governor General Without interruption since the beginning of European settlement in Canada, a governor or governor general has been at the head of the country as the resident representative of the CROWN. Although the modern office is usually regarded as descended from the British institution, the present governor general, the Rt Hon Jeanne Sauvé, is in fact the 60th successor to Champlain, who became governor in 1627; she is the 23rd since Lord Monck was sworn in at CONFEDERATION on 1 July 1867; and she is the first woman to be appointed to the office. The office has developed with Canada's evolution from colony to nation. At first, governors general represented imperial governments and were responsible to various colonial ministers. After Confederation they were em-

powered to govern according to the wishes of the Canadian PRIME MINISTER in all internal issues, but until WWI they were still obliged to acknowledge British policy in EXTERNAL RELATIONS. After the STATUTE OF WESTMINSTER of 1931, they became the SOVEREIGN's personal representatives. Finally, on 1 Oct 1947, George VI formally delegated to the governor general all the sovereign's authority in Canada. In 1952 Vincent Massey became the first Canadian to be appointed governor general. Since then, a tradition of alternating anglophone and francophone governors general has emerged.

In Canada, as in many constitutional monarchies, there is a clear division between the head of state and the head of government. The latter is the prime minister, an elected political leader. The former is the governor general, who is not involved in politics. Appointed by the sovereign on the prime minister's recommendation, the governor general usually holds office for at least 5 years. Whereas the prime minister speaks for the political majority, the governor general represents the whole country.

On taking office (at a ceremony usually held in the Senate Chamber), a governor general is accorded the title "Right Honourable" for life and "His Excellency" or "Her Excellency" for the period in office. Two official residences are provided: RIDEAU HALL, which forms part of a 36 ha estate on the Ottawa R, and the Governor's Wing at the QUÉBEC CITADEL. The salary was fixed in s105 of the BRITISH NORTH AMERICA ACT at £10 000, an amount corresponding to the 10 000 *livres* set as the salary of the governor of New France in the 1660s. In 1970 this was converted as $48 666.63. The governor general's personal standard flies wherever he or she is in residence and takes precedence over all other flags in Canada except the monarch's. It is dark blue with, at the centre, the gold Canadian crest: a crowned lion carrying a red, stylized maple leaf in his right paw.

The governor general is one of 3 elements of PARLIAMENT, the others being the SENATE and the HOUSE OF COMMONS. The governor general summons, prorogues and dissolves Parliament, authorizes treaties, receives and sends ambassadors, commissions officers in the armed forces and gives royal assent to bills that have passed both the House of Commons and the Senate, thereby giving them the force of law. By constitutional convention, the governor general exercises these prerogatives only in accordance with ministerial advice. But by the same conventions, he or she retains special personal authority in times of emergency or in exceptional circumstances; in such cases, he or she may appoint or dismiss a prime minister and may dissolve Parliament. On at least 2 occasions since Confederation (1891, 1893) governors general (Lords Stanley and Aberdeen) had to designate a prime minister, but they never had to dismiss one. At least once (1926) a governor general (Lord Byng) refused a prime minister's advice to dissolve Parliament (*see* KING-BYNG AFFAIR).

The governor general also holds the constitutional rights of the head of state: "the right to be consulted, the right to encourage, the right to warn." These are usually exercised by the receipt of Cabinet minutes and through regular visits from the prime minister and government officials. The governor general is the executive power of the governor-in-council, receiving advice from the Canadian PRIVY COUNCIL (the most important part of which is the CABINET) and signing ORDERS-IN-COUNCIL.

The governor general is designated by law as commander in chief of the Armed Forces, is charged with swearing in Cabinet ministers and commissioning high officials of state. He or she is chancellor of the Order of Canada and the Order of Military Merit, and is responsible for the administration of the whole Canadian system of HONOURS. The governor general is official host to visiting heads of state and can represent Canada abroad.

Extensive hospitality and travel within Canada make the governor general more familiar with the country, the people and the issues than most others can be. The office of governor general is also charged with symbolizing national community and continuity. It is a subtle presence above divisions and differences, affirming community, an acceptance of inherited loyalties and permanent ideals. *See* GOUVERNEUR.

JACQUES MONET, SJ

Reading: Jacques Monet s.j., *The Canadian Crown* (1979).

Governors General

French Regime	
Samuel de Champlain	1612-29; 1633-35
Charles de Montmagny	1636-48
Louis d'Ailleboust de Coulonge	1648-51
Jean de Lauson	1651-56
Vicomte d'Argenson	1658-61
Baron Davaugour	1661-63
Sieur de Mézy	1663-65
Sieur de Courcelle	1665-72
Comte de Frontenac	1672-82
Joseph de La Barre	1682-85
Marquis de Denonville	1685-89
Comte de Frontenac	1689-98
Louis de Callière	1699-1705
Marquis de Vaudreuil (Philippe)	1705-25
Marquis de Beauharnois	1726-47
Marquis de La Jonquière	1749-52
Marquis Duquesne de Menneville	1752-55
Marquis de Vaudreuil-Cavagnal (Pierre)	1755-60
British Regime	
James Murray	1764-68
Sir Guy Carleton (Baron Dorchester)	1768-78
Sir Frederick Haldimand	1778-86
Baron Dorchester	1786-96
Robert Prescott	1797-1807
Sir James Craig	1807-11
Sir George Prevost	1812-15
Sir John Sherbrooke	1816-18
Duke of Richmond	1818-19
Earl of Dalhousie	1820-28
Baron Aylmer	1831-35
Earl Amherst	1835
Earl of Gosford	1835-37
Earl of Durham	1838
Sir John Colborne	1839
Charles Poulett Thomson (Baron Sydenham)	1839-41
Sir Charles Bagot	1841-43
Sir Charles Metcalfe	1843-45
Earl Cathcart	1846-47
Earl of Elgin	1847-54
Sir Edmund Head	1854-61
Viscount Monck	1861-67
Post-Confederation	
Viscount Monck	1867-68
Sir John Young (Baron Lisgar)	1869-72
Earl of Dufferin	1872-78
Marquess of Lorne	1878-83
Marquess of Lansdowne	1883-88
Baron Stanley of Preston	1888-93
Earl of Aberdeen	1893-98
Earl of Minto	1898-1904
Earl Grey	1904-11
Duke of Connaught	1911-16
Duke of Devonshire	1916-21
Lord Byng	1921-26
Viscount Willingdon	1926-31
Earl of Bessborough	1931-35
Lord Tweedsmuir	1935-40
Earl of Athlone	1940-46
Viscount Alexander of Tunis	1946-52
Vincent Massey	1952-59
Georges Vanier	1959-67
Roland Michener	1967-74
Jules Léger	1974-79
Edward Schreyer	1979-84
Jeanne Sauvé	1984-

Gilbert John Murray Kynynmond Elliot, 4th earl of Minto, governor general of Canada 1898-1904 (*courtesy Public Archives of Canada/C-8465*).



Governor General's Literary Awards were first presented in 1936 by the Canadian Authors Assn. The CAA did the judging itself until 1944, when an independent Awards Board was established. In 1959 the CANADA COUNCIL undertook to administer the awards and to provide at least 6 prizes of $1000 each for fiction, nonfiction, and drama or poetry in English and French (previous awards had been for works in English only). That year the category of juvenile literature, which had been established in 1948, was dropped. In 1971 the council assumed responsibility for appointing two 9-member juries — one anglophone and one francophone — drawn from among experienced writers, academics and literary critics. The cash award was raised to $5000 in 1975, and the separate category of drama was added in 1981. Winners in the new drama category are as follows: S. Pollock, *Blood Relations and Other Plays* and M. Laberge, *C'était avant la guerre à l'Anse à Gilles* in 1981; J. Gray, *Billy Bishop Goes to War* and R. Ducharme, *HA ha!* in 1982; and A. Chislett, *Quiet in the Land,* and R. Gingras, *Syncope,* in 1983. Winners in other categories are listed in the table.

Like any prize, the Gov Gen's Awards are controversial from time to time; contemporary judgements do not always stand the test of time. There is a general complaint that writers have not always won for their best work, and there are specific criticisms (eg, the failure of Northrop FRYE's *The Great Code* to win an award in 1983). Some winners have refused to accept the award for political reasons. Nevertheless the Gov Gen's Awards are the pre-eminent LITERARY PRIZE offered for single works in Canada, and they serve to reward Canadian writers, as well as to publicize Canadian writing through the ceremonies held in various centres across the country.

Gowan, Sir James Robert, lawyer, jurist, senator (b at Cahore, County Wexford, Ire 22 Dec 1815; d at Barrie, Ont 18 Mar 1909). At 27 Gowan was the youngest judge appointed in Canada West, and he sat on the bench longer (1843-83) than any judge in the British Empire. He organized the judicial system in the newly created district of Simcoe, the largest jurisdiction in the colony. Gowan also served as Sir John A. MACDONALD's unofficial legal draftsman and sat on several royal commissions. These included every committee struck to revise the statute law of Canada West, Ontario and post-1867 Canada,

Governor General's Award Winners

Year	Fiction	Poetry and Drama	Nonfiction
1936	B. Brooker, *Think of the Earth*		T.B. Robertson, *T.B.R.*
1937	L.G. Salverson, *The Dark Weaver*	E.J. Pratt, *The Fable of the Goats*	S. Leacock, *My Discovery of the West*
1938	G. Graham, *Swiss Sonata*	K. Leslie, *By Stubborn Stars*	J.M. Gibbon, *Canadian Mosaic*
1939	F.D. McDowell, *The Champlain Road*	A.S. Bourinot, *Under the Sun*	L.G. Salverson, *Confessions of an Immigrant's Daughter*
1940	Ringuet (P. Panneton), *Thirty Acres*	E.J. Pratt, *Brébeuf and his Brethren*	J.F.C. Wright, *Slava Bohu*
1941	A. Sullivan, *Three Came to Ville Marie*	A. Marriott, *Calling Adventures*	E. Carr, *Klee Wyck*
1942	G.H. Sallans, *Little Man*	E. Birney, *David and Other Poems*	B. Hutchison, *The Unknown Country*
			E. McInnes, *The Unguarded Frontier*
1943	T.H. Raddall, *The Pied Piper of Dipper Creek*	A.J.M. Smith, *News of the Phoenix*	J.D. Robins, *The Incomplete Anglers*
			E.K. Brown, *On Canadian Poetry*
1944	G. Graham, *Earth and High Heaven*	D. Livesay, *Day and Night*	D. Duncan, *Partner in Three Worlds*
			E. McInnes, *The War: Fourth Year*
1945	H. MacLennan, *Two Solitudes*	E. Birney, *Now is Time*	E.M. Richardson, *We Keep a Light*
			R. Munro, *Gauntlet to Overlord*
1946	W. Bambrick, *Continental Revue*	R. Finch, *Poems*	F.P. Grove, *In Search of Myself*
			A.R.M. Lower, *Colony to Nation*
1947	G. Roy, *The Tin Flute*	D. Livesay, *Poems for People*	W. Sclater, *Haida*
			R.M. Dawson, *The Government of Canada*
1948	H. MacLennan, *The Precipice*	A.M. Klein, *The Rocking Chair and Other Poems*	T.H. Raddall, *Halifax: Warden of the North*
			C.P. Stacey, *The Canadian Army, 1939-1945*
1949	P. Child, *Mr. Ames against Time*	J. Reaney, *The Red Heart*	H. MacLennan, *Cross-country*
			R.M. Dawson, *Democratic Government in Canada*
1950	G. Guèvremont, *The Outlander*	J.W. Watson, *Of Time and the Lover*	M.W. Campbell, *The Saskatchewan*
			W.L. Morton, *The Progressive Party in Canada*
1951	M. Callaghan, *The Loved and the Lost*	C. Bruce, *The Mulgrave Road*	J. Phelan, *The Ardent Exile*
			F. MacKinnon, *The Government of Prince Edward Island*
1952	D. Walker, *The Pillar*	E.J.Pratt, *Towards the Last Spike*	B. Hutchison, *The Incredible Canadian*
			D.G. Creighton, *John A. Macdonald: The Young Politician*
1953	D. Walker, *Digby*	D. LePan, *The Net and the Sword*	N.J. Berrill, *Sex and the Nature of Things*
			J.M.S. Careless, *Canada: A Story of Challenge*
1954	I. Gouzenko, *The Fall of a Titan*	P.K. Page, *The Metal and the Flower*	H. MacLennan, *Thirty and Three*
			A.R.M. Lower, *This Most Famous Stream*
1955	L. Shapiro, *The Sixth of June*	W. Watson, *Friday's Child*	N.J. Berrill, *Man's Emerging Mind*
			D.G. Creighton, *John A. Macdonald: The Old Chieftain*
1956	A. Wiseman, *The Sacrifice*	R.A.D. Ford, *A Window on the North*	P. Berton, *The Mysterious North*
			J.L. Rutledge, *Century of Conflict*
1957	G. Roy, *Street of Riches*	J. MacPherson, *The Boatman*	B. Hutchison, *Canada: Tomorrow's Giant*
			T.H. Raddall, *The Path of Destiny*

and the commission that investigated the PACIFIC SCANDAL in 1873. Gowan also chaired several academic boards and, in 1855, founded the first legal periodical in Canada W, *The Upper Canadian Law Journal*, which survives in the *Canadian Bar Review*. In 1885 he was appointed to the Senate.
D.H. BROWN

Grace, Nathaniel Hew, chemist (b at Allahabad, India 10 Nov 1902; d at Rochester, Alta 13 Nov 1961). The son of a missionary, Grace attended schools in California and Saskatchewan. He graduated from U of Sask (1925) and completed his PhD in physical chemistry at McGill (1931). He spent the next 20 years with the NATIONAL RESEARCH COUNCIL in Ottawa, where his diverse contributions included pioneering work on plant growth regulators. He was awarded an MBE in 1946 for research related to wartime shortages of raw materials. In 1951 Grace joined what is now called the ALBERTA RESEARCH COUNCIL as its first full-time director of research. Under his guidance, the council initiated important new areas of activity, notably groundwater and hailstorm research. Grace's dedication to research of social significance and high scientific quality laid the foundation for the research council's important role in the development of Alberta.
E.J. WIGGINS

Grackle, *see* BLACKBIRD.

Gradus, Lawrence, choreographer (b at Brooklyn, NY 30 Oct 1936). Trained in New York C, he first performed with the American Ballet Theatre in 1951, rising from corps member to soloist. He joined LES GRANDS BALLETS CANADIENS in 1968 and cofounded with Ludmilla CHIRIAEFF Les Compagnons de la danse, an educational touring group. Gradus formed his own company, Entre-six (1974), and the following year received the Jean A. Chalmers Award for choreography. He moved to Ottawa as artistic director of the THEATRE BALLET OF CANADA in 1980. The company performs primarily his creative work in which ballet and modern dance flow easily together.
JILLIAN M. OFFICER

Graham, Andrew, fur trader (b probably near Edinburgh, Scot *c*1733; d at Prestonpans, Scot 8 Sept 1815). Graham worked for the HUDSON'S BAY COMPANY at Churchill, YORK FACTORY and Ft Severn (1749-75). One fish and 4 birds sent by him from Ft Severn in 1771 were immortalized as "type specimens" when given Latin names by Johann Reinhold Forster in England. At York Factory in 1771-72, closely associated with surgeon Thomas Hutchins, Graham wrote important accounts of the native peoples, birds and mammals of HUDSON BAY, including the first description of the "plunge-holes" made by the great gray OWL, in catching mice beneath deep snow. Graham described 111 bird species and Hutchins added another 12. The contributions of the 2 men were sorted out nearly 200 years later by Glyndwr Williams and published in 1979 as *Andrew Graham's Observations on Hudson Bay, 1767-1791.*
C. STUART HOUSTON

Graham, Howard Douglas, lawyer, army officer (b at Buffalo, NY 15 July 1898). A WWI veteran, having enlisted at age 17, Graham rose to become chief of the general staff 1955-58. He practised law in Trenton, Ont, 1922-39, and was mayor in 1933. He was a militia officer between the wars and went overseas as second-in-command of the Hastings and Prince Edward Regiment in late 1939 and commanded the regiment 1940-42. As commander of 1st Canadian Infantry Brigade 1943-44, he distinguished himself under fire in Sicily and Italy. He remained in the army after WWII, becoming the only army chief who had not devoted the bulk of his career to professional soldiering. After retirement he was president of the Toronto Stock Exchange 1961-66.
NORMAN HILLMER AND WILLIAM JOHNSTON

Graham, Hugh, Baron Atholstan, newspaper publisher (b at Atholstan, Canada E 18 July 1848; d at Montréal 28 Jan 1938). In 1863 Graham went to work on the Montréal *Daily Telegraph* and by 1869 became a partner in the new evening paper, the *Star*. He transformed the *Star* into Canada's largest and most profitable daily, partly through technical innovations such as its overseas cable service but especially through its loyalty to the British imperialist ideal. Partly owing to the *Star*'s pressure, the LAURIER government decided to commit Canadian troops to the SOUTH AFRICAN WAR. For his crusades during WWI (when his home was dynamited by anticonscriptionists), Graham was elevated to the peerage in 1917 as Baron Atholstan of Huntingdon, Qué, and Edinburgh, Scot. DOUG FETHERLING

Graham, Stuart, aviator (b at Boston, Mass 2 Sept 1896). Raised and educated in NS, he served in the Royal Naval Air Service, patrolling shipping lanes in flying boats. He was Canada's first professional peacetime pilot and his forestry patrol near Grand Mère is regarded as the beginning of BUSH FLYING in Canada. He was decorated by Emperor Haile Selassie for organizing civil aviation in Ethiopia. JAMES MARSH

Grain Elevators provide for the storage, cleaning and weighing of grain and its loading from elevator bins into railway cars, trucks or from port elevators into ships. The name is derived from its essential mechanical feature — the elevator proper or "leg" — an endless belt carrying a succession of buckets which lift the grain from a low level pit into which it is delivered to the top of chutes leading to the storage or cleaning bins.

Both concrete and timber elevators are familiar Canadian landmarks, the latter perhaps the most distinctive architectural symbol of the Prairies. They spread with the CANADIAN PACIFIC RY across the Canadian West in the 1880s; after 1900 a second wave of construction followed the building of the CANADIAN NORTHERN RAILWAY. By the 1930s there were nearly 6000, though the number has declined as farming and transportation have grown more efficient. Because elevators are essential to the movement and marketing of grain, their history is intertwined with economics and politics, expecially the development of the CO-OPERATIVE MOVEMENT and the wheat pools.

The familiar rectangular, pitched-roof country elevators appeared from 1881 when the first was built by the Ogilvie Milling Co in Gretna, Man (a circular wooden elevator was built at Niverville, Man, in 1879). Many more were quickly built at railway sidings across the Prairies, within easy reach of the farms. From them, grain moved by rail to much larger terminal elevators at port cities where it was loaded for shipping to the east and overseas. The first Canadian terminal elevator was built by the CPR at Port Arthur [THUNDER BAY] (completed 1884), and others rapidly followed. A third type, transfer elevators, were built at such inland centres as Calgary, Edmonton, Saskatoon and Moose Jaw, Sask for the collection and distribution of grain to regional markets.

Country elevators and the earliest terminal elevators were built of timber, though frequently covered with sheet metal. The construction of walls and bins was of "crib": 2 x 6 or 2 x 4 inch timbers laid one above another on the flat and spiked together, with the ends alternately overlapping at the corners. A typical elevator might be 9-10.5 m on side in plan and rise 23 m or more above massive concrete foundations to the ridge of the narrower top section or cupola. Such an elevator held 35 000 to 40 000 bushels of grain. While wood has remained the most economical material for country elevators, from the 1900s slip-formed cylindrical concrete bins

Governor General's Award Winners

Year	*Fiction*	*Poetry and Drama*	*Nonfiction*
1958	C. McDougall, *Execution*	J. Reaney, *A Suit of Nettles*	P. Berton, *Klondike* J. Hemlow, *The History of Fanny Burney*
1959	H. MacLennan, *The Watch that Ends the Night* A. Giroux, *Malgré tout, la joie*	I. Layton, *A Red Carpet for the Sun*	F.A. Savard, *Le Barachois*
1960	B. Moore, *The Luck of Ginger Coffey*	M. Avison, *Winter Sun* A. Hébert, *Poèmes*	F. Underhill, *In Search of Canadian Liberalism* P. Toupin, *Souvenirs pour demain*
1961	M. Lowry, *Hear Us Oh Lord from Heaven Thy Dwelling Place* Y. Thériault, *Ashini*	R. Finch, *Acis in Oxford*	T.A. Goudge, *The Ascent of Life* J. Le Moyne, *Convergences*
1962	K. Dobbs, *Running to Paradise* J. Ferron, *Contes du pays incertain*	J. Reaney, *Twelve Letters to a Small Town and the Killdeer and Other Plays* J. Languirand, *Les Insolites et les violons de l'automne*	M. McLuhan, *The Gutenberg Galaxy* G. Marcotte, *Une Littérature qui se fait*
1963	H. Garner, *Hugh Garner's Best Stories*	G. LaPointe, *Ode au Saint-Laurent*	J.M.S. Careless, *Brown of The Globe* G. Lanctot, *Histoire du Canada*
1964	D. LePan, *The Deserter* J.P. Pinsonneault, *Les Terres sèches*	R. Souster, *The Colour of the Times* P. Perrault, *Au Coeur de la rose*	P. Grosskurth, *John Addington Symonds* R. Robidoux, *Roger Martin du Gard et la religion*
1965	G. Bessette, *L'Incubation*	A. Purdy, *The Cariboo Horses* G. Vigneault, *Quand les bateaux s'en vont*	J. Eayrs, *In Defence of Canada* A.S. Vachon, *Le Temps et l'espace dans l'oeuvre de Paul Claudel*
1966	M. Laurence, *A Jest of God* C. Martin, *Le Joue droite*	M. Atwood, *The Circle Game* R. Ducharme, *L'Avalée des avalés*	G. Woodcock, *The Crystal Spirit: A Study of George Orwell* M. Trudel, *Histoire de la Nouvelle-France: vol II, Le Comptoir 1604-1627*
1967	J. Godbout, *Salut Galarneau!*	E. Mandel, *An Idiot Joy* A.A. Nowlan, *Bread, Wine and Salt* F. Loranger, *Encore cinq minutes*	N. Story, *The Oxford Companion to Canadian History and Literature* R.L. Séguin, *La Civilisation traditionelle de l'habitant aux XVII^e et XVIII^e siècles*
1968	A. Munro, *Dance of the Happy Shades* M. Richler, *Cocksure* and *Hunting Tigers Under Glass* H. Aquin, *Trou de mémoire* (declined) M.C. Blais, *Les Manuscrits de Pauline Archange*	L. Cohen, *Selected Poems 1956-68* (declined)	F. Dumont, *Le Lieu de l'homme*
1969	R. Kroetsch, *The Studhorse Man* L. Maheux-Forcier, *Une Forêt pour Zoé*	G. Bowering, *Rocky Mountain Foot* and *The Gangs of Kosmos* G. MacEwen, *The Shadow-Maker* J.G. Pilon, *Comme eau retenue*	M. Brunet, *Les Canadiens après la conquête*
1970	D. Godfrey, *The New Ancestors* M. Bosco, *La Femme de Loth*	M. Ondaatje, *The Collected Works of Billy the Kid* bp Nichol, *Still Water, The True Eventual Story of Billy the Kid, Beach Head,* and *The Cosmic Chef: An Evening of Concrete* J. Brault, *Quand nous serons heureux*	F. Ouellette, *Les Actes retrouvés*
1971	M. Richler, *St Urbain's Horseman* G. Bessette, *Le Cycle*	J. Glassco, *Selected Poems* P.M. LaPointe, *Le Réel absolu*	P. Berton, *The Last Spike* G. Fortin, *La Fin d'un règne*

Governor General's Award Winners

Year	Fiction	Poetry and Drama	Nonfiction
1972	R. Davies, *The Manticore*	D. Lee, *Civil Elegies*	J. Hamelin and Y. Roby, *Histoire économique du Québec 1851-1896*
	A. Maillet, *Don L'Orignal*	J. Newlove, *Lies*	
		G. Hénault, *Signaux pour les voyants*	
1973	R. Weibe, *The Temptations of Big Bear*	M. Mandel, *Lions at her Face*	M. Bell, *Painters in a New Land*
	R. Ducharme, *L'Hiver de force*		A. Faucher, *Québec en Amérique au dix-neuvième siècle*
			*R. Giguère, *La main au feu* (declined)
1974	M. Laurence, *The Diviners*	R. Gustafson, *Fire on Stone*	C. Ritchie, *The Siren Years*
	V.L. Beaulieu, *Don Quichottee de la dêmanche*	N. Brossard, *Mécanique jongleuse suivi de masculin grammaticale*	L. Déchêne, *Habitants et marchands de Montréal au dix-septième siècle*
1975	B. Moore, *The Great Victorian Collection*	M. Acorn, *The Island Means Minago*	A. Adamson, M. MacRae, *Hallowed Walls*
	A. Hêbert, *Les Enfants du sabbat*	P. Perrault, *Chouennes*	L.E. Hamelin, *Nordicité canadienne*
1976	M. Engel, *Bear*	J. Rosenblatt, *Top Soil*	C. Berger, *The Writing of Canadian History*
	A. Major, *Les Rescapés*	A. Piché, *Poèmes 1946-68*	F. Ouellet, *Le Bas Canada 1791-1840: changements structureux et crise*
1977	T. Findley, *The Wars*	D.G. Jones, *Under the Thunder the Flowers Light up the Earth*	F.R. Scott, *Essays on the Constitution*
	G. Roy, *Ces Enfants de ma vie*	M. Garneau, *Les Célébrations suivie de Adidou Adidouce*	D. Monière, *Le Developpement de idéologies au Québec des origines à nos jours*
1978	A. Munro, *Who Do You Think You Are?*	P. Lane, *Poems New and Selected*	R. Caron, *Go-Boy!*
	J. Poulin, *Les grandes marées*	G. Langevin, *Mon refuge est un volcan*	F.M. Gagnon, *Paul-Emile Borduas*
1979	J. Hodgins, *The Resurrection of Joseph Bourne*	M. Ondaatje, *There's a Trick with a Knife I'm Learning To Do*	M. Tippett, *Emily Carr*
	M.C. Blais, *Le Sourd dans la ville*	R. Melançon, *Peinture eveugle*	D. Clift, S.M. Arnopolous, *Le Fait anglais au Québec*
1980	G. Bowering, *Burning Water*	S. Scobie, *McAlmon's Chinese Opera*	J. Simpson, *Discipline of Power*
	P. Turgeon, *La Première Personne*	M. Van Schendel, *De l'Oeil et de l'écoute*	M. Champagne-Gilbert, *La Famille et l'homme à délivrer du pouvoir*
1981	M. Gallant, *Home Truths*	F.R. Scott, *The Collected Poems of F.R. Scott*	G. Calef, *Caribou and the Barren-lands*
	D. Chabot, *La Province lunaire*	M. Beaulieu, *Visages*	M. Ouellette-Michalsk, *L'Echappée des discours de l'oeil*
1982	G. Vanderhaeghe, *Man Descending*	P. Webb, *The Vision Tree*	C. Moore, *Louisbourg Portraits*
	R. Fournier, *Le Cercle des arènes*	M. Savard, *Forages*	M. Lagueux, *Le Marxisme des années soixante*
1983	L. Rooke, *Shakespeare's Dog*	D. Donnell, *Settlements*	J. Williams, *Byng of Vimy*
	S. Jacob, *Laura Laur*	S. Paradis, *Un goût de sel*	M. Cusson, *Le contrôle social du crime*

* Special Award

became the standard for the larger transfer and terminal elevators. The first was built at Minneapolis, Minn, in 1901, using recent European innovations in the reinforcing and forming of concrete silos. Canadian examples followed, and reinforced concrete was used at Port Arthur around 1903. Port of Montréal Elevator No 2 (completed 1912; demolished 1978) was one of the earliest all-concrete structures, "at the time probably the largest and highest concrete building in existence" according to its designers, the John S. Metcalf Co. Founded by John S. Metcalf of Sherbrooke, Qué, in Chicago, Ill, in 1887, the company built huge elevator complexes across the US and Canada, in Europe, S Africa, Argentina and Australia from its offices in Montréal, Vancouver, Chicago and London, Eng. Another major grain-elevator engineering firm, responsible for the SASKATCHEWAN WHEAT POOL's North Vancouver Terminal (1966-81), was founded by the former federal Cabinet minister C.D. HOWE. These structures were not only impressive engineering feats, but were an inspiration to pioneering European architects. Photographs of elevators at Calgary and Montréal were given by Walter Gropius to Le Corbusier and published in his *Vers une Architecture* (1923).

Recent innovations include the sloped-bin concrete "Buffalo" elevators designed for the Alberta Wheat Pool by K.U. Driedger of A.B.L. Engineering Ltd. The first country elevator was built at McGrath, Alta, in 1980 and by 1984, 5 had been completed. Though more expensive than timber elevators, the new designs are fireproof, more efficient and more durable.

MICHAEL MCMORDIE

Grain Growers' Associations, a group of farm organizations formed on the Prairies in the early 20th century. They developed in the wake of the Manitoba Grain Act (July 1900), which regulated railways and grain elevators in the interests of grain growers. This Act, the result of considerable agitation in rural areas since the late 1880s, was regarded by farmers as a major victory. But dissatisfaction with the handling of the 1901 bumper crop led farmers at Indian Head (in present-day Saskatchewan) to convene a meeting in Dec 1901, at which the Territorial Grain Growers' Assn was formed. The Manitoba Grain Growers' Assn, established 1903 at Virden, followed. In 1906 the Territorial Grain Growers' Assn was divided into the Saskatchewan Grain Growers' Assn and the Alberta Farmers' Assn. The latter joined with the Canadian Society of Equity to create the UNITED FARMERS OF ALBERTA in 1909. In 1919 the Manitoba Grain Growers' Assn was reorganized as the UNITED FARMERS OF MANITOBA in an attempt to gain the support of all farmers and to proclaim an intention to enter politics. The Saskatchewan Grain Growers' Assn amalgamated with the Farmers' Union of Canada in 1926 to create the militant UNITED FARMERS OF CANADA (Saskatchewan Section).

Grain growers' associations were powerful spokesmen for the Prairies and Canadian agriculture generally. They lobbied provincial and federal governments for reform of the grain-marketing system and improvement of rural life. They sponsored the development of 3 large farmer-owned grain-marketing organizations, the Grain Growers' Grain Co (1906), the Saskatchewan Co-operative Elevator Co (1911) and the Alberta Farmers Co-operative Elevator Co (1913). They published the GRAIN GROWERS' GUIDE, the main voice of western agriculture between 1908 and the mid-1920s. The associations agitated for better roads, schools and medical care for the countryside. Particularly responsive to the plight of rural women, they embraced WOMEN'S SUFFRAGE and helped to win the vote for women on the Prairies during WWI. Technically, the associations were politically neutral, but some early leaders, such as Liberals C.A. DUNNING, M.A. MOTHERWELL and T.A. CRERAR, achieved national political prominence. Politics, however, was a vexing issue for the associations and was one of the reasons they disappeared after farmers began to assert themselves and demand a more direct voice in the political process. IAN MACPHERSON

Reading: W. Irvine, *The Farmers in Politics* (1920).

Grain Growers' Guide, journal published 1908-28 for Prairie grain growers' associations. In 1928 it became the *Country Guide,* which is still published by the United Grain Growers in Winnipeg. Editors included E.A. PARTRIDGE, Roderick McKenzie and (1911-35) George Chipman. The *Guide* advocated educational reform to make rural schools more responsive to change, and it supported the TEMPERANCE MOVEMENT, the CO-OPERATIVE MOVEMENT and the SOCIAL GOSPEL. Its commentators included Nellie MCCLUNG, Irene PARLBY and Violet MACNAUGHTON, prominent leaders of the women's movement. Its commitment to reform made the *Guide* a major spokesman for the PROGRESSIVE PARTY. During the early 1920s, as the Progressive movement declined, the *Guide*'s commitment to reform waned, and by 1928 it was devoted to rural life, advising farmers on technical problems and providing amusement for rural families. In its day the *Guide* articulated a western rural view with vigour, style and effectiveness. IAN MACPHERSON

Grain Handling and Marketing There are approximately 145 000 grain-producing farms in Canada's Prairie region. Yearly production varies substantially, depending on climatic conditions. In 1982-83 approximately 36 million t

of grain were marketed, wheat accounting for over 69% of this total. Harvested in the late summer and early fall, grain is trucked from the combine to storage bins located on the farm. Storage time on the farm varies, depending upon delivery opportunities at primary grain elevators as determined by the CANADIAN WHEAT BOARD (CWB). Some grain does not enter the commercial grain-handling system, but is retained as seed or consumed locally as livestock feed.

The CWB is the agricultural marketing BOARD responsible for the marketing of western Canadian grains (WHEAT, OATS, BARLEY) intended for human consumption or export. Feed grains may be sold to the CWB at the farmer's discretion; however, sale of OILSEEDS and most feed and industrial grains is privately controlled. In addition to marketing as much grain as possible at the best possible prices, the CWB aims to provide price stability and ensure that each producer gets a fair market share each CROP year. The CWB periodically issues delivery quotas, which tell farmers that the board is willing to accept a certain volume of a specified grain from each farmer at primary elevators in a defined geographic region. Quotas, based on the board's sales commitments and stocks on hand in the elevator system, are issued so as to maintain a relatively even flow of grain from farms through the primary elevator system. Before making export commitments, the board is required to ensure that the domestic market is adequately supplied for both feed and industrial uses. The board may sell directly to foreign government buying agencies (eg, the USSR, the People's Republic of China), to commercial interests in foreign countries (eg, Peru, the Philippines) or to private trading companies, which then resell to foreign buyers.

As delivery opportunities arise, the grain is moved off the farm by the farmer's own truck or that of a hired commercial trucker. Farm trucks vary in carrying capacity from 3 to 20 t, the average being about 8 t. Grain may be trucked up to 125 km, but the average distance is about 20 km. Most grain is delivered to primary or country elevators but some is taken directly to feed mills or processing plants.

The primary elevator accumulates small lots of grain (sorted by species and grade) from individual farmers until there is enough to fill rail cars. The primary elevator system consists of about 2900 elevators located at 1200 railway shipping points, with a total storage capacity of 8.1 million t. During the past decade the number of primary elevators has decreased by almost 40%; the decrease in storage capacity has been over 25%. Primary elevators, each employing a manager, are operated by grain companies, either farmer-owned co-operatives or privately owned companies. Six companies now own over 95% of all primary elevators. The largest grain-handling company is the SASKATCHEWAN WHEAT POOL, a farmer-owned co-operative with approximately one-third of the primary elevators on the prairies.

When grain is delivered to the elevator, the manager weighs and samples it, assigns a grade and issues a negotiable cash ticket to the farmer. If the wheat, oats or barley is destined for export, it becomes the property of the CWB and the primary elevator company acts as an agent of the board. In the case of flaxseed and CANOLA the primary elevator company assumes ownership; feed grains destined for domestic use may be sold either to the CWB or to the primary elevator company. Grain companies recover their elevator costs from the farmer through handling and storage charges. Maximum allowable charges are specified by the Canadian Grain Commission, and grain companies establish their charges within these limits.

The Canadian Grain Commission, answerable to the minister of agriculture under the Canada Grain Act, is responsible for establishing and maintaining standards of quality for Canadian grain and regulating grain handling in Canada to ensure a dependable commodity for domestic and export markets. Specific responsibilities include establishing grain grades and standards; official inspection of grain for export; licensing all types of grain elevators; supervision of treatment or fumigation of grain; setting of maximum fees chargeable by elevators for services (eg, receiving, cleaning, drying, shipping); inspection of elevators for compliance with operating procedures as detailed by the Canada Grain Act; and operation of the Grain Research Laboratory, which conducts research on the quality of cereal grains and oilseeds.



Workers loading barley into the holds of a grain ship at Thunder Bay, Ont (*courtesy National Film Board/Photothèque*).

Grain is moved from the primary elevator system to port and other terminals by rail, using approximately 11 000 boxcars and 14 700 hopper cars. The capacity of a standard boxcar is about 54 t; of an average hopper car about 91 t. During peak movements, about 500 trains per week place empty cars at primary elevator points and take loaded cars to their destinations. The primary elevators are located at some 1200 points along approximately 30 000 km of rail lines, about 85% of which are branch lines with various carrying capacities. The average distance from a primary elevator to a port-terminal elevator is 1400 km; the average round-trip time is slightly under 3 weeks.

Grain moves from primary elevators to port terminals on Canada's West Coast (VANCOUVER and PRINCE RUPERT), on the Great Lakes (THUNDER BAY) and on the shores of Hudson Bay (CHURCHILL). The port-terminal elevators receive, store, process and ship grain. Processing includes cleaning of grain to export standards, drying, destoning and fumigating when necessary.

On the West Coast the total storage capacity is 992 000 t, most of which is at 5 terminals in Vancouver. There is also a 60 000 t terminal, which is scheduled for expansion, at Prince Rupert. West Coast terminals operate on a year-round basis. The terminal at Churchill, with a storage capacity of 140 000 t, has a very limited shipping season (less than 3 months per year). Thunder Bay has 15 terminal elevators with a combined storage capacity of approximately 2 million t; these terminals ship grain for approximately 8 months of the year. Grain loaded onto ships at Vancouver, Prince Rupert and Churchill moves directly to export destinations. In the case of Thunder Bay, only about 10% is loaded directly onto oceangoing ships; the remainder is carried by lake vessels to transfer elevators situated along the waterway between Thunder Bay and the seaboard. There are 27 transfer elevators with a capacity of 3.7 million t. Grain received at transfer elevators is either loaded onto oceangoing ships or is stored for future export shipment or for domestic distribution in eastern Canada. In addition to terminal and transfer elevators, there are 24 process elevators with a capacity of 550 000 t, located mostly in the prairies. Their function is to receive and store grain for direct manufacture or processing into other products.

The WINNIPEG COMMODITY EXCHANGE is a voluntary association of representatives of practically all firms and agencies involved in marketing western Canadian grain. Members are from private and co-operative elevator companies, shippers, millers, the CWB, banks, railways and foreign grain companies. The exchange provides facilities for trading in both cash and future contracts and establishes the conditions under which grain trading shall be conducted.

E.W. TYRCHNIEWICZ

Reading: T. Veeman and M. Veeman, *The Future of Grain: Canada's Prospects for Grains, Oilseeds and Related Industries* (1984).

Grammont, Joseph-Éloi-Augustin, *dit* **de Grandmont,** writer, director (b at Baie-du-Febre, Qué 17 Apr 1921; d at Montréal 25 Nov 1970). He studied at the Séminaire de Nicolet and Montréal's École des beaux-arts, where he was a leading opponent of the conservative director, Charles Maillard, a proponent of naturalism. During 1944-46 he was an arts critic for *Le Devoir*; in 1946 he directed the series "Les Cahiers de la file indienne" and wrote the first collection of poetry in this series: *Le Voyage d'Arlequin*, illustrated by his former teacher, Alfred PELLAN. He spent 1946-48 studying at the Sorbonne and the École du Louvre.

Upon his return from Europe, he wrote screenplays for Renaissance Film, as well as about 30 short stories for Radio-Canada, most of which were produced by Guy BEAULNE (1950-52). In 1949 he cofounded, with Jean-Louis ROUX, the Théâtre d'Essai which opened with one of his plays, *Un fils à tuer*. This theatre was replaced in 1951 by the THÉÂTRE DU NOUVEAU MONDE, which he directed for 3 years. Between 1954 and 1964,

Radio-Canada broadcast a novel for radio by him (over 1½ years), 4 radio plays in the "Nouveautés dramatiques" series and 4 humorous weekly or daily serials. He authored an excellent adaptation of *My Fair Lady* and died only a few months after his appointment as professor at U de M's School of Translation. *See* RADIO DRAMA, FRENCH LANGUAGE. ANDRÈ G. BOURASSA



Granby, Qué, City, pop 38 069 (1981c), inc 1916, located on the N Yamaska R, is an industrial crossroad of Québec's EASTERN TOWNSHIPS. First settled by British colonists and LOYALISTS, it was named for an English village. The city's present population is predominantly French Canadian. Situated 84 km SE of Montréal and about 25 km from the US border, Granby remained a modest agricultural centre until the 1940s. Subsequently, municipal annexation and an ambitious economic promotion program by the city administration has resulted in large-scale industrial diversification and population growth. Twenty of its 170 industrial plants are based in western Europe and the US. Major employers include producers of textile and knitted goods, consumer and rubber clothing, precision metal, plastic and electronic products, printed paper and publications, and food products. Smaller firms are part of the high-technology sector. Regional services, including CEGEP Granby (a college), and provincial offices employ a large professional work force. Granby's tourist industry links the city's rural surroundings with its industrial base. Granby Zoo, one of the largest in Canada, and nearby Mt Yamaska are complemented by an auto museum, an ecological centre, and a gastronomical festival. PAULA KESTELMAN

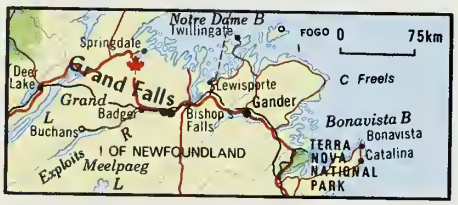
Grand Banks, part of Canada's continental shelf, lying SE of Newfoundland, consist of several separate banks, foremost of which are Grand, Green and St Pierre; their area (for water depths shallower than 200 m) is 282 500 km². Water depths over the banks are generally less than 100 m.

The banks are an internationally known fishing ground most noted for cod, but haddock, redfish, flatfish (including halibut), mackerel and herring are also caught. This abundant fish resource was first noted by John CABOT in 1498 and shortly thereafter began to attract numerous European fishermen. The first settlements on Newfoundland were established as bases for drying and salting fish for transport back to Europe. In this century, European, American and Canadian boats have continued to fish on the banks, being joined in the mid-1950s by large Soviet and Japanese vessels. Since 1977, when Canada extended its offshore jurisdiction to include most of the Grand Banks, foreign fishing has been greatly reduced.

The water over the banks is mainly supplied by the southward-flowing cold Labrador Current and, to a lesser extent, the eastward-flowing warm Gulf Stream. The Labrador Current splits as it approaches the Grand Bank, with one branch moving S along the coast of Newfoundland through Avalon Channel to St Pierre Bank. The other branch circulates clockwise around the Grand Bank, concentrated at its outer edge. The warm Gulf Stream waters are generally located S of the Grand Banks, but do on occasion move N onto their southern edge. Warm air masses moving from the Gulf Stream over the colder Labrador Current water produce heavy fog, especially in spring, when the air-sea temperature differences are greatest. Icebergs, carried along the edge of the banks by the Labrador Current, are also most numerous in spring.

Oil drilling, which began on the banks in the late 1970s, gained public attention with the disastrous loss of the Ocean Ranger rig. Test wells have been promising and expectations are high that oil production will begin in the near future. KEN DRINKWATER AND ALLYN CLARKE

Grand Falls, NB, Town, pop 6203 (1981c), inc 1890, is located 228 km up the SAINT JOHN R from Fredericton at the point where the Canada-US boundary begins to be designated by the river. The cataract from which the town's name originates was the site of overnight encampments from the time of the MALISEET. Grand Falls had a brief stint as a military post at the time of the boundary dispute, but the initial surge of settlement came through the entrepreneurial efforts of Sir John Caldwell, who brought settlers in to run his around-the-clock sawmill operation in the late 1830s. The surrounding area was settled by farmers in the ensuing decades and with the completion of railway links in the 1870s the town embarked on an era of being a tourist and resort attraction in the vein of Niagara Falls. In the 1920s a dam and electrical-generating station changed the effect of the falls, and Grand Falls's post-WWII prosperity has depended almost entirely on potato production and export. FRED FARRELL



Grand Falls, Nfld, Town, pop 8765 (1981c), inc 1961, is located in central Newfoundland on the EXPLOITS R. The pulp and paper town is named after the river's spectacular falls. In 1905 the Anglo Newfoundland Development Co acquired a 99-year lease to 10 360 km² of timber land and its minerals. The construction of the pulp and paper mill, supplied with power from the falls, on the route of the trans-insular railway, and with access to the seaport of Botwood (35 km NE), was completed 1909, as was the first phase of the well-planned town, which continued to be company built and administered until 1961. It then incorporated as a municipality. The mill was acquired in 1961 by Price Brothers, which in 1981 became a division of ABITIBI-PRICE; it remains the town's largest employer. The position of Grand Falls on major water and overland routes has made it an important regional centre. ROBERT D. PITT

Grand Lake, 539 km², elev 87 m, max length 91 km, average depth 110 m, largest lake in Newfoundland, is located on the W side of the Island, 24 km SE of CORNER BROOK. Fed by numerous small streams and brooks, it drains into Deer Lk, via the Newfoundland Canal, and then, via the HUMBER R and Humber Arm, into the Bay of Islands. The lake contains the uninhabited Glover I (200 km²), and to the NE, together with Sandy and Birchy lakes, forms a 145 km waterway much used by canoeists. DAVID EVANS

Grand Manan Island, NB, 142 km², is the largest and most remote of the 3 isles located in BAY OF FUNDY. It is 24 km long and 10 km at its widest point. Accessible year round by ferry from Blacks Harbour, it is 27 km from the NB mainland, 13 km from the Maine coast. Its name is part-French, part-Amerindian (*munanook*, meaning "island") in origin. With a population of about 2500 — chiefly in the villages of North Head, Grand Harbour and Seal Cove — its chief industries are fishing (sardines, herring, lobster), forestry (spruce, balsam, birch, poplar), dulse (seaweed) gathering and tourism. Steep cliffs rise to 125 m on the N and W showing 7 different strata of the Earth's crust, including 900-million-year-old sedimentary rock. Mixed in as well is 16-million-year-old volcanic rock.

Grand Manan is on the eastern flyway for migratory birds, and more than 400 species have been counted at the E coast sanctuary between Grand Harbour and Seal Cove. The island is a convenient spot for whale watching, as several species, including N American humpback, minke, finback, pothead and the nearly extinct right whale, inhabit the surrounding waters. Seals and whitesided dolphins are seen as well. The first recorded visit by Europeans was made in 1604 by Samuel de CHAMPLAIN and the Sieur de MONTS, though the NORSE may have visited earlier. The island was a French seigneury for many years, but most inhabitants are descended from LOYALISTS who settled here following the American Revolutionary War. Among the first

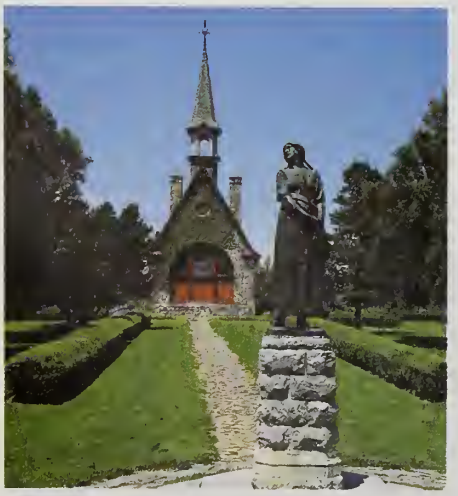
Grand Manan I, in the Bay of Fundy, is on the eastern flyway for migratory birds; more than 400 species have been counted at its east coast sanctuary (*photo by Freeman Patterson/Masterfile*).



to arrive (1784) was Moses Gerrish, whose Grand Harbour home is now the Grand Manan Museum. HENRY F. HEALD

Grand Portage, fur-trade depot and route of the VOYAGEURS at the western extremity of Lk Superior. It was the first and most strenuous of the 29 PORTAGES from Lk Superior to Lac La Croix, requiring that each voyageur carry 4 loads of 80 kg over some 14 km of rocky trails around the cascades of the Pigeon R. The Pigeon R route had long been used by the Indians and was opened to the FUR TRADE by LA VÉRENDRYE. The NORTH WEST co established an extensive post at the mouth of the river, which by 1784 was the wilderness capital of the fur trade, providing a meeting place for the voyageurs bringing supplies from Montréal (PORKEATERS) and the traders bringing furs from the North-West (WINTERERS). Within the post, which was protected by a 5 metre high palisade, reinforced with a bastion and a heavy gate, were the Great Hall, living quarters, shops, warehouses and a stone powder magazine. Because the settling of the Canada-US boundery left the post in American territory, the post was abandoned in 1802 and NWC activities were relocated at FORT WILLIAM at the mouth of the Kaministikwia R. This route, which had been travelled by de Noyon in 1688, was more arduous than Grand Portage, requiring a portage of Kakabeka Falls and a gruelling haul over the height of land to the Savanne R. JAMES MARSH

Grand Pré, NS, UP, pop 305 (1981c), 83 km NW of HALIFAX. Founded by ACADIANS in 1675, the name refers to the 1000 ha "Great Meadow" of fertile marshland that drew settlers eastward from PORT-ROYAL to farm on the shores of MINAS BASIN. Using traditional French diking techniques to protect the low-lying marsh from the saltwater tides of the basin, Grand Pré farmers annually exported agricultural products to Port-Royal, other French colonies and New England. By the early 18th century, Grand Pré was the focus of Les Mines (Minas), the most populated of 3 Acadian districts. In the 1740s it consisted of 150 houses that stretched in a line some 4 km long. On 11 Feb 1747, it was the scene of the Battle of Grand Pré, a surprise attack by French and Indians on British troops during the WAR OF THE AUSTRIAN SUCCESSION. Longfellow's romantic poem *Evangeline* portrayed the tragic events of the Acadian deportation at Grand Pré (1755). In 1917 property near the centre of the village was set aside to develop as a tourist attraction. A bronze statue of Evangeline was unveiled in 1920, and a memorial chapel in the style of mid-18th-century French architecture opened in 1930. The area is now a historic site — Grand Pré National Historic Park. DEBRA MCNABB



Church and statue of Evangeline at Grand Pré, NS (*photo by Malak, Ottawa*).



Proscenium arch of the Grand Opera House, London, Ont, which opened 1881 and was rebuilt after a fire in 1900. The building now houses the Grand Theatre Co (*courtesy Grand Theatre/James Hockings*).

Grand Theatre The original Grand Opera House opened amid a strong amateur and professional theatrical tradition on 8 Sept 1881 in the upper floors of the Masonic Temple at London, Ont. At its peak in the 1890s, the 2070-seat Grand was host to 100 companies and 300 performances annually. World-renowned artists, including Sarah Bernhardt, Lily Langtry and Ellen Terry and Canadians Clara MORRIS, Emma ALBANI and Henry MILLER, performed in the classical melodramas of the time. When this theatre, part of a Michigan-Ohio-Ontario circuit, burnt in 1900, C.J. Whitney, the original lessee, and Ambrose Small, a Canadian impresario, rebuilt and relocated the Grand. Although the capacity was reduced to 1850, the proscenium was larger. In 1924 the building was sold to Famous Players. The Grand regained its legitimacy in 1945 when it was purchased by London Little Theatre, an active amateur group that won many Dominion Drama Awards. In 1971 this group was replaced by a professional company. Major structural renovations in 1977-78 reduced capacity to 829. In 1983 the company, renamed The Grand Company under artistic director Robin Phillips, announced an ambitious season of 9 plays, but the repertory system was terminated after one year. KATHLEEN D.J. FRASER

Grand Trunk Pacific Railway was a 4800 km system whose main line ran from Winnipeg via Yorkton and Edmonton to Prince Rupert, BC. Incorporated in 1903, it was built between 1907 and 1914 to provide the GRAND TRUNK RY with western connections. It also assumed responsibility for the operation of the government-built National Transcontinental Railway from Winnipeg to Québec City. The Grand Trunk Pacific faced severe competition from the CANADIAN PACIFIC RY and the CANADIAN NORTHERN RY, both of which had excellent branch and feeder lines on the prairies. Construction costs, the exigencies of wartime financing, and the lack of a viable system of branch lines brought the Grand Trunk Pacific into receivership. The Grand Trunk, which had guaranteed Grand Trunk Pacific securities, tried to escape its obligations, but eventually the western road also dragged the Grand Trunk into default and NATIONALIZATION. The federal government decided in 1919 to acquire both the Grand Trunk Pacific and the Grand Trunk at a price to be established by arbitration, and in 1923 the operations of the Grand Trunk, the Grand Trunk Pacific and the National Transcontinental merged with those of the recently nationalized Canadian Northern Railway to form the new CANADIAN NATIONAL RAILWAYS system. T.D. REGEHR

Grand Trunk Railway of Canada, railway built to provide a main trunk line "throughout the entire length of the Province of Canada, and from the eastern frontier thereof . . . to the city and port of Halifax." Under the sponsorship of Sir Francis HINCKS, the GTR was formally incorporated in 1852 to build a railway from Toronto to Montréal. The Grand Trunk Railway of Canada East was also incorporated to build a line from opposite Québec City (Lévis) to Trois-Pistoles, Qué. The recently completed ST LAWRENCE AND ATLANTIC RAILROAD was purchased in 1853. Much of the financing had to be raised in England, and the English construction firm of Peto, Brassey, Jackson and Betts received the contract to build the Montréal-to-Toronto section in return for agreeing to promote the company. Gzowski & Company received the contract for the Toronto-to-Sarnia section. Brassey claimed his company suffered heavy losses on its contract, while Casimir GZOWSKI, more familiar with Canadian conditions, made a fortune. Hincks's enemies claimed that he, too, made a fortune — at the expense of the railway.

Work proceeded vigorously from town to town. Navvies from England swelled the labour force — at one time 14 000 men and 2000 horses were employed in Canada West alone. The line did not face challenges such as those of the CANADIAN PACIFIC RAILWAY in the mountains but achieved at least one notable engineering feat in construction of the tubular Victoria Bridge across the St Lawrence R at Montréal. The 2009 m long iron tube rested on 2 abutments and 24 piers designed to resist the crushing ice of the river; it was opened to traffic on 17 Dec 1859. The Montréal-to-Lévis line opened 1854 and the "trunk" from Montréal to Toronto in Oct 1856. Despite financial difficulties, the GTR expanded steadily, leasing the Buffalo and Lake Huron Railway in 1864, adding a line from Pt Huron to Chicago, acquiring the Georgian Bay and Lake Erie railways in 1881, and the Midland Railway (750 km) in 1884. It eliminated its main competitor and added another 1450 km of track with the takeover of the GREAT WESTERN RAILWAY in 1884. Additional links to the US rail system were established with the International Bridge across the Niagara R, and the impressive St Clair Tunnel beneath the St Clair R. At Confederation the GTR was the largest railway system in the world, with 2055 km of track; by the late 1880s it had grown to over 700 locomotives, 578 cars, 60 post-office cars, 131 baggage cars, 18 000 freight cars and 49 snowplows. The GTR ran unbroken from Sarnia to Portland, Maine.

Cost of construction, absentee management (the head office was in London, Eng) and failure to generate anticipated levels of traffic left the company debt ridden and unable to upgrade its equipment. It suffered bad publicity with several accidents; on 28 June 1864 a GTR train plunged off the Beloeil Bridge into the Richelieu R, killing 90 people. Another incident made headlines around the world when, on 15 Sept 1885, a GTR train was charged by Jumbo, the famous circus elephant, near St Thomas, Ont. The elephant was killed. From the mid-1890s until WWI the GTR undertook a massive betterment program on its property. This included double-tracking of the main line from Montréal to Sarnia, reducing curves and grades to improve operating efficiency, and reconstruction of bridges, buildings and yards. Subsequent rebuilding of the system was not required until after WWII.

Envious of the CPR thrust into the West, the GTR set up a subsidiary, the GRAND TRUNK PACIFIC, to build a transcontinental line. Completed in 1914, the railway was a financial disaster and was largely responsible for the bankruptcy of the GTR in 1919. The federal government, which had already given the GTR some $28 million in subsidies and loans, took over the railway on 10 Oct 1919. It was placed under the management of the CANADIAN NATIONAL RAILWAYS on 30 Jan 1923. JAMES MARSH

Reading: A.W. Currie, *The Grand Trunk Railway of Canada* (1957).

Grand Valley, Man, is a provincial recreation park 10 km W of Brandon on the Trans-Canada

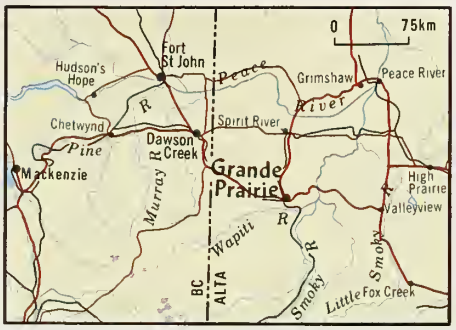
Hwy. Once a community on the N bank of the Assiniboine R, Grand Valley died when BRANDON, 3 km W on the S bank of the Assiniboine, was created in 1881 as the CPR's divisional headquarters. Settlers from Nova Scotia and Québec homesteaded here 1877-79. Population, stores and services grew. Several attempts were made to entice the CPR to locate at Grand Valley but the rivalries involved, combined with spring flooding in 1881, caused the higher site of Brandon to be chosen. Homesteaders moved across the river; businessmen moved to Chater or Brandon. By 1884 only a few houses remained, and the townsite eventually reverted to a homestead. D.M. LYON

Grandbois, Alain, poet (b at St-Casimir, Qué 25 May 1900; d at Québec City 18 Mar 1975). He is considered the first great modern Québec poet. He travelled the world 1918-39 and shared the hopes and problems of contemporary man. His work closely integrates the themes of exploring the secrets of the world and studying human destiny, each one reinforcing the other. His writing and subject matter thus had a depth and breadth previously unknown in Québec, making them a model for various young poets of the 1950s. *Né à Québec: Louis Jolliet* (1933), *Les Voyages de Marco Polo* (1941), *Avant le chaos* (1945) and *Visages du monde* (1971) all demonstrate his knowledge of the world. The confrontation with destiny (adventure, glory, love, liberty, death) occurs in precise locations, through specific characters. His poetry — *Îles de la nuit* (1944), *Rivages de l'homme* (1948), *L'Étoile pourpre* (1957), *Poèmes épars* — develops these topics within a single character, the man of the "long voyage insolite/A travers l'incantation du temps." The poetry is metaphysical, its scope being that of destiny explored, through exploratory words, and with its developed rhetorical structure it speaks for all in an intimate and personal tone. YVES BOLDUC

Reading: Yves Bolduc, *Alain Grandbois: le douloureux destin* (1982).

Grande Cache, Alta, Town, pop 4523 (1981c), inc 1966, located 430 km NW of Edmonton, was created 1966 to mine coking coal. The coal's location had been known for years, but awaited development of a market in Japan's blast furnaces and completion of the Alberta Resources Ry N from the CNR main line. Named for a "grande cache" of furs said to have been left there by Ignace Giasson (1820), it is a neatly laid out, model town. Nearby Willmore Wilderness Prov Pk promises the development of tourism. The *Grande Cache Mountaineer* is the weekly newspaper. ERIC J. HOLMGREN

Grande Entrée, Île de, Qué, pop 867 (1981c), situated almost in the middle of the GULF OF ST LAWRENCE, and flanked in the N by Ile d'ANTICOSTI, in the S by PRINCE EDWARD I and on the E by CABOT STR, is one of the 16 islands comprising the Magdalen Islands archipelago (Îles de la MADELEINE). The island group was discovered by Jacques CARTIER (1534) and was later explored by Samuel de CHAMPLAIN (about 1609). Grande Entrée was leased to Nicolas DENYS in 1653 by the COMPAGNIE DES CENT-ASSOCIÉS. After 1775 it became part of the holdings of Capt Isaac Coffin (Coffin is the island's English name today) of the Royal Marines as a reward for services to the English Crown. A Canadian corporation, the Magdalen Island Co, bought all the islands from the absentee Coffin family in 1903. Grande Entrée is joined to the other islands by lagoon-forming sandbars, and is characterized by rapidly eroding red sandstone cliffs. A constant hazard to shipping, the island group is noted for fishing, sealing and its spectacular colonies of seabirds. During the summer, the entire archipelago attracts many tourists. DAVID EVANS



Grande Prairie, Alta, City, pop 24 263 (1981c), inc 1958, is located 460 km NW of Edmonton. Surrounded by rich agricultural land, it is the business and transportation centre of the PEACE RIVER region.

History Although the area had been the domain of fur traders since Alexander MACKENZIE ascended the Peace R (1792-93), the present townsite was not settled until 1881, when Tom Kerr erected an HBC trading post. Shortly thereafter, Louie Callihou, a part-Iroquois farmer who sowed grain, constructed the first barn and corral. The community received its name from Father Grouard, an RC missionary who labelled the gently undulating wilderness "la grande prairie." After 1900 a trickle of pioneers traversed the Edson Trail and ATHABASCA LANDING TRAIL and took up homesteads here. Growth continued with completion of the Edmonton, Dunvegan and BC Ry extension line in 1916.

Economy Historically, Grande Prairie has evolved around agriculture. With demobilization following WWI, soldier settlement schemes, continued high wheat prices and publicity for the Peace R district as Canada's new agrarian mecca, migration increased throughout the 1920s. Strategically situated with a vast expanse of fertile land N, E and W, Grande Prairie by the 1930s served as the wholesale centre for the region. Although its population was only 1464 (1931c), its retail business in 1929-30 surpassed $2 million. In recent years the city's economy has become diversified, with the forestry and petroleum industries augmenting agri-business. The major employer is Procter and Gamble (which completed an $80-million pulp mill 1973) followed by North Canadian Forest Industries. Grande Prairie experienced an unprecedented boom 1978-80 due largely to the discovery of the Elmworth "deep-basin," a major gas field near the city. Extensive gas and oil activity with its concomitant impetus to the commercial and service industries resulted in a large population increase 1979-80. However, as Canada's economy stagnated in 1981, particularly in the energy sector, the flood of people into the city decreased and there has been a substantial economic slowdown.

Cityscape The city contains beautiful parkland surrounding a man-made reservoir in its centre. Cultural life is focused on the regional college (designed by Douglas CARDINAL), which provides not only diverse educational opportunities, but possesses one of the finest auditoriums in western Canada. J. PETRYSHYN

Reading: I.M. Campbell, *Grande Prairie: Capital of the Peace* (1968); C.A. Dawson, *The Settlement of the Peace Country* (1934).

Grande Société, contemporary name for war profiteers charged with providing food for Canada and the French troops stationed there during the SEVEN YEARS' WAR. The official supplier received only one-fifth of the société's profits, and silent partners almost certainly shared their three-fifths with Canada's last intendant and possibly with the governor. The other one-fifth was divided among those who looked after the Québec and Montréal operations. Intendant BIGOT wielded extensive power over Crown expenditures in the colony, so the société was in the enviable position of buying supplies from itself with the king's money. Since supplying the FUR-TRADE posts was most remunerative, the société shipped much-needed foodstuffs westward. Much of the money seems to have found its way back to France; some was even returned to the royal treasury in the late 1760s after conviction of those involved. Peculation common under the Ancien Régime was all the more tempting in Canada because of the enormous expenditures incurred by the Crown in order to save its colony from the British. THOMAS WIEN

Grandin, Vital-Justin, Roman Catholic bishop of St Albert, b at St Pierre-la-Cour, France 8 Feb 1829; d at St Albert, Alta 3 June 1902). As a pioneering Oblate missionary of the Canadian West, he became the first bishop of the then vast and newly created diocese of St Albert in 1871. Wholly dedicated to bringing Roman Catholicism to the Indians and the Métis, he worked despite great hardships to develop the missions. In 1875 he lobbied the Canadian government for funding to aid agriculture, education and health care. During the 1885 NORTH-WEST REBELLION he advocated moderation and "obedience" to the Canadian authorities. His cause for sainthood was introduced at Rome in 1937. LOUISE ZUK

Grands Ballets canadiens, Les, of Montréal, was founded by Ludmilla CHIRIAEFF in 1958 as a troupe of 16 dancers. It was the natural outgrowth of Mme Chiriaeff's earlier activities in Montréal, where she had settled after emigrating from Europe in 1952. Her first ballets were created for the acclaimed CBC French Network TV program, L'Heure du concert. Her company, Les Ballets Chiriaeff, began giving live public performances in 1954, despite opposition from the then highly conservative Catholic Church in Québec. Mme Chiriaeff had established her first school in 1952 and, in 1958, the Académie des grands ballets canadiens was established to prepare dancers for the emerging company. Schooling has remained a vital part of the company's activities. Branches of the general school — the Académie — have been opened throughout Québec and, in 1970, the Ecole supérieure de danse was founded to provide professional training for advanced students. Since relinquishing her position as artistic director in 1974, Mme Chiriaeff has focused her attentions on the schools, where she has been able to provide ballet training for talented children from all parts of Québec.

Throughout its existence, Les Grands Ballets (now about 35 dancers) has been distinguished by its commitment to French Canadian themes and Canadian composers, designers, and choreographers. In the early years, Mme Chiriaeff choreographed many ballets. Since then other important contributions to the repertoire have been made by such Canadian choreographers as Fernand NAULT, Brydon PAIGE and Brian MACDONALD. The company has also accumulated a diverse repertoire representative of the best in traditional and contemporary ballet and modern dance, performing works by such renowned choreographers as George Balanchine, John Butler, Lar Lubovitch and Paul Taylor. It also continues to present the works of a younger generation of Canadian choreographers including, among others, James Kudelka, Judith MARCUSE and Linda Rabin.

Les Grands Ballets has travelled extensively across Canada. It made its first US appearance in 1959, visited Europe in 1969, 1974, and 1982, and has appeared in Latin America and Asia. From 1970 to 1972 it became internationally known for its popular dance adaptation, by Fernand Nault, of the rock opera *Tommy*, composed by the British group, The Who. In the ear-

ly 1980s the artistic direction of the company was provided by a committee consisting of ballet mistress Linda Stearns, répétiteur Daniel Jackson, and director general Colin McIntyre. They succeeded in maintaining a high profile for Les Grands Ballets as a versatile, creatively vital company. MICHAEL CRABB

Grange, The Throughout its history this elegant brick building, constructed about 1817 on a 40 ha property stretching from Queen to Bloor streets, has been linked to the social, intellectual and political life of Toronto. Built for D'Arcy Boulton, Jr, it subsequently became home to Goldwin SMITH. Acquired in 1911 by the Art Museum of Toronto (now ART GALLERY OF ONTARIO), the building was restored to its appearance of the years 1835-40. The composition of its facade, with a slightly projecting section topped by a pediment, shows the influence of 18th-century British classical architecture as it was expressed in several grand colonial homes in the early 19th century. NATHALIE CLERK

Grant, Cuthbert, fur trader, Métis leader, captain of the Métis at SEVEN OAKS (b at Fort de la Rivière Tremblante [Sask] *c*1793; d at White Horse Plains [St-François-Xavier, Man] 15 July 1854). Grant, his reputation tarnished by the events at Seven Oaks, overshadowed in history by RIEL, has not been given due credit for his leadership of the MÉTIS. Of Scottish and Cree or Assiniboine background and educated apparently in Montréal, Grant came back to the North-West as a trader-bourgeois of the NORTH WEST CO in 1815. In 1816 he led the Métis to victory at Seven Oaks, an unplanned clash of Métis and Selkirk settlers. Three years after the amalgamation of the NWC and HUDSON'S BAY CO, in the spring of 1824, Grant led 80 to 100 Métis families to settle and farm at White Horse Plains (Grantown, later St-François-Xavier). In 1828 he was appointed warden of the Plains by HBC Gov George SIMPSON, and for at least 25 years his followers served as providers and protectors of the RED RIVER COLONY. Grant was a founder of the Métis Nation, but ironically, it was a younger generation of Métis nationalists who, by defying his attempts to uphold the HBC monopoly at the Sayer trial in 1849, ended his career as warden and sheriff of ASSINIBOIA. EMMA LAROCQUE

Grant, George Monro, Presbyterian minister, educator (b at Albion Mines, NS 22 Dec 1835; d at Kingston, Ont 10 May 1902). Educated at Pictou Academy and West River seminary in Nova Scotia, Grant attended Glasgow U (MA 1857) and was ordained in the Church of Scotland in 1860. After spending 3 years in different Maritime locations as a missionary, he was offered the pulpit of St Matthew's Church, Halifax, in 1863, a position he held until he accepted the principalship of Queen's U, Kingston, in 1877. He was principal of Queen's until his death.

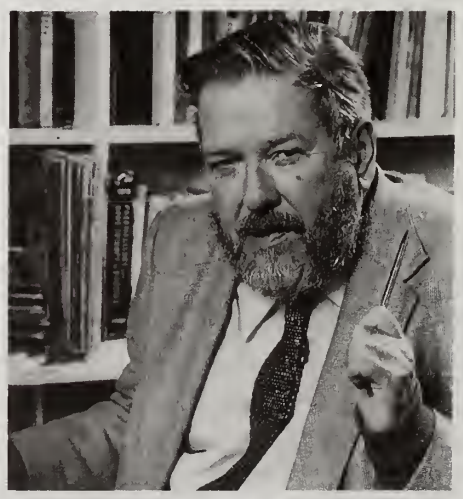
Grant inherited a small and financially unstable denominational college and spent much of his indomitable energy thereafter in raising an endowment fund and acquiring (and retaining) major scholars, especially in the humanities. He was also fully aware, however, of the necessity of strong faculties of science (pure and applied) if Queen's was to acquire a truly national stature. By the time of his death few denied that his goal had been realized.

Principal Grant was an almost archetypal "muscular Christian," greatly admiring Thomas Arnold of Rugby as well as Victorian social reformers. While not a systematic scholar, he read widely and his thought and conduct were practical applications of the philosophical idealism given voice by his colleague at Queen's, John WATSON. He believed that the knowledge and ideals acquired at university should be actively used in professional public life for the social good, and the power of his example encouraged commitment of students to a SOCIAL GOSPEL. To this organic view of society he added a firm commitment not only to the Canadian nation but also to its place within the British Empire. A leader in the Presbyterian Church in Canada (he was moderator in 1889), he was nevertheless a major spokesman for ecumenicism. He left behind him no great body of scholarship but at his death the phrase "Principal Grant" had become one of legendary significance. A.B. MCKILLOP

Grant, George Parkin, social philosopher, university professor (b at Toronto 13 Nov 1918), son of William Lawson Grant and grandson of George Monro GRANT and Sir George Parkin. A brooding philosopher of apparently implacable pessimism, Grant is one of the most influential Canadian thinkers of his era, having evolved from a nationalist and "red Tory" position to a concern with the fate of the entire Western World. Educated at Queen's and Oxford, Grant taught philosophy at Dalhousie 1947-60, then became chairman of the Department of Religion at McMaster. In 1980 he returned to Dalhousie as a professor of political science and classics. In *Philosophy in the Mass Age* (1959), he began to wrestle with the conflict between Western moral traditions and the new religion of technological progress. *Lament for a Nation* (1965), a meditation on the implications of the DIEFENBAKER period, attracted wide attention for its sombre conclusion that Canada — a nation with conservative roots — was doomed to disappear in the American-led empire of modern liberalism, which for Grant is an inexorable force leading to a universal and homogenous state of almost certain tyranny. Similar concerns dominate *Technology and Empire* (1969), in which Grant saw the Vietnam War as an evil and exemplary product of Western ideology.

Using contemporary issues as a springboard for his speculations, Grant has attracted a large following among younger writers and nationalists, most of whom see his pessimism less as an irrevocable verdict than as an invigorating challenge to unite the achievements of modern science and classical philosophy. This challenge was maintained in *English-Speaking Justice* (1978), in which Grant concludes that traditional concepts of freedom and justice have been transcended by the doctrine of technological progress, with an implication that the entire Western experience has been some sort of gigantic error. CHARLES TAYLOR

Reading: Charles Taylor, *Radical Tories: The Conservative Tradition in Canada* (1982); L. Schmidt, ed, *George Grant in Process* (1978).



George Grant's *Lament for a Nation* (1965) attracted wide attention for its sombre conclusion that Canada was doomed to disappear in the American empire of modern liberalism (*courtesy Canapress*).

Grant, Sir James Alexander, physician, politician (b at Inverness, Scot 11 Aug 1831; d at Ottawa 5 Feb 1920). A graduate of Queen's and McGill, he practised medicine for all of his professional life in Ottawa. He was personal physician to the first 8 governors general (1867-1905). Successful care of Princess Louise, Marchioness of Lorne, earned him a KCMG in 1887 and Queen Victoria's motherly thanks. His professional eminence led to election as president of the CANADIAN MEDICAL ASSN and the Royal Soc of Canada. Grant sat in Parliament for Russell County 1867-73 and Ottawa 1893-96 and gained distinction by introducing the original CANADIAN PACIFIC RY Bill in 1872, using an appropriate medical metaphor, when he said Canada would become one great country by "placing an iron splint on these provinces to strengthen the union and develop trade." A.A. TRAVILL

Grant, John Charles Boileau, anatomist (b at Loanhead, Scot 6 Feb 1886; d at Toronto 14 Aug 1973). After service as a medical officer in the imperial forces in WWI, Grant became professor and head of the Dept of Anatomy, U of Man (1919-30), of U of T (1930-56), professor emeritus, U of T (1956-73), and visiting professor of anatomy, U of Calif, Los Angeles (1961-69). Author of *A Method of Anatomy, An Atlas of Anatomy* and *A Dissector of Anatomy*, Grant was also a contributor to Gray's *Anatomy* 18th and 20th editions, Morris's *Anatomy, Myology*, 10th and 11th editions, Cuningham's *Anatomy, Respiratory System*, 9th and 105th editions, and *Anthropometry of the Saulteaux, Cree, and Chipewyan Indians*. Grant was a stimulating teacher of human anatomy and his influence through his textbooks was worldwide. During the GREAT DEPRESSION he provided encouragement and monetary assistance to dozens of unemployed. ROSS G. MACKENZIE

Grant, John Webster, UNITED CHURCH clergyman, church historian (b at Truro, NS 27 June 1919). He attended Dalhousie, Princeton and Oxford universities (Rhodes scholar 1941), graduated in theology from Pine Hill Divinity Hall, Halifax, and served as a wartime chaplain in the RCN. He taught church history at Union Coll, Vancouver, 1949-59, except for one year as a visiting professor in India. In 1959 he joined RYERSON PRESS and a year later became its editor in chief. From 1963 until retirement in 1984 he was professor of church history at Emmanuel Coll, Toronto. Besides numerous scholarly articles, he has written more than a dozen books on church history, particularly Canadian. He has been active in several academic and religious organizations, including the United Church's commission on union with the Anglicans, where he was chairman of the executive committee 1967-71. JOHN S. MOIR

Grape, common name for a family (Vitaceae) of woody, climbing vines and the fruit clusters they produce. The genus *Vitis* includes 30-50 species. The Old World species *V. vinifera* has been cultivated for at least 5000 to 6000 years. Many different grape species exist from Canada to Mexico. *V. labrusca* and *V. riparia* are the 2 main northern species. As early as 1616 attempts were made to grow *V. vinifera* in eastern N America. Cultivation of this species has continued but remains economically unsuccessful in Canada, although small quantities are grown for special wines. However, *V. vinifera* has been used extensively in hybridization of many important cultivated varieties. There are 2 main grape-growing areas in Canada, the NIAGARA PENINSULA, Ont (85% of plantings), and the OKANAGAN VALLEY, BC, with some plantings in SW Ontario and NS. Approximately 10 000 ha of grapes are grown in Ontario, 2000 ha in BC. The Niagara region has 177 frost-free days and an average rainfall of 678 mm. The 2335 heat units (above 5°C) are adequate for crop maturity. In

BC, irrigation is required to supplement rainfall. Some cultivation is necessary for best results in vineyards. Chemicals are used for WEED control, except on young vines. Green-manure crops are sown in midsummer and fertilizers are applied as needed. Common INSECT PESTS include leafhoppers, flea beetles, berry moth and phylloxera. The main PLANT DISEASES are powdery mildew, downy mildew, black rot, botrytis and dead arm. Most of the grapes produced in Canada are used by processors to make WINE and juice. Small quantities are sold for home winemaking and dessert purposes. The main varieties grown are Concord, De Chaunac, Niagara, Elvira and Foch. About 45 varieties are used by the wineries. Agriculture Canada and Ontario Ministry of Agriculture and Food scientists, working at RESEARCH STATIONS in Summerland, BC, and Vineland, Ont, respectively, have aided local wineries by breeding new hybrid vines and evaluating wines. *See* CROP RESEARCH.

O.A. BRADT

Graphic Arts, *see* GRAPHIC DESIGN; PRINT INDUSTRY; PRINTMAKING.

Graphic Design originated from graphic or commercial art and is often called visual communication. As the term covers typographic and type design, book, magazine, audio-visual and advertising design, the graphic designer is concerned with both alphanumeric symbols and nonalphabetic images in order to clarify information and enhance communication in a variety of media.

The roots of graphic design in Canada lie in the fledgling newspaper business of the early 19th century. With rapid technological progress in type casting and printing presses (*see* PRINT INDUSTRY), the demand for printed advertising increased — for promotion of stagecoaches and lake boats, posters and broadsheets for circuses, agricultural fairs and exhibitions, and playbills for theatre and concerts. Since design was an unknown profession, layout and artwork were performed by anonymous craftsmen and freelance artists, both often referred to as "graphic" artists.

At the turn of the century the Toronto Lithographing Co and Grip Ltd were among the first firms anywhere to add illustrators and graphic artists to their full-time staff. The idea of housing under one roof the services of draftsmen, photographers, platemakers, layout artists, copywriters and advertising salesmen was introduced to Great Britain in 1902 by 4 members of the Toronto Art League and former employees of Grip Ltd, A.A. Martin, W.T. Wallace, T.G. Greene and Norman Price, who became founders of London's Carlton studios. The artists at the Grip and later Rous and Mann included Tom THOMSON and members of the GROUP OF SEVEN, many of whom had studied and worked in England and who introduced elements of the international style, particularly from William Morris and the Beggarstaff Brothers, to Canadian design. The immigration posters required by the national railway and steamship companies and patriotic recruitment posters commissioned during both world wars gave a great impetus to graphic design. *The Poster* in 1919 complimented Canada on its "remarkably successful war poster advertising campaign," especially Henry Eveleigh, and during WWII the NATIONAL FILM BOARD was made responsible for designing and distributing numerous poster series, resulting in some excellent work by Leslie Trevor, Eric Aldwinkle and Harry Mayerovitch (Mayo). The railway initiative slumped after about 1920, however, and when A.C. Leighton came to Canada in 1929 to direct advertising for the CPR, he followed a widely used formula poster design often incorporating a map, train, ships and hotel inserts. It was only in 1960 that CN acquired a new corporate symbol of international calibre conceived by Toronto designer Allan Fleming. Many prominent artists, including Carl SCHAEFER and Jack BUSH, continued to earn their living as commercial designers.

The NFB and the CANADA COUNCIL have had a positive influence on Canadian graphic design as they commissioned first-rate designers to produce their posters, brochures and publications such as *Canada: A Year of the Land* (1967) and *Between Friends* (1976). Already in the late 1940s 2 Canadian-born designers were outstanding — Carl DAIR and Henry Eveleigh, who formed a partnership in Montréal in 1947. The studio failed in 1951, but Eveleigh won the first United Nations poster contest in 1947 with a brilliant photo montage. Dair wrote and lectured widely on typography and in 1967 designed the Cartier typeface for Canada as a CENTENNIAL project. Publishers became more conscious of "the look of the book," and strong design departments developed at the U of T Press with Allan Fleming and Will Rueter, at McClelland & Stewart with Frank Newfeld, and at Queen's U with Peter Dorn. The work of Fleming and of graphic designer Jim Donoahue was characterized by a synthesis combining the order of the European grid system design with the more intuitive and illustrative Anglo-American approach.

The 1950s and 1960s had brought an influx of European-trained designers (first Rolf Harder and Ernest Roch, later Gerhard Dorrié and Fritz Gottschalk) to Montréal, where they captured a large share of institutional and corporate design commissions. In Toronto, Stuart Ash and Burton Kramer acquired international reputations, especially in corporate identity design. Order and clarity were hallmarks of their work. European influence was obvious in the design work for EXPO 67 and the Montréal Olympics of 1976, when Pierre-Yves Pelletier and Georges Huel, with Gottschalk and Ash, exerted an effective quality control over all aspects of design. Gottschalk and Ash International is unique in now having offices in Montréal, Toronto, New York and Zurich. Leading Québec designers were Georges Beaupré and Laurent Marquart, both partly Swiss trained, and Jean Morin and Pierre-Yves Pelletier. In Toronto Paul Arthur, Carl Brett and John Gibson continued a line of design that evolved from the British typographic traditions of restrained balance between the innovative and the practical. Paul Arthur was particularly influential in the early 1960s, employing a number of young immigrant designers who later became eminent in their own right (eg, Fritz Gottschalk). Theo Dimson in Toronto updated Art Nouveau poster styles. Neville Smith near Ottawa combined illustrative flair with good typography. Eiko Emori of Ottawa excelled in designing government publications with a native Japanese flair and meticulous Western typography. Ian and Judith Gregory established their reputation in publication design in Ottawa. Inside the federal government, Ulrich Wodicka and a small team brought order into the chaotic signage and identity system of federal agencies, first in Information Canada, then in the Treasury Branch.

In the late 1960s graphic designers who had immigrated to the Maritimes and the West, often from abroad, began to exert an influence in those regions. Tony Mann and Gerhard Dorrié were mentors to a generation of students at the NOVA SCOTIA COLLEGE OF ART AND DESIGN and these graduates became "bridgeheads" of good design in Halifax (Greg Silver, Denise Saulnier and David Peters) and Charlottetown (Anne Patterson). In Winnipeg Bernard Michaleski won numerous awards, and at the U of Alberta Walter Jungkind, a Swiss designer, established a program of graphic design in 1969 which, with Jorge Frascara from Argentina, concentrated on research into the perception and design of public symbols. In Vancouver the design scene was for long broadly oriented towards the West Coast Artist Guild dominated by Los Angeles and San Francisco, but Fred Peters, John Long, Marion Llewellyn, Jim Haynes and Ken Hughes are among the leading contemporary designers.

A Society of Typographic Designers was founded in 1959 in Toronto, and in 1974, at a meeting in Ottawa which included representatives from across the country, the Society of Graphic Designers of Canada (SGDC) was established. It received a federal charter in 1976 and is now organized into a number of autonomous regional or city chapters. Like all professional associations, SGDC is concerned with standards of professional conduct, performance, integrity and development, as well as public information. The majority of graphic designers in Québec decided in 1972 to associate themselves at the provincial level and incorporated as the Société des graphistes du Québec. There is good rapport between the SGDC and SGQ and most national exhibition/publication/award events are organized jointly.

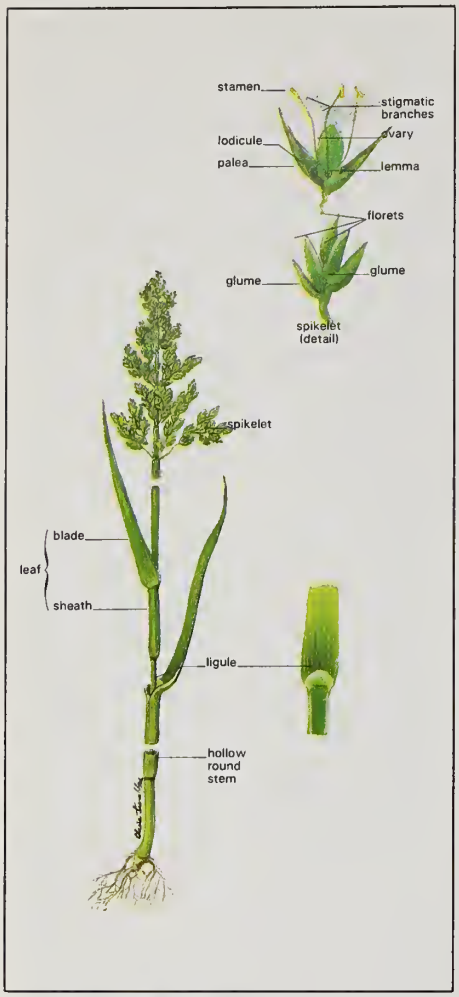
The first international design education conference in N America took place in 1975 at the U of Alberta, sponsored by both national graphic design associations, the International Council of Graphic Design Associations, the NATIONAL DESIGN COUNCIL and the Canada Council. In 1980 an International Design Symposium was held at UQAM. In 1982 a major graphic design conference took place, under the aegis of the Alliance graphique internationale, at York U, organized by educator and designer Andy Tomcik.

Graphic design in Canada, unbeknown to most Canadians, has come of age. *See also* ONTARIO COLLEGE OF ART; PRIVATE PRESSES.

WALTER JUNGKIND

Reading: C. Dair, *Design with Type* (1967); J. Gibson and L. Lewis, eds, *Sticks and Stones: Some Aspects of Canadian Printing History* (1980); R. Stacey, *The Canadian Poster Book* (1982).

Grasses are among the most familiar and important flowering PLANTS. They are used primarily as foodstuffs. Humans consume grasses directly as CEREALS (eg, wheat, corn, barley, rye, oats) or as sweetening (eg, sugar from sugar cane, molasses from sorghum). Most meat and dairy products are derived from grass-eating domesticated animals (*see* ANIMAL AGRICULTURE). Many wild animals are also grass eaters. Grasses contribute to the aesthetic environment as turfs gracing playing fields, golf courses and lawns, and as ornamental garden grasses. They stabilize SOIL and prevent EROSION. Grasslands began to appear about 25 million years ago, changing the face of much of the world and providing food for grazing animals. Grasses and grazers evolved together. Grasses benefit because grazers control the growth of competing species and provide fertilizers. Grasses owe their success largely to peculiarities of their structure. They consist of vegetative structures (roots, stems and leaves) and reproductive structures (flowers and associated modified leaves). Although most grass parts are like those of other flowering plants, certain structures are unique. Usually, the stems (culms) are hollow, except at points (nodes) where leaves are attached. However, some well-known grasses do not have hollow internodes, eg, corn (*Zea mays*) and big bluestem (*Andropogon gerardii*) of the Canadian prairies. The characteristic grass leaf consists of a sheath (basal portion of the leaf) surrounding the stem for some distance above the node. The part of the leaf that diverges away from the stem is the blade. At the junction of sheath and blade, there is often a small structure (ligule) forming a continuation of the sheath. Sheaths of grass leaves may be open (with edges overlapping but not fused) or closed (with fused edges). Closed sheaths are less common but are found in the widespread bluegrasses (*Poa*) and brome grasses (*Bromus*).



Grass (*artwork by Claire Tremblay*).

Grasses range in size from 3 cm (eg, *Aira praecox* of Vancouver I) to 2 m (eg, *Elymus cinereus* of BC and Alberta). Their life cycle may be completed in a single year, as in many annual crop plants, or they may survive for hundreds of years, as do native prairie perennials. Canadians usually associate grasses with prairie vegetation, although they occur in all habitats except the densest woods. Some grasses (eg, 3-awn grass, *Aristida longiseta*) are found in arid regions of BC, others (eg, wild rice, *Zizania aquatica*) in eastern Canadian lakes. Certain genera (eg, *Arctagrostis* and *Arctophila*) are native to the Canadian Arctic.

Turf grasses are developed from species that show desirable characteristics, eg, density of growth, fast growth after seeding, ability to remain green, etc. In Canada cold hardiness and, frequently, drought resistance are also important. Popular Canadian lawn grass mixtures often include species of *Poa* (eg, Kentucky bluegrass, roughstalk bluegrass) and *Festuca* (especially creeping red fescue, chewing fescue), although other useful species have been developed. JACK MAZE

Reading: A. Arber, *The Graminae* (1959).

Grasshopper, common name for straight-winged INSECTS which, together with locusts, make up the order Orthoptera. Over 12 000 species are known worldwide; about 140 in Canada, ranging in length from 2-12 cm. All provinces have grasshoppers; most species occur in the western grasslands, but some live in forest clearings and on trees in river valleys north to YT. Grasshoppers are herbivorous and diurnal. Most have wings; many are strong fliers. Unlike locusts, grasshoppers are usually nonmigratory. Usually one generation is produced annually, from eggs that have overwintered. Some grassland species overwinter as immature nymphs; a few, in the interior of BC, require 2 years to mature. Females lay several clutches (egg pods), each containing 10-90 eggs, depending on species. Under favourable, late summer conditions, large numbers of egg pods are deposited by pest species in densely packed egg beds or distributed through cultivated fields. In spring, many nymphs hatch and attack seedling cereal crops. Damage can be extensive: in outbreak years 5-10% of cereal crops may be lost to grasshoppers. Several species, especially the Rocky Mountain locust (*Melanoplus spretus*), extinct since 1902, discouraged, for a time, settlement of western Canada. Winged adults, flying downwind, can emigrate to invade ripening crops many kilometres distant. Five species are important INSECT PESTS: 4 species of genus *Melanoplus* and the clear-winged grasshopper, *Camnula pellucida*. All damage cereal crops; the latter devastates BC rangeland grasses. Several other species compete with cattle for forage. Hot, dry weather favours population growth; cool, damp weather retards growth and encourages fungi and bacteria that can wipe out large grasshopper populations. Birds, small mammals, and other insects prey on grasshoppers; small worms and maggots are internal parasites. Although weather and natural control agents are most effective in keeping numbers down, chemical control during an outbreak is still required for crop protection. The so-called long-horned grasshoppers are not true grasshoppers. They are more closely related to CRICKETS. P.W. RIEGERT

Grasslands National Park (est 1981, 920 km^2 provisionally) situated in the SW Saskatchewan PRAIRIES on the Canada/US border. At first glance, the park area appears empty; a gently undulating expanse of sun-scorched plains arches to meet a deep cobalt sky. But hidden from view are BADLANDS filled with weird, water-eroded shapes, meandering rivers and fertile sloughs. The hot, dry summers and cold winters produce an environment that supports a unique flora and fauna, including several species of rare herbs, 2 rare grasses and Canada's only black-tailed prairie dogs. Among its sweeping grasses the park also supports pronghorn, coyote, red fox, mule deer and numerous small mammals. Species of reptiles and amphibians, rare elsewhere in Canada, can be found along the Frenchman R Valley. Until the 1850s the park area was inhabited only by nomadic Indians who hunted throughout the territory. At that time, rapid settlement led to the growth of ranching. LILLIAN STEWART

Gravenhurst, Ont, Town, pop 8532 (1981c), inc 1887, located at S end of Lk MUSKOKA, 170 km N of Toronto. The name was arbitrarily assigned by the federal government, perhaps after a place in Washington Irving's novel *Bracebridge Hall*. In the 19th century it was a sawmilling centre, but as logging declined tourism became the most important activity. The Muskoka district, with its many wooded islands set among the crystal waters of a series of interconnected lakes, developed into a popular cottage and tourist resort area, earning Gravenhurst its nickname "Gateway to the Muskokas." The town was long a base for steamer service for the Muskoka Lks, and the paddle steamer *Segwun* has been restored to its original (1887) condition. The birthplace of native son Norman BETHUNE has been restored as a museum and national historic site.

DANIEL FRANCIS



Gray, George R., track and field athlete (b at Coldwater, Canada W 4 May 1865; d at Sault Ste Marie, Ont 7 Jan 1933). After high school he competed for 17 years at his specialty, putting the shot, without being defeated. At age 20 in 1885, at the Canadian Amateur Athletic Assn meet in Toronto, he defeated champions from other countries with his first put of 41' 5.5" (12.64 m) and was acclaimed world champion. From 1887 he competed for the famous NY Athletic Club, which paid his expenses, while continuing his Canadian career in the lumber business. He held and broke the world shotput record several times, competing throughout N America and in Britain. By retirement he had won 188 1st-place medals and trophies.

GERALD REDMOND

Gray, Herbert Eser, politician (b at Windsor, Ont 25 May 1931). Gray has represented a Windsor constituency in Parliament since 1962. A prominent Liberal nationalist, he was appointed to Cabinet in 1969 and gained attention through his report on FOREIGN INVESTMENT in Canada tabled in 1972. Though not reappointed to Cabinet after the 1974 election, he became minister of industry, trade and commerce in 1980 and was president of the Treasury Board until defeat of the Liberal government in 1984.

JOHN ENGLISH

Gray, James Henry, journalist, social historian (b at Whitemouth, Man 31 Aug 1906). Gray grew up in Winnipeg, left school to help support his family, and after a series of jobs went on relief during the Depression. He worked for the *Winnipeg Free Press* 1935-47, first as a reporter and later as an editorial writer. He edited Calgary's *Farm and Ranch Review* 1947-55, introducing unaccustomed topics such as farmers' subsoil rights, and the *Western Oil Examiner* 1955-58, where he championed the unpopular notion that independent Canadian oil producers should take precedence over American multinationals. Later, he moved to the Home Oil Co to promote the building of a Canadian pipeline to the East. Gray's 9 books, written after his retirement, draw on personal experience and original research. Lively and detailed, they investigate such facets of Prairie life as the fight against the dustbowl, the Depression, prostitution and prohibition. JEAN O'GRADY

Reading: J.H. Gray, *The Winter Years* (1966), *The Boy from Winnipeg* (1970), *Booze* (1972) and *Troublemaker!* (1978).

Gray, Jessie Catherine, surgeon, lecturer, researcher (b at Augusta, Georgia 26 Aug 1910; d at Toronto 16 Oct 1978). Canada's "first lady of surgery," and one of the 4 leading cancer surgeons in N America, Gray earned a formidable succession of firsts: first woman gold medallist in medicine at U of T (1934); first woman to obtain the Master of Surgery degree (1939); first woman resident surgeon at the Toronto General Hospital; first woman Fellow of the Royal Coll of Surgeons (Canada, 1941); first woman member of the Central Surgical Society of N America; first woman elected to the Science Council of Canada (1966). She was appointed associate surgeon in chief at Women's College Hospital, Toronto, in 1941, and held the post of surgeon in chief from 1945 to her retirement in 1965. DONNA YAVORSKY RONISH

Gray, John Hamilton, soldier, premier of PEI (b at Charlottetown 14 June 1811; d there 13 Aug 1887). Educated in England, Gray served for many years in South Africa and India with the 7th Dragoon Guards, retiring permanently to PEI in 1856. Elected to the Legislative Assembly in 1858 and 1859, Gray supported Bible reading in the schools and a commission to set-

tle the LAND QUESTION. He became premier on 2 March 1863, supporting Maritime union and, after the CHARLOTTETOWN CONFERENCE, which he hosted, CONFEDERATION. When the Islanders rejected the union of British North America after the QUEBEC CONFERENCE, Gray suddenly resigned as premier on 20 Dec 1864, perhaps influenced by his wife's illness. He became increasingly involved in the military affairs of the Island and later the Dominion. J.M. BUMSTED

Gray, John Hamilton, lawyer, politician, judge, premier of NB (b at St George, Bermuda 1814; d at Victoria 5 June 1889). Remembered as a FATHER OF CONFEDERATION, Gray, a brilliant orator, used his skill in the courtroom, as lieutenant colonel in the militia, on the stump, in the NB Assembly, in the Canadian House of Commons and on the BC Supreme Court. A "Conservative of the old school . . . gentlemanly . . . forgiving," he was considered somewhat shallow, shifting to any wind. His premiership of New Brunswick 1856-57 was tarnished by imperial influence, and his support of CONFEDERATION saw him abandon his colleagues for the Liberal S.L. TILLEY. He had however advocated union as early as 1849. His reward was the puisne judgeship of British Columbia's Supreme Court in 1873. Though resented by some in BC as an "empty-headed favourite," Gray's reputation as a jurist and arbitrator grew. He stood against the majority in his defence of the rights of the CHINESE, and became an expert on Canadian-American boundary negotiations.

CARL M. WALLACE

Gray, Joseph Alexander, physicist (b at Melbourne, Australia 7 Feb 1884; d at London, Eng 5 Mar 1966). After graduating from Melbourne U in 1907, Gray worked in Sir Ernest RUTHERFORD's laboratory in Manchester, Eng, concentrating on the study of the interaction of electrons and X rays with atoms. In 1912 he went to McGill to conduct further research. On the Western Front in WWI, he was in charge of locating enemy batteries by sound ranging. Awarded an OBE, Gray returned to McGill in 1919. From 1924 until his retirement in 1952, he was research professor at Queen's. His discoveries regarding the breadth of the energy spectrum of electrons and the scattering of X rays were important contributions to the development of the new theory of the atom. The Royal Society of London, to which he was appointed in 1932, credited his work as "clearly foreshadowing what is known as the Compton effect" (for which A.H. Compton received the Nobel Prize). He was elected to the RSC in 1922 and received the first gold medal of the Canadian Association of Physicists in 1956. YVES GINGRAS

Gray, Robert Hampton, aviator (b at Trail, BC 2 Nov 1917; d in Onagawa Wan, Honshu I, Japan 9 Aug 1944). During WWII he served aboard the RN aircraft carrier HMS *Formidable*. He was awarded the VICTORIA CROSS for a valiant dive-bombing attack on a Japanese destroyer. Though he was wounded and his aircraft was in flames, he sank the ship with a direct hit. He was killed when his plane crashed.

Gray Burial Site, N of Swift Current, Sask, lies on a sandy hillside to the W of an ancient glacial outwash channel. Excavations between 1970 and 1974 showed that it was used as a traditional burial ground by a small band of hunters who roamed the region between 3500 and 1000 BC. With a mobility based on the use of pack dogs, they followed the seasonal wandering of the bison herds. They supplemented their diet with berries, other mammals such as deer and pronghorn, and smaller animals including birds and their own dogs. During their seasonal travels they are thought to have accumulated the bones of their dead, returning periodically to the location of the Gray Site for formal burial ceremonies. The bones were interred in composite groups, including those of a number of children and one or more adult crania. The associated artifacts and the character of the burial remains reveal the antiquity of the ritual and ceremonialism that was typical of the Plains Indians of the historic period. *See also* ARCHAEOLOGY; PREHISTORY. JAMES F.V. MILLAR

Grayling, common name for freshwater FISHES of class Osteichthyes, family Salmonidae (SALMON), subfamily Thymallinae (sometimes elevated to family rank). Graylings are most easily identified by their very large dorsal fins. Arctic grayling (*Thymallus arcticus*), the only species in Canada, is one of 4 species widely distributed throughout the Northern Hemisphere. In Canada, it is confined to areas W of Hudson Bay, including northern portions of Manitoba, Saskatchewan, Alberta and BC, as well as YT and NWT, exclusive of the arctic islands. It also has a limited distribution in the Flathead R in southeastern BC and the Belly R in southeastern Alberta. Grayling occupy a wide variety of freshwater habitats but, although they sometimes enter brackish waters of coastal lagoons, they are generally intolerant of marine water.

Typically, adults spawn and young are reared in small, warm streams. They leave in fall to overwinter in larger streams or lakes or in the vicinity of perennial springs. Some populations are highly migratory, eg, some individuals of a population spawning in the upper reaches of the Donnelly R, NWT, overwinter in Great Bear Lk, over 350 km away. During the short northern summer, grayling feed voraciously on a wide variety of foods. They grow relatively rapidly until they reach maturity. Thereafter, growth slows as much of their energy intake is committed to reproduction. In the Far North, grayling sometimes live for 20 years. Grayling spawn in spring, often migrating under ice to reach spawning locations as early as possible. No nest is prepared. Eggs may fall among cracks between large rocks or the vigorous quivering of the spawning fish may deposit fine materials over them. Graylings are a prized sportfish, easily taken by fly-fishing or spinning gear, but are highly susceptible to overfishing. In some areas, populations have declined dramatically because of excessive angling. Although sometimes taken by native fishermen, grayling are not especially sought after. PETER J. MCCART



Arctic grayling (*Thymallus arcticus*) (*courtesy National Museum of Natural Sciences*).

Great Auk (*Pinguinus impennis*), largest and only flightless AUK, is now extinct. All auks are expert divers which swim underwater using their wings, but the great auk had flipperlike wings, too short for flight. It was the original penguin (true penguins are unrelated birds native to the Southern Hemisphere). Great auks bred in large colonies at a few offshore islands in low arctic and boreal waters of the N Atlantic, from the Bird Rocks in the Gulf of St Lawrence to northern Britain. They laid a single, large egg on bare rock and the breeding cycle was completed in about 7 weeks. Their pattern of incubation and chick-rearing may have resembled that of the RAZORBILL, their closest living relative. The main food was probably fish. In winter, birds ranged offshore from southern Greenland to southern Spain and Florida. They were especially numerous on the GRAND BANKS. The great auk was destroyed by man. Flightless, and colonial when breeding, it was heavily exploited by early explorers for fresh food, by fishermen for bait and, in the late 1700s, by commercial hunters for feathers. The largest and best-documented colony, on FUNK I, Nfld, had been destroyed by about 1800. The last, known breeding pair was collected (3 June 1844) on Eldey Rock off SW Iceland. D.N. NETTLESHIP

Great Awakening, New England-based movement of religious revivalism and evangelical pietism which came to Nova Scotia in 1775 with Henry ALLINE's decision to preach; it subsequently spread across the Maritimes. The religious currents which produced it were international and at least a century old. Evangelical pietism had begun among LUTHERANS in Germany at the close of the 17th century, spread to England to influence the growth of METHODISM, and contributed to a major religious outpouring in colonial America between 1720 and 1745. From New England, the centre of American revivalism and the source of most early British settlement in Nova Scotia, beliefs and experiences familiar to those acquainted with revival and pietism came to the Maritimes. But the Canadian Awakening was also an indigenous response to peculiarly local conditions. In their scattered wilderness settlements Maritimers teetered on the brink of economic disaster, and with the outbreak of the AMERICAN REVOLUTION — which the isolated settlers did not really understand — there was a crisis of identity which a movement emphasizing personal salvation could allay, if not resolve.

Alline was soon joined by others. Some, such as John Payzant, were converts through Alline's preachings, but others, such as William BLACK and his Methodist colleagues, apparently arrived at a similar point independently of Alline's "New Light" movement. Alline and his immediate followers accepted infant baptism, but many of those later involved rejected the concept as incompatible with the crisis conversion experience of being "born again." By the 1790s, when the movement had spread beyond NS into NB and PEI and even to the US, the main competition was between Methodists and BAPTISTS. The Great Awakening contributed to religious fragmentation in the Maritimes, and helped establish a regional inclination toward EVANGELICAL churches which remains characteristic. The revival never really ended, but ebbed and flowed throughout much of the 19th century as settlement spread. J.M. BUMSTED

Great Bear Lake, 31 153 km², elev 156 m, lies astride the Arctic Circle in the northwestern NWT, about 200 km S of the Arctic Ocean. It is the eighth-largest lake in the world, fourth in N America and the largest lying entirely within Canada. It is 320 km long, up to 175 km wide and very deep — 413 m at one point. Dotted with numerous small islands, it is shaped like a giant amoeba with 5 great arms — Keith, McVicar, McTavish, Dease and Smith — which meet in a common centre. Great Bear R (120 km) drains the cold waters SW to the MACKENZIE R at Ft Norman. A string of interconnected lakes to the S — Hottah, Hardisty, Rae, Faber — are drained by the Camsell R into Conjuror Bay. Great Bear Lk lies in a vast wilderness, with the S and W arms reaching into the tundra and the E shore lapping the hard rock edge of the Canadian SHIELD. The S and W shores are wooded, mostly with stunted spruce. The lake is icebound for 8 months of the year, often into July, and is served by tugs and steamers when free.

Europeans only slowly became aware of the location and immensity of the lake. Peter POND learned of its general location in 1783-84, and the FUR TRADE came to the area around 1800. Sir John FRANKLIN's expedition established Ft Franklin on Keith Arm 1825-26, while John Richardson surveyed the N shore. P.W. DEASE



Great Bear Lake, NWT, the largest lake lying entirely in Canada and the 8th-largest lake in the world. Port Radium (now Echo Bay) is shown (*photo by John de Visser*).

spent the winter of 1837-38 at Ft Confidence, and a geological survey was carried out by Robert BELL 1900. Settlement was transient until pitchblende (an ore containing radium and uranium) was discovered in 1929, and Port Radium (now Echo Bay) was established at the E end of McTavish Arm 1933. Exploration and servicing were made possible by BUSH FLYING. Some of the ore used to make the atomic bombs used by the US in WWII was mined here. Exhaustive mining depleted the reserves and the mines have been abandoned. The lake is well stocked with fish, including relic species thought to have moved S from the Arctic Ocean ahead of the glaciers. Commercial fishing is not allowed because of the slow regeneration of the fish in the ice-cold water. The lake's name, adopted 1902, likely refers to the bears in the area and to the size of the lake. A more poetic explanation is that it was named for the northern constellation of stars, called Great Bear, which is reflected in its waters. JAMES MARSH



Great Coalition The politics of the PROVINCE OF CANADA in the early 1860s were marked by instability and deadlock. The external dangers posed by the AMERICAN CIVIL WAR combined with a legislative impasse to make drastic action necessary. The Union of the Canadas had clearly failed, and its political leaders were ready to forget old political feuds to create a new political order. REFORM MOVEMENT leader George BROWN proposed that a parliamentary committee with members from all groups investigate how the impasse might be broken. This committee quickly concluded that the best solution was confederation of BRITISH NORTH AMERICA or the federal union of the Canadas. Brown quickly responded to the report by joining a coalition with the Conservatives with the intention of creating a new union. Thus the Great Coalition was formed under the leadership of Brown, George-Étienne CARTIER and, above all, John A. MACDONALD. The broadly based coalition was remarkably successful in meeting its major aims: the ending of political deadlock and the creation of a new political entity. It remained largely intact as the government of the Province of Canada until CONFEDERATION. JOHN ENGLISH

Great Depression Few countries were affected as severely as Canada by the worldwide Depression of the 1930s. It is estimated that between 1929 and 1933 Gross National Expenditure declined by 42%, 30% of the LABOUR FORCE was unemployed, and 1 in 5 Canadians became dependent upon government relief for survival. Until WWII the UNEMPLOYMENT rate never declined below 12%. The Depression's severity was aggravated by its uneven impact, a rudimentary social-welfare structure and misguided government policy. Because 33% of its Gross National Income derived from exports, Canada was particularly affected by the collapse in world trade. The 4 western provinces, which depended almost exclusively on primary-product exports, were the most affected. In Saskatchewan, plagued by crop failures and the lowest price for wheat in recorded history, total provincial income plummeted by 90% within 2 years, forcing 66% of the rural population onto relief. The other western provinces were technically bankrupt from 1932 onwards. Although Ontario and Québec experienced heavy unemployment, they were less severely afflicted because of their more diversified industrial economies, which produced for the protected domestic market. The Maritimes had entered into severe economic decline in the 1920s and had less distance to fall.

The burden of the Depression was also unequally distributed between classes. Although wages dropped throughout the 1930s, prices declined even faster. As a result, the standard of living of property owners and those with jobs increased. Farmers, young people, small businessmen and the unemployed bore the brunt of economic hardship.

Demographic changes were a revealing index of hardship. POPULATION growth throughout the 1930s reached the lowest point since the 1880s through a combination of plummeting IMMIGRATION and birthrates. The number of immigrants accepted into Canada dropped from 169 000 in 1929 to fewer than 12 000 by 1935 and never rose above 17 000 for the remainder of the decade. During that time European JEWS fleeing Nazi Germany were denied a sanctuary in Canada (*see* REFUGEES). The number of Canada's deportations, however, rose from fewer than 2000 in 1929 to more than 7600 just 3 years later. Almost 30 000 immigrants were forcibly returned to their countries of origin over the course of the decade, primarily because of illness or unemployment.

Canada's birthrate dropped from 13.1 live births per 1000 in 1930 to only 9.7 by 1937, the lowest ratio until the 1960s. During the 1930s, 50 years of urbanizing momentum were reversed as Canada's rural population (outside of Saskatchewan) grew more rapidly than its urban population. For many of the unemployed "going back to the land" was preferable to a miserable existence on urban relief.

With almost 33% of its gainfully employed still engaged in agriculture in 1931, Canada did not have an adequate system of dispensing welfare to the jobless. Although unemployment was a national problem, federal administrations led by the Conservative R.B. BENNETT (1930-35) and the Liberal W.L. Mackenzie KING (1935-40) refused, for the most part, to provide work for the jobless and insisted that their care was primarily a local and provincial responsibility. The result was fiscal collapse for the 4 western provinces and hundreds of municipalities and haphazard, degrading standards of care for the jobless. Monthly relief rates for a family of 5 varied from $60 in Calgary to $19 in Halifax. Although there were no official accounts of starvation, reports by medical authorities of scurvy and other diet deficiency diseases were common throughout the decade. Because local governments refused to aid single, homeless men, between 1932 and 1936 the federal government established UNEMPLOYMENT RELIEF CAMPS. Run by the Dept of Defence, the camps paid the men 20 cents a day for construction work in the bush. In 1935 a protest against conditions in the camps culminated in the Regina Riot — the most violent episode of the 1930s, in which one policeman was killed, dozens of men were injured and 130 arrested (*see* ON TO OTTAWA TREK).

The Depression altered established perceptions of the economy and role of the STATE. The faith shared by both the Bennett and King governments and most economists that a balanced budget, a sound dollar and changes in the tariff would allow the private marketplace to bring about recovery was misplaced. The Depression spawned a variety of political reform movements, particularly at the provincial level, which advocated the use of the state to initiate recovery. The reforms included the inflationary SOCIAL CREDIT theories of Alberta premier William ABERHART, the "Work and Wages" program of BC premier Thomas PATTULLO, and the democratic socialism of J.S. WOODSWORTH and the CO-OPERATIVE COMMONWEALTH FEDERATION. The UNION NATIONALE in Québec, led by Maurice DUPLESSIS, H.H. Stevens's Reconstruction Party and the New Democracy movement of W.D. Herridge were also spawned by the Depression. The COMMUNIST PARTY OF CANADA was virtually outlawed from 1931 (when 9 of its leaders were arrested and convicted under s98 of the Criminal Code for being members of an "unlawful association") until 1936, and banned when war was declared in 1939, although affiliated groups such as the Workers' Unity League, the Relief Camp Workers Union and the National Unemployed Workers Association played a significant role in organizing the unskilled and the unemployed in protest marches and demonstrations.

Although the national impact of these organizations was minimal, the Depression did ultimately result in an expansion of state responsibility for the economy and for social welfare. In 1934 Bennett's government created the BANK OF CANADA to regulate MONETARY POLICY; in 1935 the CANADIAN WHEAT BOARD was established to market and establish a minimum floor price for wheat; and in 1940 the federal government assumed responsibility for the unemployed by introducing a national UNEMPLOYMENT INSURANCE scheme and employment service. The Depression also legitimized the economic theories of British economist John Maynard Keynes, who argued that, if private investment failed to produce full employment, the state must initiate



Prairie drought deepened the Depression in the western provinces. Saskatchewan's provincial income plummeted by 90% in 2 years, forcing two-thirds of the rural population onto relief (*courtesy Saskatchewan Wheat Pool*).

public investment through deficit spending to create jobs. Keynes's ideas influenced the National Employment Commission report (1938) and the report of the Royal Commission on DOMINION-PROVINCIAL RELATIONS (1941). The latter was important in generating the idea of EQUALIZATION PAYMENTS. Not until war broke out in 1939, however, did KEYNESIAN ECONOMICS become a deliberate part of government policy, and it was the massive state expenditures necessitated by the war that finally reduced unemployment to minimal levels by 1942. *See also* HISTORY SINCE CONFEDERATION; BUSINESS CYCLES; BENNETT'S NEW DEAL.

JAMES STRUTHERS

Reading: J.L. Granatstein et al, *Twentieth Century Canada* (1983); M. Horn, ed, *The Dirty Thirties: Canadians in the Great Depression* (1972); H.B. Neatby, *The Politics of Chaos: Canada in the Thirties* (1972); B. Palmer, *Working-Class Experience: The Rise and Reconstitution of Canadian Labour 1800-1980* (1983); James Struthers, *No Fault of Their Own: Unemployment and the Welfare State, 1914-1941* (1984).

Great Divide Trail is a long-distance hiking trail, paralleling where possible the CONTINENTAL DIVIDE of Canada's Rocky Mt range. Some 560 km of the trail lies within the boundaries of Banff, Kootenay, Yoho and Jasper national parks, extending from Palliser Pass in the S to Mt ROBSON in the N. A series of high alpine trails combine to form a "Great Divide Route" which, if followed in its entirety, brings the hiker to elevations of just below 3000 m and gives a perspective of the entire Rockies landscape. In the mid-1970s the Great Divide Trail Assn of Calgary began work to designate and extend the trail S from Banff National Pk along the BC-Alberta border to Waterton Lks National Pk. This section would follow some of the most spectacular scenery of the southern Rockies, adding about 700 km to the overall trail length and making the trail the longest hiking trail in Canada.

BART DEEG

Great Lakes are the largest group in a chain of large lakes (including Winnipeg, Athabasca, Great Slave and Great Bear) that lies along the southern boundary of the Canadian SHIELD. From W to E the Great Lakes comprise Lakes SUPERIOR, Michigan (entirely in the US), HURON, ST CLAIR, ERIE and ONTARIO. They have a total area of approximately 246 050 km^2 and drop from 183 m above sea level at Lk Superior to 75 m at Lk Ontario — the most dramatic drop occurring at NIAGARA FALLS (51 m). After withdrawal of the Paleozoic seas, which had spread across most of the continent, there is little record of geological events in the Great Lks area between the end of the Pennsylvanian and late Tertiary periods. Although broad river valleys likely crossed the area, remnants of Tertiary erosion surfaces in Illinois and Wisconsin cannot be traced across the Great Lks, and reconstructions of preglacial drainage are uncertain. The Great Lks lie near the intersection of the Hudson Bay, Mississippi R and St Lawrence R drainage basins; because of progressive headwater capture by the Mississippi, that watershed now lies only about 10 km from parts of the southern shores of Lks Erie and Michigan, and only about 20 km from the western end of Lk Superior. Postglacial isostatic uplift, along a generally NW-SE hinge line, continues to raise the northern shorelines of the Great Lks by about 0.4 m per century, relative to the southern shores of Lks Erie and Michigan.

The Great Lks occupy bedrock depressions that have been differentially eroded by glacial ice, and their form and location are largely controlled by structural geology. The arcuate forms of Lks Huron and Michigan have developed around the periphery of the Michigan structural basin, and the more resistant Silurian limestones and dolomites (NIAGARA ESCARPMENT) separate GEORGIAN BAY and Green Bay from the main lakes. The form of Lk Superior is largely controlled by Precambrian geology; that of Lks Erie and Ontario by trends in the underlying Appalachian geosyncline.

During the last glacial period (which lasted more than a million years) there were 4 glacial stages and, with each, the lake basins were progressively enlarged. Towards the end of the last glaciation (Wisconsin), lakes formed in front of retreating ice margins, first in the Erie and Michigan basins, and drained S to the Mississippi more than 14 000 years ago. Subsequently, a lake formed in the southern part of the Huron basin and drainage between Erie, Huron and Michigan was linked. There was also an outlet to the Hudson R (S of the Ontario basin). The Ontario basin became ice-free about 12 000 years ago; Lk Superior and Georgian Bay later. The presence of ice margins caused many early lakes to form at very high levels. At one time, a single huge lake covered much of the upper Great Lks area (Superior, Michigan and Huron). As the ice melted away from the natural outlets, lake levels often dropped quickly and to extremely low levels, for example, about a 150 m drop in the Ontario basin, with the opening of the St Lawrence Valley (12 000-11 500 years ago). As a result of continued uplift during the past 10 000 years, upper lakes drainage was fully transferred (through Lks St Clair and Erie) to Lk Ontario only 4000-5000 years ago, when the Chicago outlet (Lk Michigan) closed.

The Great Lakes have, since the days of the early FUR TRADE, provided an important transportation route to the interior of the continent, and with the opening of the ST LAWRENCE SEAWAY (1959) they became a truly international waterway.

P.G. SLY

Great Lone Land: A Narrative of Travel and Adventure in the North-West of America, The, by William Francis BUTLER, appeared 1872 in London. Butler's accounts of his adventures are the most poetic and the most personable of the 19th-century Canadian travel narratives. His lyrical descriptions of landscape, climate and seasonal change testify to his deep admiration for the sheer, unpopulated expanse and beauty of the Canadian West. Sent by the English in 1870 to gather intelligence about the RED RIVER REBELLION, Butler actually met with Louis Riel at Ft Garry; his description of the encounter remains one of the most vivid portraits of Riel in our literature. *The Great Lone Land* was reprinted (Edmonton, 1968) with an introduction by Edward McCourt.

NEIL BESNER

Great Slave Lake, 28 570 km^2, elev 156 m, fifth-largest lake in N America, tenth in the world, located in S-central NWT. It was named by Samuel HEARNE after the SLAVEY Indians. Great Slave, along with GREAT BEAR, ATHABASCA and a tangled chain of lakes between, are remnants of a single postglacial pool. Its S and E shores cut into the granite edge of the Canadian SHIELD; to the N and W lie the Barren Lands. Cold, very deep (614 m) and frozen 8 months of the year, Great Slave is a vast reservoir for numerous rivers and streams which spill over the crest of the Shield. Among these are the Yellowknife, Snare, Emile, Beaulieu, Snowdrift, Taltson, and HAY; the Slave R carries the waters of the PEACE R past thick forest into the flat, grassy marshes of the delta on the S shore of the lake. The great MACKENZIE R issues from the extreme W end. Alexander MACKENZIE found the outlet in 1789, but the lake was first crossed by Hearne in the winter of 1771.

The CHIPEWYAN of the area carried furs to Hudson Bay as early as the 1730s, and the fur trade dominated the economy almost to WWII. The earliest settlements in the area were HBC posts: FORT RESOLUTION, Fort Rae (now RAE-EDZO), FORT PROVIDENCE and FORT RELIANCE. Robert BELL conducted the first survey (1899) and described the area's mineral potential. Klondike-bound travellers prospected in the area, but the gold rush came in 1934, when gold was discovered in the volcanic rock W of Yellowknife B. Next year the town of YELLOWKNIFE was established. The min-





Cold and deep, and frozen 8 months of the year, Great Slave Lake is the 2nd-largest lake lying entirely in Canada and the 10th-largest lake in the world (*photo by Hälle Flygare*).

ing of the huge lead-zinc deposits SW of the lake began 1964 after completion of the Great Slave Lake Ry to HAY RIVER and PINE POINT and the construction of a hydroelectric plant on Taltson R. A prosperous commercial fishery centered on Hay River dates from 1945; the chief catches are whitefish and lake trout. The all-weather Mackenzie Hwy, built to Hay River 1945 and to Yellowknife 1960, was constructed primarily to serve the fishery but also reaches communities hitherto isolated by the winter freeze. Great Slave has long been part of the Peace-Mackenzie waterway, and tugs and barges still ply the lake, though it is susceptible to savage storms.

JAMES MARSH

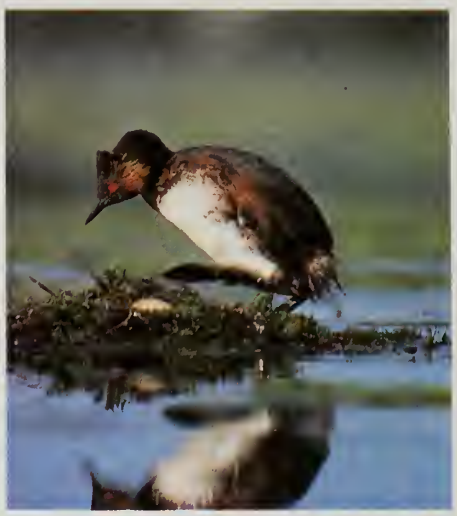
Great Western Railway The London and Gore Railroad Co, incorporated 6 May 1834, changed its name to the Great Western Rail Road Co in 1845 and to the Great Western Railway in 1853. Promoted by lawyer-politician Allan Napier MACNAB and more significantly by Hamilton merchants Isaac and Peter Buchanan, R.W. Harris and John Young, and aided by government guarantees, the road attracted sufficient American and British capital to open its main line (Niagara Falls-Hamilton-London-Windsor) in Jan 1854. By 1882 it operated about 1280 km of track throughout SW Ontario and 288 km in Michigan.

Under Charles John Brydges's aggressive management, the road enjoyed initial financial success, but following the depression of 1857 it reaped the fruits of careless construction, rapid expansion, increased local competition and protracted internal managerial conflict. While the railway helped to stimulate and integrate the local economy, it also relied for 40-60% of its gross revenue on through American traffic between New York and Michigan states. As American competitors consolidated lines, through rates fell and the Great Western and its chief local rival, the GRAND TRUNK RAILWAY, suffered. In 1882, after decades of disastrous competition, the 2 railways merged forces in order to compete more effectively with rival American railways.

PETER BASKERVILLE

Grebe, common name for members of the family Podicipedidae, aquatic BIRDS with almost worldwide distribution. Grebes have pointed bills and very short tails. Adults are black, grey or reddish above, white below. Grebes use their feet and wings to propel themselves under water where all species obtain most of their food. Their legs, lobed toes and nails are flattened for efficient use under water, but because the legs are set far back under the body, movement on land is difficult. Wings are small and flight inefficient; some species found outside Canada are flightless. About 20 species are known, including the recently described hooded grebe (*Podiceps gallardoi*), discovered in 1974 in southern Argentina. Five species occur in Canada: pied-billed, horned, red-necked, eared and western grebes (*Podilymbus podiceps, Podiceps auritus, Podiceps grisegena, P. podiceps nigricollis* and *Aechmophorus occidentalis*, respectively). Grebes spend most of their lives in the water and build nests with aquatic vegetation. These nests float, anchored to emergent water plants, or are built up from the bottom of a pond or lake. They are usually surrounded by water plants protecting them from waves and predators. Some species nest in large colonies; others are solitary, nesting as isolated pairs. Courtship behaviour involves complex vocal and visual displays. In Canada clutches contain 3-7 eggs (range 1-10). Parents take turns incubating. Both adults care for young, which leave the nest sometimes within minutes of hatching. Hatchlings ride on their parents' backs; after 1 or 2 weeks chicks swim by themselves. Canadian grebes range in size from the 287 g eared grebe to the 1.5 kg western grebe. Larger grebes eat mostly fish; smaller ones generally eat insects, crustaceans, snails and small fish. In Canada they nest from NS and PEI to central BC, and N along the TREELINE to the YT and western NWT. Grebes migrate at night, wintering in salt water along both coasts of N America and also in fresh water in the US. Grebes are thought to be most closely related to LOONS.

SPENCER SEALY



Five species of grebe occur in Canada, including the eared grebe (*P. podiceps nigricollis*), nesting as far north as the treeline in the YT and western NWT (*photo by Tim Fitzharris*).

Greeks Greek immigration to Canada began early in the 19th century. Greeks from the islands (eg, Crete, Syros and Skopelos) and from the Peloponessus, especially the poor villages of the provinces of Arcadia and Laconia, settled in Montréal as early as 1843. However, in 1871 only 39 persons of Greek origin were known to be living in Canada. Greek immigration, sporadic prior to 1900, increased considerably in the early 20th century as a result of poverty, wars and political upheavals at home. By 1981 there were over 250 000 people of Greek origin in Canada.

Migration and Settlement In 1901, 213 Greek immigrants resided throughout Canada; in 1911 the number was 2640; in 1931, 5580 and in 1941, 5871. Immigration was halted during WWII, but from 1946 to 1981 about 116 300 Greek immigrants entered Canada. By 1981, 80% of Greek Canadians lived in the cities of Montréal, Toronto and Vancouver, many in patterns of residential clustering.

Economic Life Generally the pre-WWII immigrants had little formal education, yet some of them are now among the wealthiest members of the Greek community, in which they are very active. The Canadian-born Greeks tend to include many professionals and entrepreneurs. Immigrant entrepreneurs (post-WWII) are actively involved in the restaurant business, the fur business, fruit and grocery wholesale and retail firms, theatres, etc. The majority of postwar immigrants, however, have been skilled and unskilled workers who worked in various industries.

Social and Cultural Life Since the early 1900s Greek Canadians have organized themselves into ethnic communities centered on the Greek ORTHODOX CHURCH and various ethnic associations. The establishment of the first Greek churches in Montréal (1906) and in Toronto (1909) signified the beginning of Greek ethnoreligious communities in Canada. Approximately 95% of Greek Canadians belong to the Greek Orthodox Church, headquartered in Toronto. The church has contributed significantly to the preservation of Greek identity through the use of the Greek language in religious services and through its devotion to Greek ideals. The leader is the Metropolitan Bishop of Canada, through whom the church is associated with the Greek Orthodox diocese of N and S America. Greek organizations include the American Hellenic Educational and Progressive Association (AHEPA) introduced into Canada in 1928, the Greek Orthodox Youth of America, and many regional philanthropic and social societies which were established to help newcomers and the regions from which they emigrated, and to promote understanding of Greek culture.

Several Greek Canadian newspapers, eg, *Hellenikon vema* (*Hellenic Tribune*), have helped Greeks integrate into Canadian life while keeping them informed of events in Greece. Customs and traditions include celebrations of Greek national holidays (particularly March 25, Greek Independence Day), religious festivities and holidays, as well as annual dances and picnics.

Group Maintenance The Greek family plays an important role in teaching children the Greek language and values, and providing them with some sense of identity with Greek culture. Overall, Greek immigrants are not highly integrated into Canadian society, because of low academic attainment in the homeland, short length of residence in Canada, and unfavourable employment conditions for many new immigrants in the early years. This situation is likely to change, however, as the second and third generations of Greek Canadians take their place in Canadian society.

PETER D. CHIMBOS

Reading: Peter D. Chimbos, *The Canadian Odyssey: The Greek Experience in Canada* (1980); George Vlassis, *The Greeks in Canada* (1953).

Green, Blankstein, Russell (GBR) Prominent architectural firm in Winnipeg, founded 1932 by J. Green (1899-1969) and C.M. Blankstein (b 1908), who were joined 1934 by G.L. Russell (1901-77) and R.C. Ham (d 1940). All were graduates of the School (later Faculty) of Architecture at University of Manitoba. In the 1930s the firm's most notable work was a series of housing proposals for the city of Winnipeg that eventually bore fruit with the design of Wildwood Park 1946. Based on the plan of Radburn, NJ, it was the first residential garden suburb on the Prairies. The 1950s saw GBR do buildings at U of Manitoba, the Winnipeg Post Office, Norquay office building, and Polo Park Shopping Centre. In the next decade it won competitions for Winnipeg's city hall and international airport. Throughout 3 decades GBR helped bring modernist architecture to Manitoba.

WILLIAM PAUL THOMPSON

Green, Howard Charles, lawyer, politician (b at Kaslo, BC 5 Nov 1895). Appointed minister of public works in the first DIEFENBAKER government, Green assumed the Dept of External Affairs portfolio in 1959 after Sidney SMITH's

sudden death. Green was a strong supporter of the COMMONWEALTH, a position he shared with his prime minister. During his tenure in external affairs, Green was an advocate of nuclear disarmament and sponsored UN resolutions that furthered that goal. He took an active role for Canada in various international discussions that contributed to a higher profile internationally. First elected to the House in 1935, Green served until his defeat in the 1963 general election. PATRICIA WILLIAMS

Green Fishery, the COD fishery carried out in Newfoundland and Labrador in which the product is preserved in salt on board the fishing ship to be dried later. The green fishery was undertaken by fishermen on fishing grounds too far from suitable or convenient land sites where the fish could be dried. It required the use of much more salt than did the DRY FISHERY, but it had the advantages of less handling time during the fishing season and less dependence on variable curing weather near the fishing grounds. The green fishery made ships less dependent on shore facilities and therefore was not tied to one geographical area (*see* FISHERIES HISTORY). ROBERT D. PITT

Green Paper, a statement by the government, not of policy already determined, but of propositions put before the whole nation for discussion. Like a WHITE PAPER it is an official document sponsored by the Crown. It is produced early in the policymaking process, while ministerial proposals are still being formulated. Many so-called White Papers in Canada have been, in effect, Green Papers, while at least one Green Paper — that on immigration and population in 1975 — was released for public debate after the government had already drafted legislation. C.E.S. FRANKS

Greene, Daniel Joseph, lawyer, politician (b at St John's 1850; d there 12 Dec 1911). He became prime minister of Newfoundland 13 Dec 1894 in the wake of the legal and political turmoil surrounding the 1893 elections. Educated in law at Laval, he began his 22-year political career in 1875, became leader of the Opposition in 1887 and in 1890 was part of a delegation to Ottawa protesting French fishing rights in Newfoundland (*see* FRENCH SHORE). Greene's most pressing problems upon succeeding Augustus GOODRIDGE's brief Conservative administration were the consequences of the collapse of 2 major Newfoundland financial institutions on Dec 10, but the most significant legislation passed during his 58-day tenure was the Disabilities Removal Act. This allowed candidates who had been disqualified because of election irregularities in 1893 to seek election again. This Act, and Greene's resignation on 8 Feb 1895, allowed William WHITEWAY to resume the prime ministership. ROBERT D. PITT

Greene, Lorne Hyman entertainer (b at Ottawa 12 Feb 1915). While taking chemical engineering at Queen's, he became involved in amateur theatrics and after graduation spent 2 years in New York studying drama. Settling in Toronto, he became active in radio, eventually as chief news broadcaster for the CBC 1939-42. Following service in WWII, he returned to radio in Toronto, was co-founder of the Jupiter Theatre there and established and taught at the Academy of Radio Arts. In 1953, like many of his talented contemporaries, he headed south and for 5 years appeared in Broadway plays. Then for 14 years, beginning in 1959, he was Ben Cartwright on the highly successful TV series "Bonanza." Thereafter, he continued to appear on television, including stints in several other series. In the 1980s his energy has mainly been directed at wildlife and environment preservation, notably through his television series "Lorne Greene's New Wilderness." CHARLES DOUGALL

Greene, Nancy, alpine skier (b at Ottawa 11 May 1943). Raised in Rossland, BC, she only began serious racing at age 14. Outstanding ability led to her selection to the 1960 Olympic team after only 2 years of racing. Finishing twenty-second in the Olympic giant slalom, she became determined to match her roommate Anne HEGGTVEIT's victory. During the early 1960s she had several major US and European victories, but was inconsistent. Her aggressive style caused several injuries, including torn ligaments in the 1966 world championships. Resolving to try for more control she achieved remarkable results, concluding the 1967 season with 3 straight victories to win the World Cup. In 1968 she continued her domination of the sport, winning an Olympic gold medal in the giant slalom, a silver in the slalom, and 9 straight victories to clinch her second World Cup. She was Canada's Athlete of the Year in 1968. MURRAY SHAW



Nancy Greene dominated World Cup skiing in 1967 and 1968, culminating in Olympic gold and silver medals and 9 straight victories to clinch her second World Cup in 1968 (*courtesy Canada's Sports Hall of Fame*).

Greenfield, Herbert, farmer, politician, businessman, premier of Alberta 1921-25 (b at Winchester, Eng 25 Nov 1867; d at Calgary 23 Aug 1949). Greenfield migrated to Canada in 1892 and established a homestead N of Edmonton in 1906. By 1921 he was president of the Alberta Assn of Municipal Districts and an interim VP of the UNITED FARMERS OF ALBERTA. Though not initially a candidate when the UFA entered the 1921 provincial election campaign, he was asked to accept the position of premier after it was refused by Henry Wise WOOD. Sworn in as premier, provincial secretary and provincial treasurer on 13 Aug 1921, Greenfield led the novice UFA government in its response to drought and credit problems of Alberta farmers and its assistance in establishing a voluntary wheat pool and other commodity marketing pools. Often ill and absent during 1923, and increasingly regarded as ineffective thereafter (although he maintained his personal popularity), Greenfield resigned on 23 Nov 1925 in favour of John Edward BROWNLEE. CARL BETKE

Greenhouse Crops The cultivation of greenhouse crops is the most intensive form of agricultural production. Investment and labour costs are greater in this sector than in any other; however, the yield and value of crops are correspondingly high. The greenhouse essentially provides a controlled climate which, in adverse conditions, may be adapted to the needs of particular crops. For example, in northern countries such as Canada, where outdoor cultivation is possible for only about 5 months of the year, greenhouses provide a temperature-controlled environment which also shelters plants from heavy rain, strong winds, insects and other pests. Although greenhouses are used by amateur gardeners and by training and research institutions, highly specialized growers of ORNAMENTAL plants and MARKET-GARDEN produce form the most important group in Canada's greenhouse-crop industry. The overall objective of this industry is to provide Canadian consumers with fresh produce for as much of the year as possible.

The major producers of greenhouse crops are located in Ontario, Québec and BC, which had 2 500 088 m^2, 458 176 m^2 and 436 182 m^2, respectively, of greenhouse space in 1983. About 60% of the Canadian greenhouse industry is located in Ontario, the largest production centre being Leamington, Essex County; Kent County is also very important. Both regions are at the most southerly point of Canada and have favourable climates. In other provinces, the major production areas are located near large cities (eg, Montréal, Vancouver). Although over 60% of the total greenhouse area in Canada is devoted to market produce (tomatoes, cucumbers, etc), the market value of greenhouse-grown ornamentals is generally 4 or 5 times greater, and was worth over $226 million in 1983. Tomatoes represent over half of vegetable sales; cucumbers, over 40%. The major species of greenhouse-grown FLOWERS are ROSES and chrysanthemums; green-leaved tropical plants are also popular. The major challenge for the greenhouse sector in future is to maintain industry profits by reducing energy costs and increasing production. A great deal of engineering and horticultural research is devoted to ensuring the survival of one of the most important sectors of Canada's horticulture system. MARC J. TRUDEL

Greenpeace, originated in Vancouver (1970) as a small group opposed to nuclear testing in the Pacific, and has blossomed into one of the largest and best-known environmental organizations in the world, addressing itself to a wide range of international and local issues. Through nonviolent confrontation it attempts to draw attention to violations of ecological principles, such as the equal rights of all species to exist and flourish. No longer based in Canada, Greenpeace maintains relatively autonomous offices throughout the world, co-ordinated by the Greenpeace Council in Amsterdam. Total membership is difficult to estimate as it fluctuates according to interest in current issues, but over $2 million is raised yearly in N America alone through membership fees, donations and the sale of promotional items.

In the hope that public pressure will help change policies, Greenpeace aims for maximum publicity for its activities. In its most publicized campaigns, against nuclear testing and SEALING and WHALING policies, the environmentalists have intervened directly and exposed themselves to risk. The success of such tactics is difficult to measure, but certainly Greenpeace has brought various issues to public attention. The public's response to Greenpeace has varied widely from apparently almost unanimous support of antinuclear testing campaigns to very strong opposition to some of the tactics the group employs, often on more local issues. P. DEARDEN

Reading: R. Hunter, *Warriors of the Rainbow* (1979).

Greenstone, general term for dark green, compact metamorphic rocks formed by the alteration of dark-coloured IGNEOUS ROCKS. Basalt, a common example, is a major component of the greenstone belts of the Canadian SHIELD. These belts contain the Shield's principal gold and base-metal mines. The term greenstone is also used for green ornamental materials used for

sculpture and gems, such as nephrite jade, serpentine, fuchsite (a chrome-mica rock) and chlorastrolite (a tortoiseshell-like GEMSTONE composed of pumpellyite needles). *See* INUIT ART.

ANN P. SABINA

Greenway, Thomas, merchant, farmer, land speculator, politician, premier of Manitoba (b at Kilhampton, Eng 25 Mar 1838; d at Ottawa 30 Oct 1908). Instrumental in the formation of the Liberal Party of Manitoba, Greenway was its first leader and premier of Manitoba 1888-1900. In 1844 the Greenways immigrated to Huron County, Canada W. Thomas eventually became an independent supporter of Sir John A. MACDONALD's Liberal-Conservative Party and MP for South Huron, 1875-78. However, he broke with Macdonald on the NATIONAL POLICY tariff and became a Liberal. In 1879 he moved to Manitoba and was elected MLA that year; by 1882 he led a provincial rights opposition which became the Liberal Party. As premier he ended federal disallowance of Manitoba railway legislation and the CPR monopoly, bringing the Northern Pacific into the province to induce competition in freight rates. He is remembered, however, for the elimination of minority educational rights for Roman Catholics; the MANITOBA SCHOOLS QUESTION dominated provincial and federal politics during his years as premier. He remained leader of the provincial Liberals until his election as MP for Lisgar in 1904.

DAVID HALL

Greenwich, Sonny, né Herbert Lawrence Greenidge, guitarist (b at Hamilton, Ont 1 Jan 1936). This most intriguing of Canada's jazzmen has divided his life between musical and spiritual pursuits, thus turning away from a potentially major career. Emulating jazz saxophonists, he developed a highly personal music and original guitar style, which left him working largely in isolation. He has performed only sporadically, beginning *c*1958 with small ensembles in Toronto and Montréal and reaching a wider audience through brief liaisons with other musicians (eg, John Handy, 1966-67) and through his 1970s recordings, *The Old Man and the Child, Sun Song* and *Evol-ution, Love's Reverse.*

MARK MILLER

Reading: Mark Miller, *Jazz in Canada: Fourteen Lives* (1982).

Grenfell, Sir Wilfred Thomason, medical missionary (b at Parkgate, Eng 28 Feb 1865; d at Charlotte, Vt 9 Oct 1940). Grenfell entered the London Medical School in 1883 and 2 years later was converted to active Christianity at a tent meeting of American evangelist Dwight L. Moody. In 1888 he followed the suggestion of one of his teachers, Sir Frederick Treves, that he join the National Mission for Deep-Sea Fishermen. He was made superintendent in 1889 and for 3 months in 1892, at the mission's request, cruised the Newfoundland and Labrador coast where 30 000 stationers, 3300 "livyers" (permanent settlers) and 1700 Inuit received only an annual visit from one government doctor. Grenfell treated 900 patients and saw a great opportunity for medical and missionary work. He raised funds to open the first hospital at Battle Harbour in 1893. Grenfell was a forceful speaker and easily gained the friendship of influential men. His medical mission grew rapidly with hospital, orphanage and nursing stations and the first co-operatives in Newfoundland. Grenfell did not winter in the North until 1899 and spent comparatively few winters there, establishing his headquarters at ST ANTHONY, Nfld. A prolific writer and forceful publicist, he often used artistic licence in accounts of life on the northern coasts. His main financial support came from the US. In 1909 he married a Chicago heiress, Anne MacClanahan, who took him away from life on the coast. Growing friction with the mission eventually led to a split, and the International Grenfell Assn was incorporated in 1912. The practical medical work of the IGA was carried on by dedicated if autocratic doctors, while Grenfell himself became increasingly involved in fund raising. He was made CMG in 1906 and KCMG in 1927, the year in which he retired to Vermont. Famous in his lifetime, he is now largely forgotten; his papers are in the Yale medical history library.

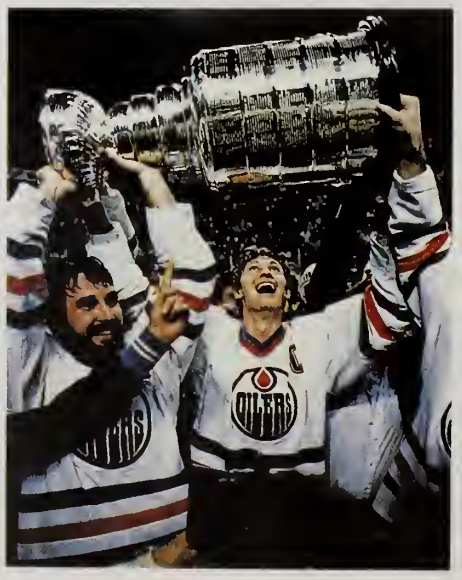


Wilfred T. Grenfell opened the first hospital at Battle Harbour (1893), and with funds raised around the world he built further hospitals, an orphanage and nursing stations to serve the people of the Newfoundland and Labrador coasts (*courtesy Public Archives of Canada/C-68717*).

TERENCE MACARTNEY-FILGATE

Gretzky, Wayne, hockey player (b at Brantford, Ont 26 Jan 1961). He was a hockey prodigy who, with his father's guidance, mastered the skills of the sport on a backyard rink. He played junior hockey for Sault Ste Marie Greyhounds and in 1978 turned professional with WHL Indianapolis Racers and EDMONTON OILERS. At age 17 he was the youngest athlete playing a major-league sport in N America. He tied for the scoring lead in Edmonton's first season in the NHL (1979-80), won the HART TROPHY as the league's "most valuable player" and the LADY BYNG TROPHY, and began an assault on scoring records that is likely unprecedented in any sport. In his second NHL season (1980-81) he scored 164 points, breaking Phil ESPOSITO's single season record of 152 points and surpassing Bobby ORR's assist record of 102 with 109. The following year he scored 212 points, including 92 goals — shattering Esposito's previous record of 76 goals. He has won the Hart Trophy in all 5 of his NHL seasons, the ART ROSS TROPHY 4 times, and at the end of the 1983-84 season he held 34 individual records, including a consecutive-game point streak of 51 games (1983-84). After only 5 NHL seasons, Gretzky's 356 goals, 558 assists and 914 points placed him 21st among the all-time career point leaders and 5th among active players.

Captain Wayne Gretzky holds aloft the Edmonton Oilers' first Stanley Cup, 1984 (*photo by Mike Pinder/Edmonton Journal*).



Gretzky is an agile skater, accurate shooter and undoubtedly the greatest passer in hockey history. But it is his instinctive grasp of the flow of play — his sense of how opposing players and teammates will react to each situation — that makes him such a creative player. His personal charm as well as his scoring feats have endeared him to the N American sporting public.

JAMES MARSH

Grey, Albert Henry George Grey, 4th Earl, governor general of Canada, 1904-1911 (b at St James's Palace, London, Eng 28 Nov 1851; d at Howick, Eng 29 Aug 1917). A keen imperialist Grey saw his appointment as governor general as an opportunity to forge stronger links of empire. In public speeches in Canada he tried to foster imperial pride and in private he urged PM Wilfrid LAURIER to respond favourably to proposals for closer defence ties. He devoted much of his time to Canadian-American relations, working closely with the British ambassador to the US and acting as mediator when Britain and the US seemed to misunderstand Canada's position. Despite vigorous effort, he was unable to achieve the entry of Newfoundland into the Canadian federation. Perhaps best remembered as the donor of the GREY CUP for football supremacy, Grey himself was more interested in the music and drama festivals he inaugurated. It was fortunate for Canada and Britain that in this difficult transition period in imperial relations a governor general of Grey's energy and charm was associated with a prime minister of Laurier's strength and patience.

M.E. HALLETT

Grey Cup, trophy produced by Birks Jewellers that has been part of Canadian sports since 1909, when it was donated by Governor General Lord GREY for the Canadian FOOTBALL championship. The original conditions stated that the "cup must remain always under purely amateur conditions," although there is good reason to believe that this was at the urging of P.D. Ross of the Ottawa *Journal* rather than Lord Grey. Until 1966, the cup was presented to the Canadian champion by various trustees, including, from 1921, the Canadian Rugby Union (CRU). In 1966, the CRU named the Canadian Football League (CFL) trustee. In the early years (1909-24) the university teams were invariably the Grey Cup champions. From 1925 to 1945 the representatives from senior city leagues were supreme, and they continued to contest the cup until the early 1950s, when the professional teams that later comprised the CANADIAN FOOTBALL LEAGUE began to dominate.

In 1948 the Calgary Stampeders and their supporters transformed the Grey Cup game into a week-long carnival of festivities, a national celebration, and the most watched sporting event in Canada. In 1962, hailing the game as an instrument of national unity, Parliament decreed that both major Canadian television networks must make the television transmission of the game available to the other so that all regions could see it.

FRANK COSENTINO

Grey Nuns, *see* CHRISTIAN RELIGIOUS COMMUNITIES.

Grierson, John, film producer (b at Deanston, Scot 26 Apr 1898; d at Bath, Eng 19 Feb 1972). Grierson is best known as the father of documentary cinema and the man who created the NATIONAL FILM BOARD of Canada. In 1938, after

Grey Cup Champions 1909-1984

Year	*Club*
1909	University of Toronto
1910	University of Toronto
1911	University of Toronto
1912	Hamilton Alerts
1913	Hamilton Tigers
1914	Toronto Argonauts
1915	Hamilton Tigers
1916-19	(championship not held)
1920	University of Toronto
1921	Toronto Argonauts
1922	Queen's University
1923	Queen's University
1924	Queen's University
1925	Ottawa Senators
1926	Ottawa Senators
1927	Toronto Balmy Beach
1928	Hamilton Tigers
1929	Hamilton Tigers
1930	Toronto Balmy Beach
1931	Montreal Amateur Athletic Association
1932	Hamilton Tigers
1933	Toronto Argonauts
1934	Sarnia Imperials
1935	Winnipeg Blue Bombers
1936	Sarnia Imperials
1937	Toronto Argonauts
1938	Toronto Argonauts
1939	Winnipeg Blue Bombers
1940	Ottawa Rough Riders
1941	Winnipeg Blue Bombers
1942	Toronto RCAF-Hurricanes
1943	Hamilton Flying Wildcats
1944	Montreal St-Hyacinth Donnacona
1945	Toronto Argonauts
1946	Toronto Argonauts
1947	Toronto Argonauts
1948	Calgary Stampeders
1949	Montreal Alouettes
1950	Toronto Argonauts
1951	Ottawa Rough Riders
1952	Toronto Argonauts
1953	Hamilton Tiger-Cats
1954	Edmonton Eskimos
1955	Edmonton Eskimos
1956	Edmonton Eskimos
1957	Hamilton Tiger-Cats
1958	Winnipeg Blue Bombers
1959	Winnipeg Blue Bombers
1960	Ottawa Rough Riders
1961	Winnipeg Blue Bombers
1962	Winnipeg Blue Bombers
1963	Hamilton Tiger-Cats
1964	British Columbia Lions
1965	Hamilton Tiger-Cats
1966	Saskatchewan Roughriders
1967	Hamilton Tiger-Cats
1968	Ottawa Rough Riders
1969	Ottawa Rough Riders
1970	Montreal Alouettes
1971	Calgary Stampeders
1972	Hamilton Tiger-Cats
1973	Ottawa Rough Riders
1974	Montreal Alouettes
1975	Edmonton Eskimos
1976	Ottawa Rough Riders
1977	Montreal Alouettes
1978	Edmonton Eskimos
1979	Edmonton Eskimos
1980	Edmonton Eskimos
1981	Edmonton Eskimos
1982	Edmonton Eskimos
1983	Toronto Argonauts
1984	Winnipeg Blue Bombers

some 10 years' involvement in government filmmaking in England, he was invited to Canada to study the Canadian government's use of film. His report led directly to the creation of the NFB in May 1939. Shortly after the outbreak of war, Grierson was appointed government film commissioner in Canada, a post he held until 1945. Under his direction the NFB grew to be a large organization, producing both regular series of theatrical shorts (*Canada Carries On* and *The World in Action*), which were shown monthly in Canadian and US cinemas, and hundreds of nontheatrical films shown across Canada in a network of industrial, rural and trade-union circuits.

Grierson activated the Canadian film industry almost single-handedly. He had enormous energy, a deep-seated vision of what he wanted to accomplish, an excellent eye for talent and got the best out of the people who worked with him. His belief in the documentary film — a term he coined in a review in 1926 — influenced a generation of filmmakers, and his thinking governed the evolution of the dominant aesthetic of Canadian cinema, strongly rooted in reality. He provided a rationale and a purpose for the NFB that turned it into one of the most creative film organizations in the world.

Grierson left Canada in 1945 to form a film company in New York, but he was implicated in the communist scare that followed the defection of Igor GOUZENKO and this effectively ended his career in N America. In 1947 he was named director of mass communications at UNESCO in Paris. After 3 years he joined Group 3, an unsuccessful experiment in feature filmmaking established in England 1950. Grierson then hosted a popular TV program based in Scotland, "This Wonderful World," for 10 years, and spent the last period of his life travelling and teaching, including lecturing at McGill. PIERS HANDLING

Griffon, first ship to sail the Upper Great Lakes, launched at Cayuga Creek, on the Niagara R, 7 Aug 1679. A small barque, armed with 7 cannon, it sailed under the command of LA SALLE to Michilimackinac and Green Bay. Loaded with furs, the *Griffon* was lost on the return voyage, likely in the storms of Lk Michigan. J. MARSH

Grignon, Claude-Henri, journalist, critic, novelist, author of radio and TV serials (b at Ste-Adèle, Qué 8 July 1894; d there 3 Apr 1976). Grignon is known primarily for his novel *Un Homme et son péché* (1933), whose hero, the miserly Séraphin Poudrier, became the central figure in adaptations for radio, TV and 2 films. This original, powerful novel broke with the convention of extolling rural life and won Québec's Prix David (1935). Some 100 000 copies of the book have been printed, and it has been adapted for series on radio and TV. Grignon, who has other publications to his credit, also became well known as a virulent critic, thanks to *Les Pamphlets de Valdombre* (1936-43). In 1962 he became a member of the RSC. *Un Homme et son péché* was translated into English as *The Woman and the Miser* (1978). ANTOINE SIROIS

Grimsby, Ont, Town, pop 15 797 (1981c), inc 1876, is situated in the Niagara Peninsula to the E of Hamilton. The first European settlers, primarily LOYALISTS, arrived in the 1780s after the American Revolution. Originally called The Forty, it was named for Grimsby, Eng. Following the clearing of the land for mixed-farming practices, Grimsby grew as an agricultural service centre. In the late 19th century, 2 developments aided its growth. The large-scale expansion of orchards and vineyards in the area resulted in several packing and canning plants and a winery. For a while the town was popular as a lakeside resort, with steamboat services from Toronto. More recently, it has attracted a variety of light industries. Good communications with Hamilton, first by interurban electric railway and later by the QUEEN ELIZABETH WAY, have fostered the growth of a dormitory community. The Manor, a gracious Loyalist residence (1798) is one of Ontario's few remaining 18th-century buildings. H.J. GAYLER

Reading: P. Dechman, ed, *Once Upon a Little Town* (1979).

Grisdale, Joseph Hiram, agronomist (b at Ste-Marthe, Qué 18 Feb 1870; d at Iroquois, Ont 24 Aug 1939). Son of a farmer, trained at OAC and Iowa State Coll, Grisdale joined the staff of the Central Experimental Farm, Ottawa, in 1899, and in 1911 succeeded William SAUNDERS as director. He became deputy minister of agriculture, the first agronomist in this post, in 1918, and was a powerful figure in Ottawa, sitting on the National Research Council and leading the Canadian delegations at the 1926 and 1928 imperial conferences on co-ordinating research. He retired owing to ill health in 1932, was shipwrecked 4 days later on a Bermuda cruise ship, and survived to breed Jersey cattle and apples on his own farm. DONALD J.C. PHILLIPSON

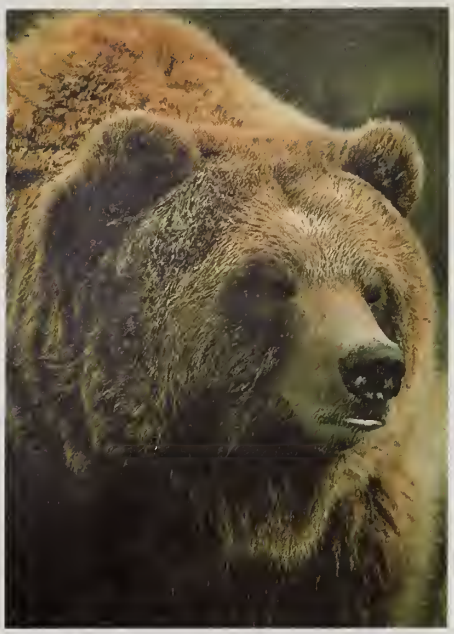
Grise Fiord, NWT, UP, pop 106 (1981c), is located on the S coast of ELLESMERE I. Canada's most northerly INUIT community is situated in game-rich country from which the residents derive their living. The settlement is the result of federal government efforts to alleviate poor economic conditions among the Inuit and to establish Canadian sovereignty over the arctic islands. Inuit families from other areas of the North were settled in the area in 1953. Grise Fiord means "Pig Fiord" in Norwegian. Many NWT residents consider the community setting the most beautiful in the North. ANNELIES POOL



Grise Fiord, NWT, Canada's most northerly Inuit settlement, is located on the S coast of Ellesmere I (*photo by Karl-Heinz Raach*).

Grit, a popular reference to a member of the LIBERAL PARTY of Canada. The nickname derives from grit, fine sand or gravel, which is often valued for its abrasive quality, and from an American slang term implying firmness of character, as used in the phrase "true grit." Canadian political usage of the word dates from 1849, when progressive members of the Upper Canada Reform Party were dubbed CLEAR GRITS and characterized as being "all sand and no dirt, clear grit all the way through." Led by George BROWN of the *Globe*, in the early 1870s the progressive members joined with Lower Canada reformers to create the Liberal Party, and the description of the few was applied to the many.
JOHN ROBERT COLOMBO

Grizzly Bear (*Ursus arctos horribilis*), large MAMMAL of the order Carnivora. It differs from other N American carnivores in that it eats primarily plant matter. Grizzlies opportunistically kill or scavenge animals, especially ungulates, ground squirrels and insects. They also are attracted to edible garbage. In fall they dig dens and begin a 4-7 month dormant period during which they usually do not eat, urinate or defecate. Courtship and copulation occur mid-May through early July; embryo implantation is delayed until fall. In delayed implantation the fertilized egg develops slowly, while floating in the uterus. Eventually, it becomes attached to the wall of the uterus and development continues normally until birth. Young are born Jan-Feb. Newborns weigh about 0.5 kg, are very immature, and are nursed inside dens for up to 3 months. Litters average 2 young (range 1-4). Females breed about once every 3 years (range 2-5 years). Grizzlies thus have few young and hunting must be carefully regulated to maintain a population. In



Grizzly Bear (*Ursus arctos horribilis*), so called for the grizzled (ie, flecked) hair on its flanks, back and shoulders (*photo by Stephen J. Krasemann/DRK Photo*).

the wild most die before reaching adulthood and 15-25 years is considered old. Grizzlies have longer front claws and are larger than black BEARS. Large males may weigh 250-400 kg; large females, 150-200 kg. Grizzlies have a hump on the back and a dish-shaped facial profile. They range from black through brown to blond. Often the ends of hair on the flanks, back and shoulders are grizzled (ie, have white or grey flecks). Mothers may defend their young and males may fight, especially during breeding season. Occasionally, aggression is directed toward humans: in Canada's National PARKS, about one visitor in 2 million is injured by a grizzly. Grizzlies may stand on their hind legs when sensing their environment. They typically charge on 4 legs and can run at least 50 km/h. They prefer semi-open habitats; an adult male may have a home range of 1000-1500 km^2. As human populations have expanded, grizzly bear numbers have declined. They were extirpated from the prairies by about 1900. Today they are found in Alberta (estimated population 800-1200), BC (6000-8000), the NWT (4000-5000), and the YT (5000-9000). Grizzlies were sacred, yet fearsome, animals to most native people. STEPHEN HERRERO

Gros-Louis, Max, or Oné-Onti, politician, businessman (b at Huron Village Indian Reserve, Loretteville, Qué 6 Aug 1931). After working as a surveyor's labourer and travelling salesman, he became a producer of pan-Indian handicrafts and manager of a Huron dance troupe. First elected chief of the Huron of Lorette in 1964, he was involved in the Indians of Canada pavilion at Expo 67, in the foundation of the Indians of Quebec Association (secretary and spokesman, 1966-73), and in the National Indian Brotherhood (Québec representative, 1970). As a publicist claiming to speak for Québec Indians, and as a community leader advocating individualist approaches to economic and social problems, he has differed with native and other groups over LAND CLAIMS and relations with non-Indian governments. His autobiography, *First among the Huron,* was published in 1973. BENNETT MCCARDLE

Gros Morne National Park (est 1970) covers 2000 km^2 on the W coast of Nfld. The spectacular landscape was created by the grinding action of glaciers on the ancient Long Range Mts. Barren rocky ridges and tundralike slopes contrast with forested foothills and boggy coastal plains, where mosses and pitcher plants thrive. The presence of caribou and arctic hare reflect the northern character of the PARK. Pine marten inhabit dense forest areas while moose and snowshoe hare, although not native, are frequently observed. Terns and gulls abound along the coast; ptarmigan typify the bird life of the heathlands and barrens. Pre-European culture in the area dates from 2500 BC when the Maritime Archaic Indians inhabited the area. DORSET and BEOTHUK cultures followed. European contact was established with the arrival of Jacques Cartier in the adjacent Gulf of St Lawrence (1534); however, European settlement did not occur until the late 1800s. The park has facilities for tent and recreational-vehicle camping and for primitive winter camping. In summer, hiking, fishing and cool saltwater swims are popular. Visitors in winter can cross-country ski, snowshoe and snowmobile. LILLIAN STEWART

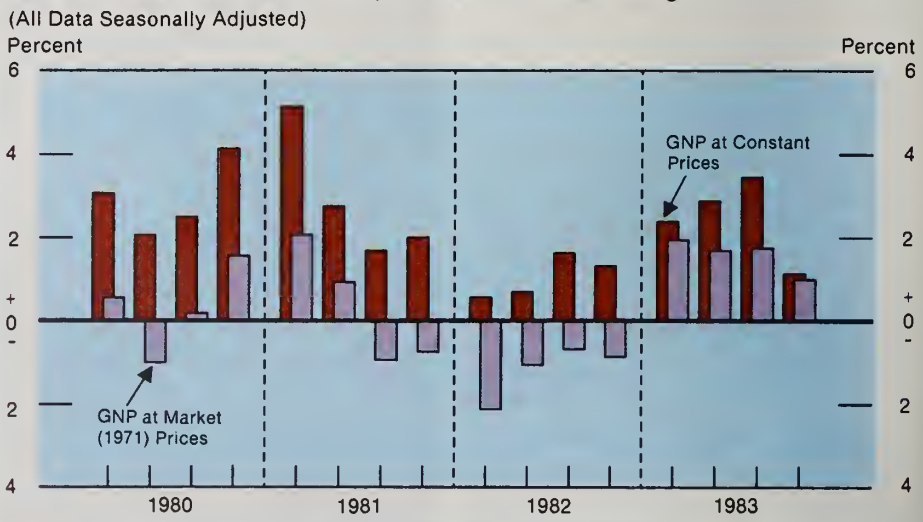
Grosbeak, common name for large members of 2 families, Emberizidae (SPARROW, BUNTING) and Fringillidae (FINCH), with large, deep bills adapted for cracking hard-coated seeds. In Canada, 4 breeding species occur. Another species, blue grosbeak (*Guiraca caerulea*), is a rare straggler to southern Ontario. Rose-breasted grosbeaks (*Pheucticus ludovicianus*) are common in deciduous forests from NS to northern BC. Males have striking plumage: black heads; black and white backs, wings and tails; white underparts; rose red, triangular patch on the breast; and white bill. Females are brown with dark streaks but have the characteristic large, white bill. The black-headed grosbeak (*P. melanocephalus*), occurring in wooded valleys from southern BC to southwestern Saskatchewan and rarely Manitoba, is distinguished by its yellow-brown underparts and brownish collar and rump. These 2 species are similar in size; females of both are easily confused; and males have similar songs. Hybrids have been found where ranges overlap. Evening grosbeaks (*Coccothraustes vespertinus*) are familiar winter birds and readily attracted to feeders with sunflower seeds. Males have lemon yellow bodies; brown crowns, necks and upper backs; black tails and wings with large, white wing patches; and large, greenish yellow bills. Plumage of females is duller. Their summer distribution is incompletely known; they are known to occur from BC across the coniferous forests to the Maritimes (recent arrivals). Pine grosbeak (*Pinicola enucleator*), the largest grosbeak in Canada, breeds across northern Canada from YT to NB, and S along the Rocky Mts in BC and Alberta. Males are predominantly pinkish red, with 2 white bars on grey wings. Females and immatures are grey, with wings similar to males, and head and rump tinged with yellow. They prefer pine and spruce trees, extracting seeds from cones. In fall and winter they also feed on fruit and berry seeds. Their call notes of usually 3 tuneful whistles are extended to form a song. RICHARD W. KNAPTON

Gross National Product (GNP) refers to the money value of all goods and services produced in a nation during a stated period of time, usually a year. Despite its limitations GNP is the best overall measure of economic performance; it is often used to calculate changes in the welfare of a country's residents. Its principal components are wages, salaries and supplementary labour income; military pay and allowances; corporation profits before taxes (minus dividends paid to nonresidents); interest and investment income (except for interest on consumer loans and government income from crown corporations); net income (pretax profits) of farm operators; net income from businesses and of professionals, eg, doctors; and rental income; and an adjustment for changes in the value of inventories because of price changes. Together these items comprise net NATIONAL INCOME at factor costs, or the earnings of various factors of production. GNP is measured by including as well indirect taxes less subsidiaries, eg, manufacturers' sales taxes, business property taxes and other taxes levied on businesses but paid by (or "shifted to") consumers; capital-cost allowances and miscellaneous adjustments for depreciation of business assets; and a residual error of estimate, a small statistical balancing of figures. Another measure, that of gross national expenditure (total level of demand in the economy for goods and services), reveals how GNP is consumed through consumer spending, investment and government spending. Gross domestic product (GDP) differs from GNP in that it is a measure of the value of production of goods and services in the economy resulting from the factors of production whether of Canadians or nonresidents; by contrast, GNP includes the value of goods and services produced by Canadians both at home and abroad, but excludes the returns to nonresidents on capital they have invested in Canada. In Canada interests and dividends paid to nonresidents exceeds that received from nonresidents. (*See* graphs below and p 777).

Grosse Île, or Quarantine I, 1.9 km^2, 2.9 m long by 1 km wide, 46 km downstream from Québec City in the ST LAWRENCE R estuary. The island is a wooded Appalachian ridge sculpted by coves and capes. In 1646 the Île de Grâce was ceded to Gov Charles Huault de Montmagny. Usage transformed the name from Grace I to Grosse Île.

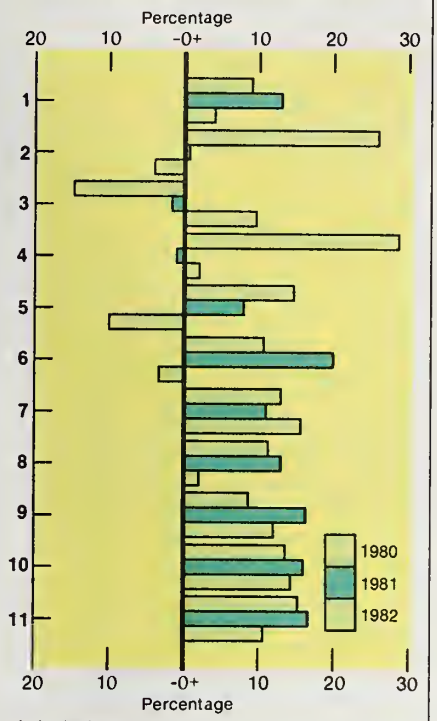
Canada's Gross National Product, Quarter-to-Quarter Change

(All Data Seasonally Adjusted)



Source: Infomat, Statistics Canada.

Gross Domestic Product at Factor Cost by Industry, 1980, 1981 and 1982



1. Agriculture
2. Forestry
3. Fisheries
4. Mining, quarries and oil wells
5. Manufacturing
6. Construction
7. Transportation, communication and other utilities
8. Trade
9. Finance, insurance and real estate
10. Public administration and defense
11. Community, business, and personal services

Source: Catalogue 13-201, Statistics Canada.

GDP differs from GNP in that it includes returns to nonresidents on capital invested in Canada.

In 1832 the deserted island became a quarantine station where 51 146 IRISH and ENGLISH immigrants were examined (of the total of 61 800 received in Canada). In 1833 the station received 21 732 immigrants; in 1834, 30 945. Some died of cholera. In 1847 the Irish famine sparked emigration despite a typhus EPIDEMIC. Irish immigrants endured 6-12 weeks of inhuman conditions in 221 ships to reach Canada — 8000 were buried at sea. At the Grosse Île quarantine station medical superintendent Dr George Mellis Douglas and his team removed some 4500 corpses from the ships and examined 68 106 immigrants, of whom 5424 died. Ships had to be sent to Pointe Saint-Charles, Montréal, where 6000 Irish immigrants died and are buried. Several doctors, priests and nuns died, and many orphans were adopted by French Canadian families. In 1937 the station was closed. Since secret bacteriological research began there in 1947 access to the island has been forbidden.

SERGE OCCHIETTI

Grossman, Daniel Williams, dancer, choreographer (b at San Francisco, Calif 13 Sept 1942). A compelling performer of contemporary dance, Grossman was a member of the renowned Paul Taylor Dance Co 1963-73, after which he joined TORONTO DANCE THEATRE. In 1975 he formed the DANNY GROSSMAN DANCE CO as a vehicle for his own compositions. Grossman's works are remarkable for their inventive exploration of grotesque but appealing movement and for their humour, compassion and sometimes alarming virtuosity. He won the Jean A. Chalmers Award for choreography in 1978, and he and his company have earned an enviable international reputation.

PENELOPE DOOB

Groulx, Gilles, film director (b at Montréal 30 Aug 1931). In 1956 he joined the NFB as a film editor and co-directed with Michel BRAULT the celebrated documentary *Les Raquetteurs* (1958). After directing numerous documentaries, he turned to feature films and produced the now classic *Le Chat dans le sac* (1964). He pursued his interest in cinema, politics and aesthetics with energy, directing 3 feature films in the next 3 years. *24 heures ou plus* (1972) was deemed too politically controversial and was suppressed for 5 years. Groulx left the NFB during that period but returned in 1977. In 1980 he began production of *Au pays de Zom* but because he was in a serious automobile accident it was not completed until 1983.

PIERRE VÉRONNEAU

Groulx, Lionel-Adolphe, historian, priest, nationalist spokesman (b at Vaudreuil, Qué 13 Jan 1878; d there 23 May 1967). Commemorated by Claude RYAN as the spiritual father of modern Québec, Groulx was French Canada's foremost historian until the 1960s and, after Henri BOURASSA, Québec's most prominent nationalist spokesman. Through his teaching and writing, his sermons and his direction of nationalist organizations, Groulx was a controversial figure, inspiring thousands of young people with a pride in French Canada's past and a confidence in Québec's future.

Born of rural parentage, Groulx had rudimentary village schooling and then classical college training in the seminary in Ste-Thérèse. The intense religious atmosphere of his upbringing and school life led him towards the priesthood and teaching. As a student and then ordained priest he taught literature and history at the college in Valleyfield from 1900 until 1915 with a 3-year interruption for graduate theological and linguistic study in Europe 1906-09. During his early teaching days, Groulx developed his 2 lifelong passions: a commitment to young people and to the study of history. He initiated the Association catholique de la jeunesse canadienne-française, a province-wide student body, inspiring its members to develop high religious and social ideals and to put them into practice throughout their lives. Groulx gleaned illustrations for the students from the past as he trained himself to be an historian. The effort entailed creating a course and a text in Canadian history virtually from scratch. He developed François-Xavier GARNEAU's view of the CONQUEST as a disaster and his idea of history as a struggle by examining the post-Conquest period (*see* HISTORIOGRAPHY). The novelty of that approach is hard to imagine because Groulx was so successful in undermining the common assumption that the British presence in Québec was beneficial and that French Canadian subordination was natural. In 1915 Groulx was appointed to the first chair in Canadian history at U de M, a position he held until 1949.

Groulx saw politics through the eyes of Henri Bourassa, embittered and unhappy over the ONTARIO SCHOOLS QUESTION and Canada's participation in WWI. With friends in the Ligue des droits du français he worried over the diminishing stature of the French language in the burgeoning world of commerce and industry. His history lectures, published annually 1916-21, continued their assault on the unknown and the commonplace. During 1917, the year of CONSCRIPTION, Groulx's history lessons threw a dash of cold water on Confederation itself. From 1920 to 1928 he edited a monthly journal ACTION FRANÇAISE and animated a nationalist organization of the same name. In the journal Groulx



Lionel-Adolphe Groulx, who urged French Canadians to draw their inspiration from their religion and their past *(courtesy Public Archives of Canada/C-16657).*

kept posing the worrisome question of French and Catholic survival in an urban, industrial, Anglo-Saxon environment, and he toyed with the idea of an autonomous state for French Canada. He carefully avoided the word SEPARATISM and denied all his life any advocacy of it. But still the thought was there if only as an ideal. Perhaps French Canadians *could* organize their social, economic and political existence in their own way, drawing their inspiration and their genius from their religion, their past and their French culture.

Groulx maintained that ideal through some of the darkest episodes in modern Québec history. The Depression of the 1930s found him involved with yet another nationalist organization, ACTION NATIONALE, which interpreted the Depression as the result of excess industrialization fostered by American capitalists and abetted by an overly generous provincial government. During WWII Groulx bluntly blamed English-speaking Canadians for the division over conscription. Usually Groulx was more severe with his fellow French Canadians: they must insist on their equal place in Canada. In the 1950s Groulx chastised a new generation for sloughing off their religious heritage. In an increasingly secular society, Groulx emphasized that heritage in his major work *Histoire du Canada français* (1950-51) and in the historical journal he founded in 1947 and edited for 20 years: *Revue d'histoire de l'Amérique française*. What he did share with the younger generation was a distaste for Maurice DUPLESSIS and great excitement over the beginnings of the QUIET REVOLUTION. Indeed Groulx cast off his clerical prudence momentarily to vote in the election of 1962 when nationalization of hydro was at stake. Finally, the *petit peuple* were taking part of their destiny into their own hands.

Groulx maintained his ardour to the day he died. Just 2 weeks before, he was discussing history at the Youth Pavilion at Expo 67, and on the very day the last of his more than 30 books was launched, significantly entitled *Constantes de vie.*

SUSAN MANN TROFIMENKOFF

Reading: Lionel Groulx, *Mes mémoires* (1970-74), and *Abbé Groulx: Variations on a Nationalist Theme*, ed Susan Mann Trofimenkoff (1973); Susan Mann Trofimenkoff, *Action française: French Canadian Nationalism in the 1920s* (1975), and *Dream of Nation: A Social and Intellectual History of Québec* (1982).

Groundhog, *see* MARMOT.

Groundsel, or ragwort, common names for PLANTS of genus *Senecio*, family Compositae or Asteraceae. The genus, one of the largest plant genera (1000-2000 species), occurs worldwide and is very diverse, including small TREES, shrubs, annual and perennial herbaceous plants and succulents (ie, plants with fleshy tissues for conserving moisture). About 30 species are native to Canada, growing in habitats ranging from ponds to prairie grasslands; from moist woods to mountain tops; and in the Arctic. Exact species numbers are difficult to determine because of the hybridization and complex variation patterns found in some groundsels. Flower heads are mostly yellow, and usually have both ray and disc florets, although the former are lacking in the ubiquitous, introduced weed *S. vulgaris*, common groundsel. The leaves (bracts) below the heads are typically arranged in a single, circular row. The fruit, a small, dry, one-seeded achene, bears a crown of white bristles. Golden ragwort or squawweed (*S. aureus*), found from Manitoba eastwards, was used by native peoples to heal wounds and for birth control. *S. cineraria*, "dusty miller" or "cineraria," is a widely grown ORNAMENTAL; *S. cruentus* is a greenhouse favourite.

Groundwater, the WATER filling the pores and fissures of SOILS and ROCKS beneath the land surface. Although not as widely used as RIVER or LAKE water, groundwater is a valuable water source because of its clarity, purity, and consistent, cool temperature, and because it usually provides a reliable, continuous supply, even in dry seasons and DROUGHTS. Groundwater has also played an important role over geologic time in creating some of Canada's best-known resort attractions. For example, groundwater can dissolve soluble rocks and its circulation is responsible for formation of CAVES in limestone terrain (*see* KARST LANDFORM). Groundwater, heated at depth, often rises to the surface to form hot SPRINGS like those at Banff and Jasper, Alta, and Radium and Fairmont, BC.

Group of Seven was founded in 1920 as an organization of self-proclaimed modern artists. The original members — Frank CARMICHAEL, Lawren HARRIS, A.Y. JACKSON, Franz JOHNSTON, Arthur LISMER, J.E.H. MACDONALD and F.H. VARLEY — befriended each other in Toronto between 1911 and 1913. All except Harris, who was independently wealthy, made their living as commercial artists, and several of them even worked together in the same shop. Tom THOMSON, another commercial artist, was included in this circle of friends, but since he died in 1917 he never became a member of the Group. He was important to the other artists, however, for he was an avid outdoorsman and awakened their interest in painting the rugged northern Ontario landscape.

The Group were not exclusively landscape painters, and it was only after their first exhibition at the Art Gallery of Toronto in 1920 that they began to identify themselves as a landscape school. They were initially drawn together by a common sense of frustration with the conservative and imitative quality of most Canadian art. Romantic, with mystical leanings, the Group and their spokesmen zealously, and sometimes contentiously, presented themselves as Canada's national school of painters. This provoked the ire of the artistic establishment, which seems to have hated their rhetoric even more than their paintings. Eric Brown, director of the National Gallery of Canada, always stood by them. He began buying their paintings for the gallery's collection several years before the Group was formally established, and in 1924 and 1925 he made sure they were well represented in the Canadian art shows that went to the prestigious Wembley exhibition in England. This enraged many members of the Royal Canadian Academy, who felt that the Group were given an unfair advantage, but British press reports were so favourable that both Brown and the Group felt vindicated.

Like the European *fin de siècle* symbolists and postimpressionists from whom their aesthetic largely derived, the Group rebelled against the constraints of 19th-century naturalism and tried to establish a more equitable and independent relationship between art and nature. They shifted emphasis away from similitude — the imitation of natural effects — towards the expression of their feelings for their subjects. As they often painted together, both in the bush and in the studio, their paintings developed along somewhat similar lines. The canvases exhibited in their early shows usually have heavy impasto and bright colours, and are boldly summarized with attention drawn to surface patterning. This is as true of the portraits of Harris and Varley as of the landscapes. In 1922 MacDonald began using thinner paint and more stylized designs, and Harris, Carmichael and Varley soon began heading in the same direction. Harris went further than the others, however, and by the mid-1920s he had reduced his paintings to a few simplified and nearly monochromatic forms. Ten years later he became the only member of the Group, and one of the first Canadian artists, to turn to abstraction.

Through self-promotion and through friends at the Arts and Letters Club and the *Canadian Forum*, as well as with the support of the National Gallery, the Group's influence steadily spread during the 1920s. In 1926, after Franz Johnston's resignation, A.J. CASSON was appointed a member. The Group realized they could hardly call themselves a national school of painters as long as they all lived in Toronto, so they invited other artists to join them: in 1930 Edwin Holgate from Montréal and in 1932 L.L. FITZGERALD from Winnipeg were admitted to give the organization a wider geographic base.

Harris and Jackson influenced and encouraged the next generation of Canadian artists, and Lismer, MacDonald and Varley all became distinguished and influential teachers. Disbanded in 1933, the Group had become as entrenched, and in some ways as conservative, as the art establishment it had overthrown. Its influence has therefore been a mixed blessing, and it is not surprising that it was in Montréal, which did not respond to the Group's call, that the next generation of significant Canadian painters emerged. Paintings by members of the Group of Seven can be found in most Canadian public art galleries. CHRISTOPHER VARLEY

Reading: J. Russell Harper, *Painting in Canada* (1977); D. Reid, *A Concise History of Canadian Painting* (1973) and *The Group of Seven* (1970).

Terre Sauvage (The Northland) (1913), oil on canvas, by A.Y. Jackson, one of the founding members of the Group of Seven (*courtesy National Gallery of Canada*).



Groupe de la Place Royale, Le, integrates dance, voice and music in ways that make it Canada's most consistently innovative modern-dance company. It was formed in Montréal (1966) by Jeanne Renaud with Peter Boneham as assistant artistic editor. Renaud, a French Canadian who had studied in New York with Hanya Holm and Mary Anthony, was noted for very abstract and unemotional choreography. Boneham, originally trained in ballet, served as artistic codirector, dancer, choreographer and teacher for the company. Renaud left the company in 1971 and it came under the joint direction of Boneham and Jean-Pierre Perreault the following year. Boneham has been sole director since 1980. Le Groupe moved to Ottawa in 1977. The company now performs at the NATIONAL ARTS CENTRE and tours across Canada.

CAROL BISHOP

Grouse (Tetraoninae), small subfamily (18 species) of chickenlike BIRDS with circumpolar distribution above lat 26° N. It includes PTARMIGANS as well as those birds commonly called grouse. Members of the largest species weigh up to 6360 g; the smallest, 340 g. Of the 10 N American species, 9 occur in Canada (6 grouse, 3 ptarmigans). Grouse species are blue (*Dendragapus obscurus*), spruce (*D. canadensis*), ruffed (*Bonasa umbellus*), sharp-tailed (*Tympanuchus phasianellus*) and sage grouse (*Centrocercus urophasianus*). The greater prairie chicken (*T. cupido*) has virtually disappeared in Canada. Grouse inhabit woodlands, tundra and, in N America, grasslands.



Nine species of grouse occur in Canada, including the ruffed grouse (*Bonasa umbellus*) shown here — the most sought-after game bird (*artwork by Claire Tremblay*).

Adult plumages are cryptic patterns of brown, grey and black with paler or white underparts. There are many plumage modifications associated with displays, eg, pointed or curved tail feathers, elongate neck feathers, neck ruffs and pointed primaries. All species have completely or partially feathered legs; when toes are not feathered, they grow 2 rows of narrow scales, like the teeth of a comb, as "snowshoes." Nostrils are covered by feathers. In breeding season, males give elaborate displays alone or in groups (leks) involving strutting, whirring of wings and sometimes vocal accompaniment. Some have red or yellow erectile combs above the eyes, and colourful neck patches of bare skin which are made prominent by the inflated esophagus. As a group, grouse are important GAME BIRDS attracting over 10 million hunters annually. Ruffed grouse are the most sought after species.
S.D. MACDONALD

Grove, Frederick Philip, author, teacher, translator (b Felix Paul Berthold Friedrich Greve at Randomno, E Prussia, 2 Feb 1879; d at Simcoe, Ont 19 Aug 1948). Grove was raised in Hamburg, attended university at Bonn and Munich, but left to become a poet, associated briefly with Stefan George and the neoimpressionists. The volume of poems *Wanderungen* (1902) was his first book. He made a precarious living translating English and French authors into German, was in debt and briefly in prison. He left Germany in 1909 and under his new name in 1913 began a new life as a schoolteacher in Manitoba.

Encouraged by the publication of *Over Prairie Trails* (1922) and *Turn of the Year* (1923), Grove gave up teaching after 1923 and devoted his life to writing, publishing one volume of essays, one volume of short stories (posthumously), a satire, 7 novels and a fictionalized autobiography, *In Search of Myself* (1946), which won a Gov Gen's Award. *Settlers of the Marsh* (1925), a harsh yet romantic story of a settler's ambition betrayed by sexuality, is said to have introduced realism to Canadian fiction. With *Our Daily Bread* (1928), *The Yoke of Life* (1930) and *Fruits of the Earth* (1933), it records the high ambitions, personal failures and belated self-knowledge of its aloof and strongly individual protagonist. Something of a dandy in his youth, the later, austere Grove is reflected in these uncompromising pioneers. *A Search for America* (1927) is Grove's most successful book. Failure, and a kind of triumph, inform the 3 late works: *The Master of the Mill* (1944), *In Search of Myself* and *Consider Her Ways* (1947). *The Master of the Mill* is the first Canadian novel to explore the social effects of monopoly capitalism. Its protagonist, like the narrator of the autobiography, tries to account for his own, and mankind's, failure to realize his potential greatness.

Neglected in his lifetime, Grove has been studied in 6 books and numerous articles and theses. Desmond Pacey's *Frederick Philip Grove* (1945) was the first, but Pacey mistakenly accepted the autobiography as fact. D.O. Spettigue's *F.P.G.: The European Years* (1973) brought the German and Canadian careers together. Margaret Stobie's *Frederick Philip Grove* (1972) examined his life and work in Canada. The principal German works are becoming available in translation. Unpublished novels, essays and poems, mostly in the Grove collection at U Man, are being published. The *Letters* were edited by Desmond Pacey (1976).
D.O. SPETTIGUE

Groves, Abraham, physician (b at Peterborough, Canada W, 8 Sept 1847; d at Fergus, Ont 12 May 1935). After graduating from the Toronto School of Medicine in 1871, Groves practised in Fergus for 60 years. He performed the first successful appendectomy in N America (10 May 1883) and was as skillful in a farm kitchen as in a hospital operating room — sterilizing his instruments before it became standard practice. In 1902 he established the Fergus Royal Alexandra Hospital, later renamed the Groves Memorial Hospital, and in 1934 his *All in the Day's Work: Leaves from a Doctor's Case-Book* was published.
J.T.H. CONNOR

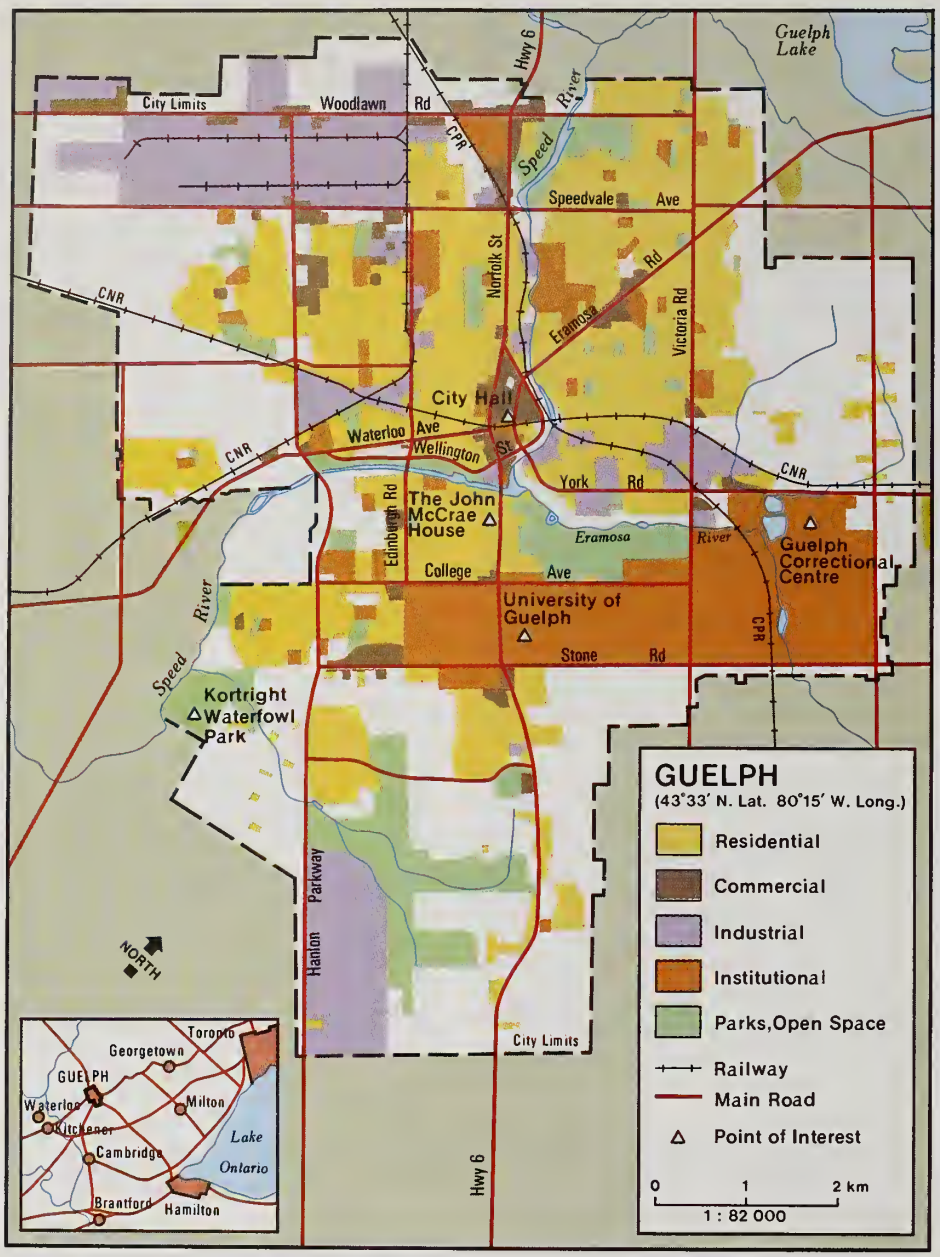
Guarantee Act, 1849, conceived by Francis HINCKS and carried in the Legislative Assembly of the PROVINCE OF CANADA, established the principle of government assistance to railways. Under the terms of the Act, any railway more than 75 mi (120 km) long was eligible for a government guarantee on the interest of half its bonds as soon as half the line had been completed. Several railways received assistance under this Act, most notably the GREAT WESTERN, the ST LAWRENCE AND ATLANTIC, and the Ontario, Simcoe and Huron. Indeed, with the incentive of the Guarantee Act, as well as with the aid provided by the 1852 Municipal Loan Act, railway building became a mania in the Canadas, the amount of track increasing from 106 km in 1850 to more than 3200 km in 1860. The darker side of this policy was the economic recklessness that government assistance encouraged: by 1860 railways in the Canadas were suffering severe financial problems, and many municipalities had so overextended themselves that they were having difficulty meeting their obligations to the MUNICIPAL LOAN FUND.
CURTIS FAHEY

Guelph, Ont, City, 71 207 (1981c), inc 1851 as a village, 1856 as a town and 1879 as a city. The seat of Wellington County, it is located on the Speed R in S-central Ontario, 96 km W of Toronto and 28 km E of Kitchener-Waterloo. It has a land area of 68 km^2 and an elevation of 300-360 m above sea level. This industrial and educational centre is set in the heart of an attractive and highly productive agricultural region.

Settlement and Development Guelph was founded as a planned town in 1827 by John GALT, a Scottish novelist, who was superintendent of the CANADA COMPANY, a land company based in London, England. Galt effectively used the concept of planning towns in advance of general settlement in order to stimulate sales of agricultural land. To this end he laid out an imaginative town plan, with streets radiating from a focal point, based on American precedents such as Buffalo. The original design is still discernible in the present business core. Galt



The use of locally quarried limestone, continuous cornice heights and consistent window spacings give much of downtown Guelph a visual unity (*photo by Bill Brooks/Masterfile*).



chose the town's name to honour Britain's royal family, the Hanoverians, who were descended from the Guelfs, one the great political factions in late medieval Germany and Italy. The waterpower potential at the townsite attracted a number of large mills during the 19th century; the most important of these were owned by William Allan and James Goldie. From the 1860s, several local industries established a worldwide reputation, based on technological innovation; these included the Raymond Sewing Machine Co and the Bell Organ Co.

Economy The economic base of the community has continued to be diversified manufacturing, which employs about 40% of the local work force. Major firms include Canadian General Electric (appliances), Hammond Manufacturing (electrical), International Telephone and Telegraph, Imperial Tobacco and W.C. Wood (freezers). The city has been a pioneer in the trend to municipal ownership of utilities. In the 1880s it built its own railway, the Guelph Junction, which it still owns. After the turn of the century, led by its major businessmen through the Board of Trade, the city took over the water, gas, electricity and streetcar systems.

Education The UNIVERSITY OF GUELPH was established in 1964, but it represents an amalgamation of several colleges whose traditions go back more than a century. The Ontario Agricultural Coll was founded in 1874 on a 200 ha experimental farm S of the townsite. It has been an important force in agricultural research throughout the world. Among its noted graduates is the economist John Kenneth GALBRAITH. A second college, the Macdonald Institute, was built in 1903, at the instigation of Adelaide Hoodless, to teach household science. In 1922 the Ontario Veterinary Coll was moved to the Guelph campus. The present university's full spectrum of programs attracts about 10 000 undergraduates; its research has won international recognition in a wide variety of fields, especially for helping to solve the complex agricultural problems of developing countries.

Cityscape Much of the city's 19th-century townscape still exists. The wide use of a warm-hued, locally quarried limestone, easily worked by stone carvers, has given a visual unity to much of the community. This is especially evident on major downtown streets such as Wyndham where architects used almost continuous cornice heights and consistent window spacings with neighbouring buildings. Particularly significant structures include the Renaissance Revival-style City Hall (1956), designed by William THOMAS, and Joseph Connolly's Church of Our Lady (1877-88), which still dominates the city visually.

Population The population of Guelph has always been highly British in ethnic origin, with those of English background dominating (92% British, 1880; 87%, 1921). More recently (1971) the British proportion had dropped to 67%. The most important new group, those of Italian origin, stands at about 10%.

Culture The city and district are home to a number of well-known artists, such as Ken DANBY. Major support for artistic activity is provided by the new Macdonald-Stewart Art Gallery on the university campus. Guelph's cultural heritage, however, is primarily musical. Edward JOHNSON (1878-1959), the world-famous operatic tenor and manager of New York's Metropolitan Opera, was born and educated here. His tradition is carried on by the Edward Johnson Music Foundation, which annually sponsors the highly acclaimed Guelph Spring Festival, a 2-week presentation of concerts, operas, films and plays. G.A. STELTER

Reading: Leo Johnson, *History of Guelph, 1827-1927* (1977).

Guerre, Yes Sir!, La (1968), Roch CARRIER's first and best-known novel, is a surrealist fable set in rural Québec during WWI. Carrier uses the CONSCRIPTION crisis to allegorize the tragedy of fear and hatred governing French-English relations. The novel is dominated by the wake and funeral of the war hero Corriveau — an occasion for praying and swearing, feasting and brawling. Corriveau's friend Bérubé beats his bride Molly, a Newfoundland whore, while his officers, the "English" soldiers who delivered the corpse, are attacked by the villagers. Other vignettes reflect violence both literally and linguistically: Joseph chops off his hand in order to avoid conscription, while Amélie rules over her deserter husband and the draft-dodging Arthur, loving both cowards. Carrier's nightmare vision portrays the peasant and his language realistically but sympathetically. The novel was translated by Sheila Fischman (1970) and was adapted for the stage in French (1970) and English (1972). MICHÈLE LACOMBE

Guess Who, leading Canadian rock band (1968-75), formed in Winnipeg (1965) as Chad Allen and the Expressions. Personnel changed frequently. Singer Burton Cummings and drummer Garry Peterson were constants; guitarist Randy Bachman was an important member until 1970. The band had many international hit singles and albums, and toured worldwide. Cummings pursued a successful solo career after 1975. A reconstituted Guess Who was active after 1978. MARK MILLER

Guèvremont, Germaine, née Marianne-Germaine Grignon, writer (b at St-Jérôme, Qué 16 Apr 1893; d at Montréal 21 Aug 1968). After studies in Ste-Scholastique, St-Jérôme, Lachine and Toronto (Loretto Abbey), Guèvremont worked at Ste-Scholastique courthouse. She published her first article in *L'Avenir du Nord* in 1912. On 24 May 1916 she married Hyacinthe Guèvremont, an Ottawa civil servant. Five children were born of this marriage. In 1920 the family moved to Sorel where they lived until 1935, when they moved to Montréal. Guèvremont took up journalism in Sorel, writing for the *Montreal Gazette*, *Le Courrier de Sorel*, *Paysana* and *L'Oeil*. In 1942 she published her first book, a collection of stories called *En pleine terre*, and began editing her major work, *Le Survenant*, 2 chapters of which appeared in *Gants du ciel* in 1943. *Le Survenant*, for which she won the Prix Duvernay, Prix David and Prix Sully-Olivier de Serres, was published by Beauchemin (1945) and in Paris by Plon (1946). *Marie-Didace*, second instalment of *Le Survenant*, appeared in 1947. It

was a triumph, winning her election to the Académie canadienne-française in 1948, the Gov Gen's Award for the English translation in 1950, honorary doctorates, popular acclaim with radio (1951) and TV adaptations (1954-60), and election to the RSC in 1962. She is buried in Sorel, close to the islands she had immortalized.
YVAN G. LEPAGE

Guggisberg, Sir Frederick Gordon, soldier, governor (b at Galt, Ont 20 July 1869; d at Bexhill, Eng 21 Apr 1930). Commissioned in the Royal Engineers in 1889, he served first in Singapore, then at the Royal Arsenal, Woolwich, and as a surveyor in West Africa 1902-14. After distinguishing himself in WWI, he was governor of the Gold Coast (Ghana) 1919-27, where he implemented a 10-year development plan to provide an economic and social infrastructure. He constructed a harbour, college and hospital, improved transportation and encouraged agriculture. He pushed for African advancement in the colonial service, but conceded little to national political demands. He later served briefly as governor of British Guiana. Gold Coast chiefs placed a memorial over his grave, and in 1974 Ghana erected a statue of him in Accra.
RICHARD STUART

Guibord Affair One of the most dramatic incidents in the conflict between Catholicism and liberalism in Québec was the suppression by the bishop of Montréal of the INSTITUT CANADIEN. Founded in 1844, it possessed a library for the use of the members containing many books prohibited by the Roman Catholic index of forbidden books. Bishop Ignace BOURGET regarded the activities of the society as dangerous to the faith of the French Canadians and its very existence as a challenge to the authority of the church. In July 1869 the bishop, supported by Rome, placed the Institut under an interdict. In Nov 1869 Joseph Guibord, who explicitly refused to renounce his membership in the Institut, died, and Bourget denied him burial in consecrated ground. That action opened more than 5 years of violent argument. A suit was brought against the bishop by Guibord's widow Henriette, and in 1874, after a series of appeals, the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL ordered that Bourget's decision be reversed. Guibord's body meanwhile had been placed in a Protestant cemetery. But because of outraged feelings among Catholics in Montréal, an attempt at interment in the Roman Catholic cemetery on 2 Sept 1875 failed. It was finally accomplished on Nov 16 with an armed military escort. Even then Bishop Bourget had the last word. After the burial, he immediately deconsecrated the plot of ground where Guibord's body lay. The Institut canadien did not survive the affair. With only a handful of members remaining, it soon disappeared from public life. H. TURNER
Reading: L.C. Clark, *The Guibord Affair* (1971).

Guillaume-Delisle, Lake, 702 km², is a large, triangular, saltwater lake in northern Québec, connected to the E shore of HUDSON BAY by a long, narrow channel bound by steep cliffs. The W side of the lake is actually a high, rocky ridge separating it from the bay; the E side is irregular and barren, but less bold. The TREELINE begins a few km N and the many islands that litter the southern portion of the lake are wooded. The area was visited seasonally by INUIT and Naskapi, especially at the 2 Whale rivers, a short distance to the S, where beluga whales congregate in the summer. The lake was originally called Richmond Gulf by the HBC, which operated a trading post on the S shore in the 1750s.
DANIEL FRANCIS

Guitar With its small body and 6 nylon strings, the classical guitar is played on a wide fingerboard, allowing for control of simultaneous melody and harmony. It is responsive to a considerable degree of musical expression, on par with the violin and other concert instruments. The guitar can be traced back to harp and lyre-like instruments found in the ruins of the ancient Sumerian city of Ur (2500 BC). The course of guitar evolution lead circuitously to the 15th- and 16th-century 4- and 5-string guitar which, however, did not gain much recognition until the 17th century in the French court of Louis XIV. The 19th century saw the classical guitar as we know it today develop in construction, performance, pedagogy, repertoire and popularity; and the 20th century brought it worldwide popularity, almost solely through the efforts of its master performer Andres Segovia. The electric guitar was introduced in the US in the 1930s and became extremely popular in JAZZ, and later in POPULAR MUSIC.

Although the guitar was brought to Canada as early as the mid-17th century, it had limited use. There were few if any classical guitarists in Canada even in the 1950s, although the influential guitarist and teacher Eli Kassner came to Toronto in 1951 from Austria. Composer Harry SOMERS took guitar lessons from Kassner in 1957 and his "Sonata for Solo Guitar" (completed 1959 and premiered 1964) was the first major Canadian work written for the classical guitar. Though pieces were written by composers John BECKWITH, Walter Buczynski and others, there were few Canadian guitarists to perform them until the 1970s and 1980s, when a number of superb professionals emerged, including Pierre Augé, Liona BOYD, Philip Candelaria, Lynne Gangbar, Paul-André Gagnon, Davis Joachim, Norbert Kraft, Michael Laucke, Peter McCutcheon, Gordon O'Brien, Alan Torok, Jean Vallières, the Wilson-McCallister Duo, Tom and Lynn West and the Laval Trio. Guitarists Michael Shutt (from the UK) and Paul Gerrits (from the Netherlands) immigrated to Canada. Well-known professional pop and folk guitarists in Canada have included Randy Bachman, Bruce COCKBURN, Robbie Robertson and Dom Triano; jazz guitarists have included Ed Bichert, Sonny GREENWICH, Nelson Symonds and Lenny BREAU.

Guitar making has spread to several centres, mostly at the craft level; Richard Berg, Marshall Dun, Oscar Graff, Neil Herbert, Robert Holroyd, Pat Lister and Michael Shriner are a few of the excellent luthers across Canada.

Canadian works composed for the classical guitar have had a corresponding increase, and Boyd, Kraft and Laucke, among others, have launched successful recording careers. Amateur playing, competitions and workshops have been encouraged by the Classical Guitar Soc of Toronto (est 1956) and similar organizations across Canada. Formal instruction is offered by the ROYAL CONSERVATORY OF MUSIC OF TORONTO, the BANFF CENTRE SCHOOL OF FINE ARTS and the Orford Art Centre (JEUNESSES MUSICALES DU CANADA). Canada's first international guitar festival, Guitar '75, was held in Toronto and has been held every 3 years since. Under Kassner's direction, the festival has commissioned new works and has become the most important event of its kind in the world. Guitar '84 featured new concertos by Stephen Dodgson (UK), Leo Brouwer (Cuba) and Harry Somers. D'ARCY GREAVES

Gulf Canada Limited was incorporated in 1906 as the British American Oil Company Limited. In 1969 Gulf Oil Corp of the US bought BA, which became Gulf Oil Canada Limited. The present name was adopted in 1978. Gulf has amalgamated with and acquired other companies; in 1978 it established a Calgary-based subsidiary, Gulf Canada Resources Inc, which handles all resource operations. Today the company explores for and develops oil, gas and coal properties, and refines and markets crude-oil, natural-gas, petroleum and petrochemical products. It holds large areas in western and northern Canada. In 1982 it had sales or operating revenue of $4.7 billion (ranking 11th in Canada), assets of $4.9 billion (ranking 16th) and 10 179 employees. Foreign ownership stands at 75%, with Pittsburgh-based Gulf Oil Corp owning 60% of the shares. DEBORAH C. SAWYER

Gulf Islands are a cluster of 225 islands and islets in the Str (originally Gulf) of GEORGIA E of VANCOUVER I, BC. SALTSPRING is the largest and most populated, and is linked with GALIANO, N and S Pender, MAYNE and Saturna islands by car ferry. VALDES, Thetis, Kuper and Gabriola islands have similar physical and climatic features. Glacial movement created distinctive oceanside and hill-and-valley landscapes on the larger islands, eroding folded sedimentary rock into ridges of sandstone and conglomerate and narrow valleys of softer rock. Exposed bedrock on the islands' numerous points and coves forms interesting stacks, fretworks and galleries. A smooth-barked leafy evergreen, the arbutus tree, occupies exposed rocky sites overlooking the water, and the Garry oak grows on parkland on the islands' sunny sides. Their bucolic charm, calm waters, rich bird and marine life and mild climate, in the driest zone on Canada's Pacific coast, have attracted homesteaders and cottagers since about 1859. Stands of tall timber growing in deep soil were logged early in this century. With improved ferry service since the 1960s, tourism has challenged farming as the islands' most productive industry. The resident population has burgeoned, mostly from an influx of retired people. A number of West Coast artists, craftsmen and writers have also settled here. Preserving the Gulf Islands' character in the face of development pressure is a local political issue.
PETER GRANT

Gull (Laridae), family of long-winged, web-footed BIRDS containing 2 subfamilies: Larinae (true gulls and kittiwakes, about 44 species) and Sterninae (TERNS, about 40 species). Larinae are distributed worldwide; in Canada 22 species of gulls and kittiwakes have been recorded, 18 as breeding. All but one species of Larinae have a squared-off tail. Most adults are white with grey back and wings, and black wing tips. Most have white heads, but some smaller species have black heads. Nearly all juveniles are brownish, becoming white adults in 2-3 years. They are relatively long-lived (banding records show 20-30 years), breeding from 3 to at least 12 years of age. On the West Coast, the glaucous-winged gull (*Larus glaucescens*) is the common nesting gull. Herring, ring-billed, California and Franklin's gulls (*L. argentatus, L. delawarensis, L. californicus, L. pipixcan,* respectively) nest on the prairies. Herring gulls and ring-billed gulls also nest on the Great Lakes. They are joined, in the St Lawrence R and Maritimes, by great black-backed gulls (*L. marinus*) and, in the Maritimes, by black-legged kittiwakes (*Rissa tridactyla*). Bonaparte's and mew gulls (*L. philadelphia* and *L. canus*) and herring gulls nest in the boreal forest region of Canada. Glaucous, Iceland, Thayer's, ivory, Sabine's and Ross's gulls (*L. hyperboreus, L. glaucoides, L. thayeri, Pagophila eburnea, Xema sabini, Rhodostethia rosea*, respectively) nest in arctic Canada.

Gulls frequent coastal and freshwater shores. Although omnivorous, gulls feed primarily on fish. Most nest on the ground, on islands or peninsulas in wild, rural or urban settings. Franklin's and Ross's gulls nest in marshes; Bonaparte's and less frequently mew gulls nest in trees. In southern Canada, nesting begins mid-late Apr, progressively later to the N. Most Canadian species lay 3 olive green, brown-splotched eggs. Nests range from small accumulations of vegetation and debris to large (46 cm diameter), well-made structures with well-maintained nest bowls. Eggs hatch in 3-4 weeks; down-covered young have open eyes, and can walk

hours after hatching. Adult gulls swallow their food whole, then fly to the nest to regurgitate it for young. Young gulls fly about 6 weeks after hatching. A pair of adults may raise 1-2 young from 3 eggs. Young gulls die from exposure, toxic chemicals passed into the egg from the female, starvation, or attacks from adult gulls or predators. Deaths often result because young are unskilled at competing for food.

Most gulls in Canada migrate to areas of open water. Generally, gulls breeding from Manitoba westward migrate to the Pacific coast and southward; those nesting E of Manitoba go to the Atlantic coast and southward. Franklin's gull, which winters in S America, has one of the longest MIGRATION routes of any gull in Canada.

D.V. WESELOH

Gun Control laws seek to limit access to firearms by the potentially dangerous, irresponsible or criminal and to encourage the responsible handling, storage and use of firearms. The Criminal Code, amended in 1977 to strengthen its provisions relating to gun control, defines a firearm as any barrelled weapon from which a bullet may be discharged and which is capable of causing serious bodily injury or death to a person. It defines a prohibited weapon as one that is capable of firing bullets in rapid succession during one pressure of the trigger.

In order to acquire and use firearms, individuals must register for a permit and meet criteria set out in the Code. The issuance of registration certificates is controlled, and businesses are required to maintain inventory and transaction records.

The Code also provides for the enforcement of gun-control laws. It authorizes a peace officer to search for and seize a firearm without a warrant whether on a person, in a vehicle, or in a place, and provides for penalities for the criminal use of firearms and the use of prohibited weapons; it prohibits the improper storage and transportation of firearms, the pointing of a firearm, the carrying of a concealed weapon without permit, and the gift of a weapon to an intoxicated person, or a person of unsound mind.

The Code does allow for certain uses of firearms by gun clubs and collectors (eg, for sporting activities) and by people who require them in their employment, such as peace officers, customs officers. Even these exceptions are subject to the provision, however, that anyone may be prohibited by a court from possession of a firearm for a period of time if the court considers such prohibition desirable in the interests of public safety. VINCENT M. DEL BUONO

Gundy, James Henry, investment dealer (b at Harriston, Ont 22 Mar 1880; d at Toronto 10 Nov 1951). After working for the Central Canada Loan and Savings Co and Dominion Securities Corp, in 1905 Gundy organized the firm of Wood, Gundy and Co, which within several years became Canada's largest investment firm. During WWI he was chairman of the special subscriptions committee of several Victory Loans and later president of the Investment Bankers' Assn of Canada. As an investment dealer he was active in the merger wave of 1923-30 in Canada, mainly in the financial reorganization of companies such as Simpsons, Canada Power and Paper, Dominion Steel and Coal Corp and Massey-Harris. He was a member of the boards of directors of dozens of Canadian companies, including British Columbia Power Corp, Halifax Shipyards, Dominion Life Assurance Co, London Canadian Investment Corp, North American Life Assurance Co and Canada Cement.

JORGE NIOSI

Gunn, William Walker Hamilton, ornithologist, ecologist (b at Toronto 18 Mar 1913; d at Lindsay, Ont 15 Oct 1984). His research on bird migration and behaviour has been applied effectively to ecological management and public education. He was the first executive director of the Federation of Ontario Naturalists 1952-55 and helped found several naturalist and professional biologist organizations. His research into conflicts between birds and aircraft in the 1960s helped develop a warning system still in use by Canadian officials. He was a founder, first president (1971-80) and chairman (1980-84) of LGL Ltd, an early environmental consulting firm. He also pioneered the recording of bird songs, and in 1963 became associated with the CBC as consultant and sound recordist, especially for "The Nature of Things" series. His research, conservation efforts and educational endeavours have been recognized by awards and appointments to several naturalist organizations.

MARTIN K. MCNICHOLL

Gunning, Harry Emmett, scientist, administrator (b at Toronto 16 Dec 1916). After obtaining an MA in English and a PhD in chemistry at U of T (1942), he was a research fellow at Harvard and NRC; professor at U of Rochester (1946) and Illinois Inst of Technology (1948); professor and head of chemistry at University of Alberta (1957) and president there 1974-79. He made major contributions to science and published 175 articles in photochemistry, chemical kinetics, separation of isotopes and petroleum sciences. Council member of NRC and president of the Chemical Inst of Canada, he introduced many innovations in science policy and administration. OTTO P. STRAUSZ

Gurik, Robert, dramatist (b at Paris, France 16 Nov 1932). He immigrated to Canada in 1951 and qualified as an engineer before deciding to devote himself to theatre. His plays treat a variety of themes, from the one-act satire *Le Chant du poète* (1963) to the science fiction of *Api 2967* (1966) and the Kafkaesque *Le Procès de Jean-Baptiste M.* (1972), the latter depicting an average Québecois who out of frustration turns to violence and revenge against society. Apart from *Le Pendu* (1967), Gurik's best-known plays have strong political content, especially his parody of contemporary Canadian politicians, *Hamlet, prince du Québec* (1968), *Play Ball* (1974) and *La Baie des Jacques* (1978). He is the author of 2 novels, *Spirales* (1966) and *Jeune Délinquant* (1980).

L.E. DOUCETTE

Gutenberg Galaxy: The Making of Typographical Man, The, by Marshall MCLUHAN (Toronto 1962), is a brilliantly eclectic analysis in which McLuhan claims that print technology has modified the form of our perception, shifting and concentrating perceptual emphasis from the ear to the eye, with tremendous consequences for individuals and cultures. McLuhan describes the condition of "typographic man" at the historic moment when electronic media meet with print media, an encounter McLuhan studies in his next major work, *Understanding Media* (1964). *The Gutenberg Galaxy* established McLuhan as one of the Western world's most influential and controversial writers in the redefined field of communications; the implications of his often-quoted watchwords, phrases and syntheses continue to fascinate and disturb the post-modern imagination. *The Gutenberg Galaxy* has been translated into French (Paris, Montréal, 1967), as *La Galaxie Gutenberg: la genèse de l'homme typographique,* by Jean Paré; and into German and Italian. NEIL BESNER

Gutteridge, Helena Rose, feminist, trade unionist, socialist politician (b at London, Eng 1879 or 1880; d at Vancouver 3 Oct 1960). Gutteridge immigrated to BC in 1911 and organized the BC Women's Suffrage League. Her interest in working-class women contributed to her participation in trade-union activities, and before long she took a leading role on the Vancouver Trades and Labour Council. Her responsibilities there kindled a turn to socialist politics and membership in the CO-OPERATIVE COMMONWEALTH FEDERATION. In Mar 1937 she was elected as a CCF representative to Vancouver City Council, becoming its first woman member. SUSAN WALSH

Reading: B. Latham and C. Kess, eds, *In Her Own Right* (1980).

Guy, John, merchant venturer, colonizer, governor of the first English colony in NEWFOUNDLAND (d Mar 1629, monument at Bristol, Eng). Guy, an early advocate of colonizing Newfoundland, was appointed governor of the colony created by the London and Bristol Co in 1610. He selected Cuper's Cove (now CUPIDS) in Conception Bay as the site of the settlement; from 39 members in its first year the colony increased to over 60 under his leadership. After 5 years he returned to England but remained a strong supporter of the Newfoundland plantation against English migratory-fishing interests, economic difficulties and war. G.M. STORY

Guyon, Jean, priest, artist (b at Château-Richer, Qué 5 Oct 1659; d at Paris 10 Jan 1687). Bishop LAVAL had great hopes for this young Canadian priest, who died before he could create any significant body of work. The lovely oil portrait of Mother Jeanne-Françoise Juchereau, *dite* de Saint-Ignace, in the Hôtel-Dieu in Québec C, is attributed to him. In addition the SÉMINAIRE DE QUÉBEC at one time had some of his watercolour studies of the flora of Québec. At his death his effects included some oil paints and sculptor's tools, evidence that he intended to help decorate the religious buildings constructed under Laval.

FRANÇOIS-MARC GAGNON

Gymnastics This sport is performed in many different formats: women on the vaulting horse, uneven bars, balance beam and in floor exercises; men on the vaulting horse, pommel horse, rings, parallel bars, horizontal bar and in floor exercises. It is participated in by all ages for fun, fitness, competition and social relaxation, and is included in modern-day school curriculums across Canada. One of the oldest and most fundamental sports, it originated in ancient Greece. Modern-day artistic gymnastics developed in Germany in the early 1800s. The first Olympic Gymnasium opened in Montréal in 1843, followed by others in Québec City, Toronto, Hamilton, Ottawa, Halifax and Victoria. The inspiration for these clubs came mostly from immigrants from Germany and Czechoslovakia; an Englishman, F. Barnjum, was responsible for developments in the most active centre at that time, Montréal. The sport was introduced into school curriculums in the 1800s under the advisement of Egerton Ryerson, and in 1899 Canada became the fourteenth country to join the International Gymnastics Federation.

Competitively, individuals such as Lou Sievert, Alan Keith and Orville Elliott represented Canada at the 1904 and 1908 Olympic Games. In 1956 Ernestine Russell was Canada's first woman Olympic competitor. Canada entered full teams (men and women) in the 1962 world championships in Prague and in the 1968 Mexico Olympics. By 1976 Canada's women's team was ranked in the top 10 in the world; by 1979 the men ranked in the top 15. The first national championship was held in 1923 at the Canadian National Exhibition in Toronto. The CNE donated all awards and for 11 consecutive years hosted this event for men. Women entered the championships for the first time in 1954. Canada has hosted many teams, the first being the Japanese in 1962, and was the host country of the 1980 World Cup in gymnastics.

Canadian gymnastics now has an organization with a full-time staff, sophisticated national programs, a registered membership of over 150 000, over 500 active coaches and many thousands of dedicated supporters. Recent outstanding Canadian gymnasts include Philip De-

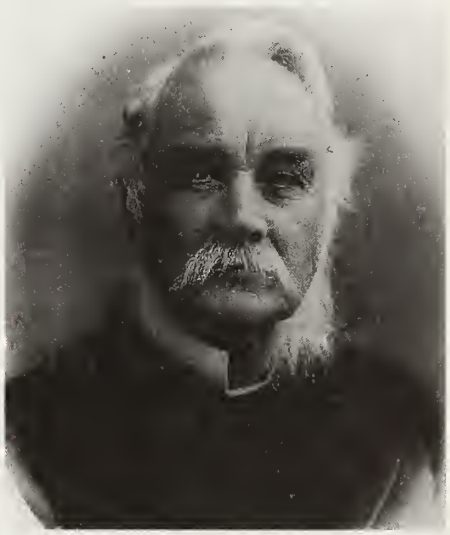


Elfi Schlegel, the first Canadian to win a medal in an international gymnastics meet — a bronze in vaulting at the 1980 World Cup (*photo by Ron Watts/First Light*).

lesalle, the highest ranking Canadian in individual all-around world competition; Elfi Schlegel, the first Canadian medal winner in an international meet (bronze in vaulting, 1980 World Cup); and Karen Kelsall, first Canadian to compete at the World Cup. In the 1983 World Student Games at Edmonton, Canada won 4 medals in gymnastics, including a gold by Philipe Chartrand. In the 1984 Los Angeles Olympics, the women's team placed 5th overall; Kelly Brown was 6th in the vault. The men's team placed 8th. The Canadian Gymnastics Federation boasts fine development programs for all ages. CAROL ANNE LETHEREN

Gypsum, MINERAL consisting of water-containing calcium sulphate ($CaSO_4.2H_2O$). When calcined (roasted) at temperatures of 120-250°C, gypsum releases 75% of its water. The resulting plaster of paris, when mixed with water, can be molded, shaped or spread, then dried or set to form hard plaster. Gypsum was used by the builders of the pyramids as a construction material and earlier by artisans producing decorative objects. Nova Scotia gypsum was shipped to the eastern US in the 1780s for use as land plaster. The popularity of gypsum as a building material grew from the mid-1880s as methods of controlling setting time were developed. Crude gypsum is pulverized and heated to form stucco, which is mixed with water and aggregate (sand, vermiculite or expanded perlite) and applied over wood, metal or gypsum lath to form interior wall finishes. Gypsum board, lath and sheathing are formed by introducing a slurry of stucco, water, foam, pulp and starch between 2 unwinding rolls of absorbent paper, resulting in a continuous sandwich of wet board. Gypsum is also used as a filler in paint and paper manufacture, as a substitute for salt cake in glass manufacture and as a soil conditioner. Canada ranks second among world producers of crude gypsum, after the US. Over 80% of Canadian production comes from the Atlantic provinces, about 70% of this being shipped to American wallboard plants. Other major sources are in Ontario, Manitoba and BC. Crude gypsum is a low-cost, high-bulk mineral commodity and contributes only marginally to the Canadian GNP (about 0.014% in 1980). The gypsum products industry contributes considerably more (0.73% in 1980). D.H. STONEHOUSE

Gzowski, Sir Casimir Stanislaus, engineer (b at St Petersburg [Leningrad], Russia 5 Mar 1813; d at Toronto 24 Aug 1898). He began his engineering career in Canada in 1842. As a superintendent of public works of the Province of Canada, he improved waterways and canals and constructed roads, harbours and bridges. Later he built the Canadian portion of the ST LAWRENCE AND ATLANTIC RAILROAD (1845-53) and constructed the GRAND TRUNK RAILWAY LINE from Toronto to Sarnia (1852-57). He designed and built the international bridge between Fort Erie and Buffalo, NY (1870-73), a difficult job because of strong currents, ice and winds. At the same time he served on a commission to study inland waters from the Atlantic to Lk Superior; its report of 1871 anticipates the system now known as the St Lawrence Seaway. Gzowski was the first chairman of the Niagara Parks Commission and planned the park system along the Canadian bank of the river. Together with several other engineers he formed the Canadian Soc of Civil Engineers and later served as president (1889-91). Established during his term of office, the gold Gzowski Medal has been awarded annually for outstanding written contributions to engineering. Keenly concerned over the defence of Canada, Gzowski fought for the strengthening of the Canadian militia and served in it as lieutenant-colonel and colonel. Appointed aide-de-camp to Queen Victoria (1879), he was awarded a KCMG (1890) in recognition of his services in the military and engineering fields. PHYLLIS ROSE



Sir Casimir Gzowski, born in St Petersburg, Russia, began his career in Canada as a superintendent of public works of the Province of Canada (*courtesy Public Archives of Canada/C-8620*).

Habitant (inhabitant), a relatively precise social connotation initially signifying a status: in NEW FRANCE, habitants were free proprietors who were differentiated from indentured servants and those whose stay was perceived to be temporary. By the late 17th century, "habitant" came to mean peasant proprietor, as opposed to seigneur or town resident. Finally, in the waning years of the 18th century, when landless peasants had become common, all those who earned their living from agricultural labour were known as habitants. *See* SEIGNEURIAL SYSTEM.

THOMAS WIEN

Hachey, Henry Benedict, oceanographer (b at West Bathurst, NB 7 June 1901). Educated at St Thomas U, Saint Francis Xavier, McGill and U of T, he was professor of physics at UNB before joining the Biological Board of Canada (later the Fisheries Research Board) at St Andrews, NB, in 1928. In 1930 he was appointed officer in charge of the Hudson Bay Fisheries Expedition. His service with the armed forces (1940-46) included operational research and antisubmarine duties. As chief oceanographer of Canada (1946-64), he co-ordinated the work of various government agencies in developing Canadian OCEANOGRAPHY. As head of the Atlantic Oceanographic Group of the FRB he established the course of oceanographic studies on the East Coast and Arctic now largely sustained by the BEDFORD INSTITUTE OF OCEANOGRAPHY. His outstanding scientific contributions to oceanography have been widely recognized.

NEIL J. CAMPBELL

Hackett, James Keteltas, expatriate actor (b at Wolfe I, Ont 6 Sept 1869; d at Paris, France 8 Nov 1926). A handsome, swashbuckling, matinee idol, he made his name as the romantic hero of such 1890s hits as *The Prisoner of Zenda* and *Rupert of Hentzau*. He made his professional debut in 1892 in Philadelphia where he was amateur duelling champion. He toured to Halifax and Saint John in 1893 and opened his own theatre in New York in 1905. Aspiring to serious roles, he mounted with an inherited fortune New York productions of *Othello* (1914) and *Macbeth* (1916), remembered for their advanced scenic design. In 1920 *Macbeth* was taken successfully to London and Paris. He was awarded the French Legion of Honour.

DAVID GARDNER

Haddock, *see* COD.

Haendel, Ida, violinist (b at Chelm, Poland 15 Dec 1924). Celebrated for flawless technique and beauty of tone, Haendel has enjoyed great demand as a soloist, recitalist and recording artist, performing a large repertoire ranging from Bach to Bartók through a lengthy international career. A child prodigy in her native Poland, she immigrated to England prior to WWII. She gave recitals for British servicemen and appeared as soloist in concertos with many well-known British and European conductors. Haendel immigrated to Canada in 1952 and settled in Montréal. She has given recitals in Canada and performed with major orchestras, among them the Montréal, Toronto and Vancouver symphonies. In 1977, with a CBC orchestra conducted by Franz-Paul Decker, she gave the Canadian premiere of Benjamin Britten's *Concerto*.

BARCLAY MCMILLAN

Hagerman, Christopher Alexander, lawyer, politician, judge (b at Adolphustown, UC 28 Mar 1792; d at Toronto 14 May 1847). "Handsome Kit" grew up outside the charmed circle of pupils educated by John STRACHAN. Rising spectacularly by dint of his service during the WAR OF 1812, he was appointed to the lucrative collectorship of customs at Kingston. He was called to the Bar in 1815 and proved a brilliant lawyer and eloquent orator. This latter gift served him well as an assemblyman and leading conservative spokesman in 4 parliaments. A large, powerfully built man, he was bumptious and aggressive: on one occasion, he horsewhipped Robert GOURLAY. His impulsive actions at times had disastrous political results, notably his role in handling the ALIEN QUESTION and the expulsion of William Lyon MACKENZIE from the assembly. His bellicose personal traits, natural abilities and ardent defence of toryism in successive administrations made Hagerman a *bête noire* of the Opposition. He was a particular favourite of Lt-Gov COLBORNE and served as solicitor general 1829-33 and attorney general 1837-40 when like others of the so-called FAMILY COMPACT he was appointed to the Court of Queen's Bench, a position he held until his death.

ROBERT L. FRASER

Hagfish, group of primitive VERTEBRATES which together with LAMPREYS and various extinct forms comprise the FISH class Agnatha. Hagfishes have an eellike body with a cartilaginous skeleton which permits a degree of flexibility unique among vertebrates. The mouth is a fleshy tunnel with an eversible tongue carrying 2 rows of horny teeth; a single tooth occurs on the palate. Hagfishes have 6-8 barbels (whiskerlike tactile organs) around the mouth and a single nostril. The eyes lack a lens. External gill openings (1-16 pairs) occur on each side. Scales and paired fins are absent; a single fin extends around the posterior profile. A well-marked series of mucous pores occurs along the sides; when handled or disturbed, hagfishes produce large amounts of mucus. Hagfishes are hermaphroditic and lack a larval stage. A few large (30 x 10 mm) keratinized eggs are laid. Unlike lampreys, hagfishes do not shrink in size at spawning. All species live only in salt water, sometimes at great depths. They feed on dead or dying fish by boring into the body cavity, and may be damaging to FISHERIES. In Canada, one species, *Myxine glutinosa*, is found in the Atlantic; 2 species of genus *Eptatretus* in the Pacific.

VADIM D. VLADYKOV

Haida live along the coastal bays and inlets of the QUEEN CHARLOTTE IS, BC. Archaeological evidence confirms continual habitation on the islands for at least 8000 years (*see* PREHISTORY). A few hundred years ago a small group of Haida migrated N to the southernmost islands of the Alaskan "panhandle," where their descendants live in the village of Hydaburg. The Haida language is an isolate with 2 dialects — Masset is spoken in the northern islands and Skidegate in the S. Haida culture and art are distinctive within Northwest Coast traditions, though there are cultural similarities to the neighbouring TSIMSHIAN and TLINGIT.

Traditionally, each village was an independent political unit, and to a great extent each family in a village was an independent entity. All Haida, however, belonged to one of 2 clans — the Eagle or the Raven. A Haida always married a member of the opposite CLAN, and clan membership was inherited from the mother. Individuals publicly proclaimed clan membership through an elaborate display of inherited family crests, carved on TOTEM POLES erected in front of houses and carved or painted on great war CANOES, cedar boxes, MASKS, and utilitarian and decorative objects. Large ceremonial feasts (*see* POTLATCH) were a focus of Haida life, a means of reinforcing the social and economic organization and the interdependence of clans, lineages and villages.

The first recorded European contact (1774) was with the Spanish explorer Juan PERÉZ. British Capt George Dixon initiated trade (1787) with the Haida for sea-otter pelts, and the Haida remained at the centre of the lucrative China



Haida village on the Queen Charlotte Islands, BC, with totem poles depicting stories and family crests, 1878 (*courtesy Geological Survey of Canada/255*).



A Haida face mask with the outer mask of a hawk and unfolding segments to show a green human face inside (*courtesy National Museums of Canada/National Museum of Man/S72-1529*).

sea-otter trade until the mid-1800s. European settlers did not significantly populate the Queen Charlotte Is until almost 1900. Mainland fur traders estimated a Haida population before 1850 of 6000-8000. By the 20th century the population had declined to under 1000 people, mainly because of smallpox and other diseases. Though the Haida were traditionally a warlike people, their large seagoing canoes carrying them on raiding expeditions as far S as Washington state, incidents of violent confrontation with Europeans were few. In 1983 the Haida population on the Queen Charlotte Is was approximately 1400, with another 700 living off the islands, mostly in urban centres.

Contemporary Haida are famous for their fine art (*see* NORTHWEST COAST INDIAN ART), and many work as prosperous commercial fishermen, loggers and artists. *See also* NATIVE PEOPLES; NORTHWEST COAST and general articles under NATIVE PEOPLE.

TRISHA GESSLER

Reading: J.R. Swanton, "Contributions to the Ethnology of the Haida," *The Jesup North Pacific Expedition*, Vol 5, Part 1 (1901).

Halda, a powerful WWII "Tribal" Class destroyer, commissioned 30 Aug 1943, built in England for the Royal Canadian Navy. From Jan 1944 to Jan 1945 it patrolled the English Channel and the Bay of Biscay, and it was present at the NORMANDY INVASION, 6 June 1944. *Haida* became famous for participating in the destruction of several German ships. After peacetime service, 1947-50, it received modern armament and from 1952 to 1954 served with UN forces in Korea. It remained in service with the RCN until 11 Oct 1963. The next year friends and admirers bought it, and in 1970 it was taken over by the Ontario government and moved permanently to Ontario Place, Toronto, as a naval memorial.

ROGER SARTY

Haig-Brown, Roderick, author, conservationist (b at Lancing, Eng 21 Feb 1908; d at Campbell River, BC 19 Oct 1976). Haig-Brown's early appreciation of nature greatly influenced his later life. A 1926 visit to the American West impressed him with the hunting and fishing opportunities of the Pacific coast, and he emigrated to Vancouver I in 1931, eventually settling at Campbell R. He made his living by logging, trapping, guiding and increasingly by writing. His early stories fictionalized various types of wildlife, including cougars (*Ki-ya — A Story of Panthers*, 1934) and Atlantic and Pacific salmon (*Return to the River*, 1941; *Silver*, 1932). Although his later adult novels were moderately successful, he is perhaps best known as an author of children's literature. *Starbuck Valley Winter* (1943) and its sequel *Saltwater Summer* (1948) received much acclaim, the latter winning a Gov Gen's Award. His essays on sportfishing (*A River Never Sleeps*, 1946; *Measure of the Year*, 1950) have considerable literary merit and wide popular readership. His *A Primer of Fly Fishing* (1964) is considered a standard work on the subject. A committed conservationist, Haig-Brown eloquently supported the preservation of wilderness areas and condemned the rank exploitation that has characterized much of the development of the West.

C.J. TAYLOR

Hail, precipitation consisting of lumps of ICE, 5 mm to 10 cm in diameter and about 0.1 g to 1 kg in weight. A 290 g hailstone that fell near Cedoux, Sask, is one of the largest recorded in Canada. A hailstone begins as a frozen RAIN droplet or snow pellet, falling through a CLOUD which has a temperature below 0°C. The embryo hailstone collects water by collision with supercooled (unfrozen) cloud droplets. Vertical air currents of 10-50 m per second help keep it in the cloud as it grows. Some of the accreted water freezes, yielding ice which may be bubbly or clear, depending on the cloud liquid-water concentration, air temperature and hailstone size. Variations of these parameters during the hailstone's growth lead to an onionlike appearance, consisting of alternating layers of clear and bubbly ice. These layers, clues to the hailstone's history, can be seen by cutting the hailstone in half, or by examining a thin slice between crossed, polarizing filters.

Although hail occurs in all provinces, it is most frequent and severe in Alberta and Saskatchewan, where farms have been hit up to 10 times in one year. Here, hail comes mostly from late-afternoon, summer THUNDERSTORMS, which can grow to heights of almost 20 km. Severe hailstorms may last for several hours and leave a hail swath up to 50 km wide in places and hundreds of kilometres long. Large hailstones damage crops, buildings and automobiles. Very big ones have as much energy as a bullet and can injure or kill animals and people. A hailstorm in Calgary on 28 July 1981 caused $100 million of damage to property. The total annual loss to crops and property in Canada may exceed twice that amount. In Alberta attempts to reduce hail damage, through cloud seeding with silver iodide, have been undertaken since 1956. Although some evidence appears to indicate benefits from this practice, hail suppression remains controversial.

E.P. LOZOWSKI



This hailstone, 7 cm across, fell near Cedoux, Sask, on 27 Aug 1984. A thin slice reveals colourful ice-crystal layers, which provide clues to how the stone was formed (*courtesy Edward Lozowski/Tony Kot*).

Hailey, Arthur, author (b at Luton, Eng 5 Apr 1920). He served in the RAF 1939-47 as a flight lieutenant and immigrated to Canada in 1947. He has become a successful writer of POPULAR LITERATURE, and his forte lies in his practice of writing novels — dealing with fashionable subjects — that have been well researched. His literary career has spanned a quarter of a century. After collaborating on adventure novels in the 1950s, he produced a string of BEST-SELLERS, including *The Final Diagnosis* (1959), *In High Places*, dealing with the Ottawa political scene (1962), *Hotel* (1965), *Airport* (1968), *Wheels* (1971), *The Moneychangers* (1975), *Overload* (1979) and *Strong Medicine* (1984). He has written scripts for a number of movies, including *Hotel* (1966) and *Airport* (1970), and numerous television plays. He now lives in the Bahamas.

DAVID EVANS

Haileybury, Ont, Town, pop 4925 (1981c), inc 1904, located on NW shore of Lk TIMISKAMING, 150 km N of North Bay. Haileybury was established and named (after his English *alma mater*, Haileybury College) by C.C. Farr, who came to the area as an employee of HBC in 1883. Because of its readily accessible port facilities on Lk Timiskaming and its proximity to the silver mines of COBALT and to the agricultural region known as Little Clay Belt, Haileybury developed as a residential, mercantile and service centre for the whole vicinity. Famous for its devastation by several forest fires, most notably the Great Fire of 1922 which dispossessed over 2900 people, the town has since maintained and strengthened its role as commercial entrepot, and has taken on new functions as seat of the District of Timiskaming and site of a campus of the Northern College of Applied Arts and Technology (School of Mines).

MATT BRAY

Haines Junction, YT, UP, pop 366 (1981c), is located at the junction of the ALASKA HWY and the Haines Hwy, built to the port of Haines, Alaska, by US Army engineers 1942-45. Army barracks and shops were the first buildings on the site, and a Canadian customs office and RCMP station followed completion of the road. As headquarters of KLUANE NATIONAL PARK, Haines Junction offers facilities for trail riding, mountain climbing and photographic expeditions.

H. GUEST

Hainsworth, George, hockey player (b at Toronto 26 June 1895; d near Gravenhurst, Ont 9 Oct 1950). He joined MONTREAL CANADIENS in 1926 as a replacement for Georges VÉZINA and was traded to TORONTO MAPLE LEAFS in 1933, playing 3½ years before returning briefly to Montréal. He won the VÉZINA TROPHY the first 3 years it was awarded and recorded 22 shutouts in 44 games in 1928-29 and 94 shutouts in 464 NHL games. He was killed in a car crash.

JAMES MARSH

Haldimand, Sir Frederick, army officer, governor (b at Yverdon, Switz 11 Aug 1718; d there 5 June 1791). As governor of Québec Haldimand concentrated on defending the province militarily and the status quo politically. After service in Prussia and Holland, he transferred to the British army in 1756. He served in N America during the SEVEN YEARS' WAR, and after the CONQUEST of Canada he was twice military governor of Trois-Rivières. He was governor of Québec 1777-86 between Guy Carleton's 2 terms, but was in the province only 1778-84. He attempted to improve the province's defences and sent raiding parties against the American frontier. Politically, Haldimand agreed with the French party that the QUEBEC ACT represented the charter of government and rejected the English-speaking community's demands for English institutions. As the AMERICAN REVOLUTION ended, he was responsible for establishing the LOYALIST refugees in what is now Ontario, a task he carried out efficiently, and for reconciling the six NATIONS to their resettlement in Canada.

STUART R.J. SUTHERLAND

Haliburton, Thomas Chandler, author, judge, politician (b at Windsor, NS 17 Dec 1796; d at Isleworth, Eng 27 Aug 1865). Haliburton was a born Tory, whose father and grandfather had been lawyers and judges. An Anglican, he was educated at King's Collegiate School and King's College, Windsor, NS. Following graduation in 1815 he studied law and was admitted to the bar in 1820. Gregarious and ambitious, he soon founded a law practice in Annapolis Royal and established a sufficient local reputation to become an MLA in 1826. Three years later he was elevated to the bench. In 1854 he was appointed to the NS Supreme Court but retired 2 years later because of ill health. While a judge, and in addi-



Thomas Chandler Haliburton, lithograph by E.V. Eddie. Haliburton's book, *The Clockmaker: or, the Sayings and Doings of Samuel Slick, of Slickville*, made him the first Canadian writer to gain an international reputation (*courtesy Public Archives of Canada/C-6087*).

tion to his family and social life and his writing, Haliburton was an active businessman. He relinquished direct participation in his business endeavours when he moved to England following his retirement from the bench. There Haliburton settled at Isleworth and in 1859 became the Tory MP for Launceston. He retired from politics in England in 1865.

Haliburton's reputation lies in the many substantial works in provincial history, political pamphlets and fiction that he wrote from 1823 to 1860. His first book was published in 1823 when he was 27. *A General Description of Nova Scotia* (1823) was followed by a more ambitious, 2-volume work, *An Historical and Statistical Account of Nova Scotia* (1829). His other historical writings include *The English in America* (1851) and *Rule and Misrule of the English in America* (1851). Two political works also demonstrate Haliburton's lifelong interest in Canadian affairs: *The Bubbles of Canada* (1839) and a shorter pamphlet, *A Reply to the Report of the Earl of Durham* (1839). It was *The Clockmaker; or, the Sayings and Doings of Samuel Slick, of Slickville* that made Haliburton the first Canadian writer to gain an international reputation. Twenty-two instalments of *The Clockmaker* appeared in the newspaper *Novascotian* before it was first published in book form by Joseph HOWE in 1836. There soon followed *The Clockmaker*, 2nd series (1838), and in 1840 the 3rd series. It is estimated that as many as 80 editions of *The Clockmaker* appeared during the 19th century.

Perhaps Haliburton's finest and most enduring work is *The Old Judge; or Life in a Colony* (1849). This work reveals Haliburton in a more sombre and reflective mood as he states with genuine feeling his farewell to Nova Scotia. *The Old Judge* lacks the wisecracking observations that made the adventures of Sam Slick so readable, but it is balanced and marked by a maturity not always present in Haliburton's other writings.

Like his fellow Nova Scotians, Thomas MCCULLOCH and John YOUNG ("Agricola"), Haliburton provoked Nova Scotians to better themselves in agriculture and business to combat the depression of the 1820s. Despite his initial debt to McCulloch, he extended his writings to fight the political situation both at home and in England. *The Clockmaker* has been described as "a series of moral essays pointed by satire." There can be no doubt about Haliburton's extraordinary ability as a writer of social satire which was heightened by his ear for local idiom, dialect and anecdote. No full bibliographical study of Haliburton's career has yet been made, nor is there a book-length biography. DOUGLAS LOCHHEAD

Halibut, *see* FLATFISH.

Halibut Treaty, 2 Mar 1923, a Canadian-American agreement concerning fishing rights in the N Pacific Ocean; the first treaty independently negotiated and signed by the Canadian government. Although Canada's right to negotiate commercial treaties was well established, the British wished to sign the convention along with Canada, as they always had. PM Mackenzie KING argued that the matter was solely the concern of Canada and the US; he threatened separate Canadian representation in Washington, and the British acquiesced. The Halibut precedent, confirmed by the Imperial Conference of 1923, was an important step towards establishment of Canada's right to separate diplomatic action. NORMAN HILLMER

Halifax, capital of Nova Scotia and largest city in Atlantic Canada, occupies a strategic and central location on the province's E coast. With neighbouring Bedford and Dartmouth, it surrounds one of the world's largest harbours. Sometimes called "Warden of the North" for its historic military role, today it is a major regional centre for Atlantic Canada's economy. Founded in 1749 and first named Chebucto, it was renamed shortly after as Halifax in honour of George Dunk, earl of Halifax and chief Lord of Trade and Plantations, who masterminded its settlement.

Settlement MICMAC occupied various harbour sites, as did French forces temporarily as late as 1746. To counter the French presence at LOUISBOURG, but ultimately and more importantly to exploit the rich cod fishery, the British government sponsored a settlement plan for Nova Scotia focused on Halifax. Some 2500 settlers, recruited mainly from England and led by Col Edward CORNWALLIS, established a new town in the summer of 1749. The gridlike plan, with a central square, was later copied throughout the region. Settlers drew free building lots, but few completed houses before winter, when half the population fled to the American colonies. Dartmouth was first settled in 1750, but the Indian threat and isolation from Halifax's defences restricted growth.

Development Halifax functions on the margin of the Canadian and N Atlantic trading world. This "tyranny of location" makes it less favoured for growth than other Canadian cities.

Population: 114 594 (1981c); 277 727 (CMA)
Rate of Increase (1971-81): (City) 6.6%; (CMA) -24.7%
Rank in Canada: Thirteenth (by CMA)
Date of Incorporation: 1841
Land Area: City 62 km²; 691 km² (CMA)
Elevation: 25 m (est)
Climate: Average daily temp, July 18.5°C; Jan -33°C; Yearly precip 1376 mm; Hours of sunshine 1872 per year

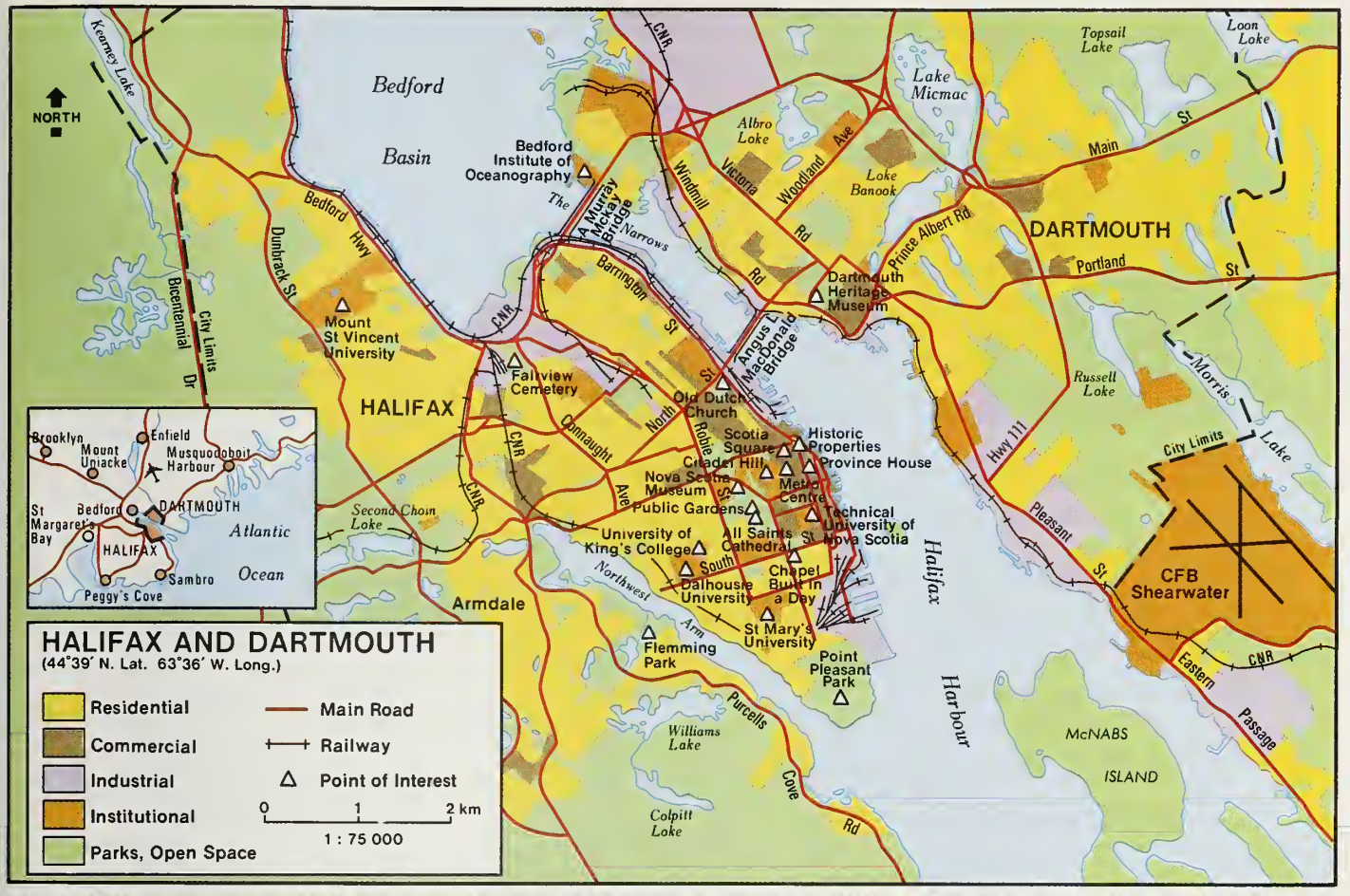
Exports of fish and forest staples were comparatively small and mercantile activity risky until the early 19th century. Wartime activity buoyed the local economy during the Napoleonic Wars (1793-1815). Economic growth based on trade to the West Indies and international shipping expanded wealth and population, culminating in a "golden age" of prosperity at mid-century. Enos COLLINS established the Halifax Banking Co; Samuel CUNARD earned his early fortune in the city. The age of sail was surpassed by railway building after 1850 and the new industrialism of the 1870s, both linking Halifax to the continental economy. But the industrial spurt in Halifax and Dartmouth, including a cotton factory, 2 sugar refineries, a ropework and railcar plant, was short-lived. Some of these businesses were destroyed during the HALIFAX EXPLOSION (1917). Distance to markets, lack of local resources, and central Canadian competition limited further manufacturing expansion.

By WWI, the BANK OF NOVA SCOTIA and the Mercantile Bank (ROYAL BANK) had relocated in Toronto and Montréal. Halifax strengthened only its transportation function. The large-scale ocean terminals were initiated in 1912. Wartime activity (1914-18 and 1940-45) heightened Halifax's enduring strategic role, but steady development from the 1950s stems from wholesale distribution, transportation, government services, and specialized functions such as the internationally famous BEDFORD INSTITUTE OF OCEANOGRAPHY. Offshore oil discoveries promise additional growth. Halifax's economic base is largely determined by its maritime, but nonetheless peripheral, location in Canada.

Cityscape Early Halifax stretched N and S for several kilometres along the harbour, flanked to the W by the Citadel and the Common. The Naval Dockyard (1758) occupied a site in the North Suburbs, a working-class district even today. The South Suburbs and large estates on the Northwest Arm were preserves of the upper classes. St Paul's, Canada's oldest Anglican

The Tandem Club, an association of the urban gentry that met in Halifax in the winter months (*courtesy Public Archives of Canada/C-13362*).





church (1749), PROVINCE HOUSE (1818), Government House (1827) and other important institutional and residential buildings attest to Halifax's rich architectural heritage. Like Vancouver's Stanley Park, Halifax's Point Pleasant Park (1866) was once a military reserve. By the 1950s, much of peninsular Halifax was built up. In Dartmouth, locks of the Shubenacadie Canal and waterfront manufacturing tell of 19th-century industries. With the recent spanning of Halifax Harbour by the Angus L. Macdonald (1954) and A. Murray MacKay (1970) bridges, Dartmouth's residential importance grew rapidly. Suburban Bedford and the Sackville district now share this growth. Central Halifax has been revitalized by extensive redevelopment around the original central square and waterfront. Projects include Scotia Square, Historic Properties, the Maritime Museum and a courthouse. Dartmouth's historic core has been similarly restored.

Population Until recently, Halifax has been overwhelmingly British; people of British origin now make up about 80% of the population. Most are either ENGLISH or IRISH; Scots number fewer. These groups were present at Halifax's founding and were soon joined by GERMANS ("Foreign Protestants") and Americans. The Irish gained the majority through the early 19th century. Late 19th-century immigration bypassed Halifax for Ontario and the West. Growth was therefore slow, dependent on natural increase and on migrants from rural NS. Expansion of the city boundaries westward in 1969 boosted population considerably. Summer brought additional army and navy personnel (as did war); winter, extra dockworkers. Today, many newcomers to Halifax-Dartmouth are transients, employees of the armed forces, national corporations, research institutes and the federal government.

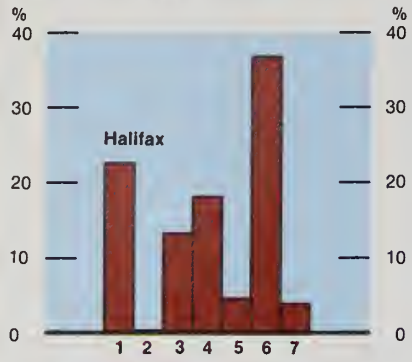
Economy and Labour Force The strength of the metropolitan area economy rests on Halifax's defence and port functions, and on the service sector. Manufacturing employs few people; fishing is unimportant. Regional prominence in government administration, health services, university education, research activities, as well as the traditional functions of trade, distribution, transportation and finance all sustain Atlantic Canada's most dynamic urban economy. In fact, considerable disparities distinguish the well-being of Halifax-Dartmouth from most of the Maritimes. Despite success, control of the economy lies beyond the city; branch businesses are the major employers.

Transportation Halifax is the principal port in the Maritimes. Two large container terminals, recently built, serve all Canada. Containers travel over the CNR, the successor to the INTERCOLONIAL RY, which was once headquartered briefly in Halifax (1872). The CPR's Dominion Atlantic Ry runs to the Annapolis Valley and by car ferry across the Bay of Fundy to SAINT JOHN. Other lines along the southwestern and eastern shores now stand idle. Halifax merchants once owned many ships and they dominated the province's shipping industry throughout the 19th century, a prominence not sustained in the steamship era; major steamship companies were owned by outsiders. The Halifax International Airport is now home field to Eastern Provincial Airways and is served by Air Canada and CP Air. Water, rail and air facilities will expand with offshore oil development.

Government and Politics Continuity and accommodation mark Halifax politics, but significant reforms have occurred through the city's history. Until incorporation as a town in 1841, local affairs were governed by an appointed "clique of magistrates." Joseph HOWE promoted reform, and with Halifax's incorporation, an elected mayor and council of aldermen representing city wards managed urban affairs. This system still exists. Through RESPONSIBLE GOVERNMENT, established in NS in 1848, Halifax lost dominance over provincial politics. Since 1967, however, when more legislative seats were created, metropolitan Halifax has reasserted a prominent position in provincial politics. Other changes include a short-lived board of control, established at the time of WWI during the Urban Reform era, and the introduction of a city manager in 1951 to administer day-to-day business affairs. Partisan politics play little role in local government, despite significant class and religious divisions. A "dual" school system, introduced in the 1860s, operates Catholic and other "public" (nonsectarian) schools, but the 1969 annexation of suburban districts from the County of Halifax and school closures in central Halifax have weakened this system. A century-old "gentleman's agreement" of alternating Catholic and Protestant mayors ended in 1968 when incumbent Allan O'Brien, a Protestant, won re-election against another Protestant. Metropolitan government for Halifax, Dartmouth, Bedford and neighbouring communities does not yet exist, but several metropolitan agencies provide region-wide planning, sanitary and transit service.

Cultural Life Halifax is the cultural centre of Nova Scotia. From its founding, music, art and the theatre have been central attractions. When it was a garrison town, many officers both supported and participated in these activities. The Neptune Theatre, the Nova Scotia College of Art and Design, and the Atlantic Symphony today continue these traditions. Well-known writers associated with the capital are Thomas Chandler HALIBURTON, Thomas MCCULLOCH, Thomas RADDALL, Hugh MACLENNAN and Charles RITCHIE. MacLennan's *Barometer Rising* details the drama surrounding the Halifax Explosion of 1917. The Halifax *Gazette* (1752), Canada's first newspaper, and the *Novascotian*, once a forum

Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



industry groupings

1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figura II, Catalogua 31-209, Statistics Canada.

for Joseph Howe's reform politics, are no longer published; remaining are the *Chronicle-Herald*, the *Mail Star*, the (Sackville) *Daily News* and Dartmouth's weekly *Free Press*.

The NS Museum and the Maritime Museum exhibit the historic past, which is also recorded by the Public Archives of NS. Traditions are further upheld by long-established ethnic organizations such as the Charitable Irish Soc (1786) and the North British Soc (1761). There are several universities in Halifax, most with religious affiliations. DALHOUSIE (founded 1818) was the first. ST MARY'S (chartered 1841) is the oldest English-speaking Roman Catholic university in Canada. King's Coll U, founded by Anglicans in 1788 at Windsor, moved to Halifax in 1929. MOUNT ST VINCENT, a university since 1966, was founded in 1873 by the Sisters of Charity as a residential school for young ladies. The TECHNICAL UNIVERSITY OF NOVA SCOTIA, the NS Institute of Technology, and the NS College of Art and Design offer specialized programs. Amateur rather than professional sports characterize the metropolitan area. The Wanderers' Amateur Athletic Assn (1882) is most renowned. Yachting, rowing, canoeing, curling, swimming and other sports have produced national champions.

L.D. McCANN

Reading: M.J. Bird, *The Town That Died* (1962); Phyllis Blakeley, *Glimpses of Halifax* (1973); Thomas Raddall, *Halifax: Warden of the North* (1965).

Halifax Citadel The present citadel, located on an imposing elevation overlooking the original town and harbour of the capital of Nova Scotia, is actually the fourth fortification built on the site. Earlier works were built in 1749-50, 1776-81 and 1795-1800. Plans and estimates for the present fort were submitted in Dec 1825. Three years later the British government granted the necessary funds and work began in Sept 1828. The men most responsible for the construction were Sir James Carmichael Smyth and Col Gustavus Nicolls, both Royal Engineers officers. Construction was plagued with design and structural problems and took almost 30 years. The fort, finally completed 1855-56, cost £242 122. The general introduction of rifled artillery (with greater range and accuracy than earlier guns) shortly after completion of the Citadel rendered the costly installation obsolescent. It was partially rearmed in the 1860s and 1870s, and continued in use as a barracks into the 20th century. Upon departure of the British garrison in 1906, it was handed over to the Canadian militia. In May 1951 it was transferred to the Dept of Resources and Development; and finally, in July 1956, the site was declared a National Historic Park. About 1 million people visit the site annually. ROBERT ALLEN

Halifax Explosion At 8:45 AM, 6 Dec 1917, at the height of WWI, the Belgian Relief vessel *Imo*, through human error and negligence, collided with the French munitions carrier *Mont Blanc* in the narrowest part of Halifax harbour. Sparks generated by the collision ignited benzol stored on the *Mont Blanc*'s deck; the burning liquid then seeped into the holds, where it lit 2766 t of picric acid, TNT and guncotton. At 9:06 the munitions ship blew a mile high in the world's greatest man-made explosion before Hiroshima.

Over 2½ km² of Halifax's industrial N end was totally levelled, either by the blast, the subsequent tidal wave or the raging fire caused when structures collapsed inward on roaring stoves and furnaces. Homes, offices, churches, factories, vessels, the railway station and freight yards — all were obliterated. Farther from the epicentre, Citadel Hill deflected shock waves away from S and W Halifax, where shattered windows and doors were the predominant damage. Across the harbour, Dartmouth suffered devastation to a lesser degree, since its N section was sparsely developed. The blast shattered windows in Truro, 100 km away, and was heard in PEI.

Out of a population of less than 50 000, over 1600 people died and 9000 were injured, including 200 blinded by flying glass. Sixteen hundred buildings were destroyed and 12 000 damaged; 6000 people were homeless and 20 000 lacked adequate shelter. Total damage amounted to $35 million. The misery was compounded by a forced evacuation of the city, necessitated by fire threatening the main dockyard magazine, and by appalling weather conditions in the days immediately following the explosion.

Relief assistance was immediate and extensive. Trains from throughout the Maritimes and from central Canada and New England brought medical aid, food, clothing, building materials and skilled labourers. The continuing assistance provided by the Massachusetts Relief Committee was particularly noteworthy. Money donated by government, industry and individuals worldwide eventually totalled some $30 million, and was administered 1918-76 by the HALIFAX RELIEF COMMISSION. LOIS KERNAGHAN

Reading: M.J. Bird, *The Town that Died* (1962); G. Metson, *The Halifax Explosion* (1978); Hugh MacLennan, *Barometer Rising* (1941).

Halifax Relief Commission began 6 Dec 1917 as an emergency committee to provide immediate relief after the HALIFAX EXPLOSION. In Apr 1918, a 3-man commission was incorporated by provincial statute to administer a $30-million fund for medical care, social welfare, compensation and reconstruction. Total destruction and lingering human misery encouraged the rapid implementation of various innovative civic-planning and social-rehabilitation schemes, including a master town plan in 1921 and Canada's first public-housing project, the Hydrostone development, built in the devastated area and administered by the commission. By 1948 the commission's priorities had changed and it became a pension board. In 1976, with $1.5 million remaining and 65 disabled dependants, the Halifax Relief Commission was terminated and its responsibilities transferred to the Canada Pension Commission.

LOIS KERNAGHAN

Hall, Emmett Matthew, lawyer, judge (b at St-Colomban, Qué 9 Nov 1898). In 1910 Hall moved to Saskatoon with his family. A classmate of John G. DIEFENBAKER, he graduated in law from U of Sask in 1919 and was appointed chief justice Court of Queen's Bench for Saskatchewan in 1957. He became chief justice of Saskatchewan in 1961 and was elevated to the Supreme Court of Canada in 1962, retiring in 1973. He has reported on a national health scheme for Canada (1964), the Ontario primary- and secondary-school programs (1968), railway arbitration (1973), provincial court structure in Saskatchewan (1974) and grain handling and transportation in western Canada (1977). He received the only honorary medical degree (U of

The Halifax Citadel, completed 1855-56, took almost 30 years to build and is the fourth fortification on the site (*photo by Sherman Hines/Masterfile*).



O) ever awarded, and has been chancellor of U Sask since 1978. FREDERICK VAUGHAN

Hall, John Scott, painter (b at Edmonton 17 Jan 1943). Hall studied at the Alberta College of Art, Calgary (1960-65) and Instituto Allende in Mexico (1965-66) and has taught at Ohio Wesleyan U, Delaware, Ohio (1969-70), Alberta College of Art (1970-71) and U of Calgary (1971-). He rose to national prominence during the 1970s with his large hyper-realist still-life paintings of common objects that he selected intuitively, then carefully arranged in glass-covered boxes. More recently he has painted from photographs of similar still-life arrangements of toys and souvenirs. His painstaking enlargements of these objects on canvas adds to their implied importance, but the paintings are so cool and detached that they are impossible to interpret literally. CHRISTOPHER VARLEY

Halpenny, Francess Georgina, editor (b at Ottawa 27 May 1919). After studies in English at U of T, she began in 1941 her long association with U of T Press, interrupted only by service in the RCAF 1942-45. She headed the editorial department of UTP 1957-69 and then became general editor of the DICTIONARY OF CANADIAN BIOGRAPHY, a joint UTP-Presses de l'U Laval project. While continuing as general editor, she was dean of the Faculty of Library Science at U of T 1972-78 and was appointed to the National Library Advisory Board in 1977, a board she chaired 1979-82. She was associate director (academic) of UTP 1978-84. Through these years she continued an interest in theatre as an actor and writer. Indefatigable and unfailingly optimistic, she has encouraged scholarly publishing in Canada over 40 years by her teaching, writing, editorship of the DCB, and dedicated committee work at the national level. A member of the Royal Soc of Canada, she was awarded the MOLSON PRIZE in 1983 and made a companion of the Order of Canada in 1984.
MARY MCDOUGALL MAUDE

Hamel, Théophile, painter (b at Ste-Foy, Lower Canada 8 Nov 1817; d at Québec City 23 Dec 1870). Appointed official portrait painter in 1853, Hamel was referred to as the national painter by contemporary journalists, and was throughout his career one of the most popular painters with notables and clergy alike. From age 16 to 22, Hamel apprenticed with Antoine PLAMONDON in Québec C. He travelled to Europe in 1843, studying in Rome and visiting France and Belgium. He returned to Québec in 1846, and opened a studio. He moved to Montréal in 1847 for 2½ years before establishing his permanent residence in Québec.

Given the poorly developed communications of the 19th century, the upper classes used artists to make them known and spread their influence over either their flock (clergymen), or voters (politicians) or their social circle (professionals). Inspired by Titian, Hamel developed a style perfectly suited to the aspirations of members of the liberal professions. With Plamondon he had developed the technical mastery needed to paint faithful portraits and learned to handle daring chromatic effects, reflections and the rendition of beautiful fabrics. He refined his sober art during a stay in Italy 1843-46, studying the works of his mentor, Titian. Hamel created an interesting gallery of historical figures, including Jacques CARTIER, CHAMPLAIN and General James MURRAY. He did official portraits of the Province of Canada politicians, now housed in the Parliament Buildings in Ottawa, and many other portraits of politicians in Québec C, Kingston, Montréal and Toronto. Catholic and Protestant bishops, grand vicars, priests and founders of religious communities all posed for Hamel. Several notaries, doctors and merchants had themselves painted, with their wives and children on 2 separate panels. Except for children, Hamel generally showed only one figure in a given composition.

Hamel's talent allowed him to move in a few years from a farming background to the liberal professions; his brothers could only reach the level of commerce. Hamel possessed a handsome fortune, was captain of the militia and a member of the INSTITUT CANADIEN; he regularly met with the leading personalities of the day, such as F.X. GARNEAU, P.J.O. CHAUVEAU and Octave CRÉMAZIE. His magnificent, lifelike, austere and dignified portraits helped popularize Titian's style. Hamel also taught other artists, including Napoléon BOURASSA, one of the best Canadian artists of the 19th century. Besides its artistic value, his work allows us to study a section of Canadian society in the mid-19th century. Some of the people he painted left no photographs of themselves or their families. Each portrait shows us what a member of the ruling class thought of himself and how he wished the population to view him. RAYMOND VÉZINA

Reading: Raymond Vézina, *Théophile Hamel* (1975-76).

Hamilton, Ont, City, seat of Wentworth County, located at W end of Lk ONTARIO, on Burlington Bay, 68 km SW of Toronto and 66 km W of Niagara Falls and the American border. It is Canada's largest steel producer and ranks high in industrial production. It forms part of the Regional Municipality of Hamilton-Wentworth (pop 411 445, 1981c), which also includes Ancaster, Dundas, and Stony Creek.

Settlement The earliest references to habitation in the Hamilton area come from 17th-century French accounts referring to the NEUTRAL nation. French adventurer Étienne BRÛLÉ had visited the Neutrals 1616 and again 1624, and Jesuit missionary Jean de BRÉBEUF in 1641. LOYALISTS from the Niagara region — including John Depew (1786) and Richard Beasley (1790-1) — began to settle on and develop the land around Burlington B. In Jan 1815, George Hamilton, son of Robert Hamilton (one of the wealthiest and most influential men in Upper Canada) purchased 104 ha of land in Barton Township, laid out a townsite and successfully promoted its selection as the seat of administration for the newly created Gore Dist (1816). Because of the concentration of streams descending the NIAGARA ESCARPMENT and the area's location at the head of navigation on Lk Ontario, it had been developed as a milling and transportation centre even before the establishment of Hamilton.

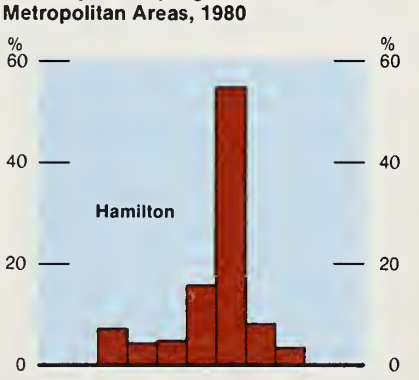
Development Hamilton's townsite grew slowly until the late 1820s when a newly constructed canal through Burlington Beach permitted schooners and steamers entry into Burlington B. With the access points for roads ascending the Niagara Escarpment, the canal transformed the fledgling community into a significant transshipment point. With enormous migration from the UK during the 1830s, its fortunes grew; its situation made it an ideal location for mercantile houses and manufacturing establishments that could serve the surrounding region. Plans were made for a steamboat company, a bank and a railway to London. An economic panic and the Rebellion of 1837 delayed the railway's construction until the early 1850s. Led by land agent and lawyer Sir Allen MACNAB and others, the city bought into the GREAT WESTERN RY and other lines. Though the railway boom collapsed in 1857, it had attracted stove and farm-implement foundries. Ready-made clothing and sewing-machine manufacture developed during the American Civil War.

The city's industries prospered from the mid-1880s to the early 1890s. In the early 1900s, national railway construction and American branch plants serving the Prairie market touched off a factory and residential construction boom that lasted until 1913. The Hamilton Blast Furnace Co began to produce pig iron in the 1890s. During both world wars, Hamilton industries concentrated on the production of war material, converting successfully after 1945 to serve the strong market for appliances, automobiles and houses. With the closing of textile mills and knit-wear plants in the 1950s and 1960s, Hamilton became increasingly dependent on steel. More recently, several of its long-time employers (Westinghouse, International Harvester, Firestone) have suffered economic troubles.

Population: 306 434 (1981c); 542 095 (CMA)
Rate of Increase (1971-81): (City) -8.9%; (CMA) 8.7%
Rank in Canada: Ninth (by CMA)
Date of Incorporation: Police Village 1833; City 1846
Land Area: 127.9 km²
Elevation: 76.2 m; 198 m (mountain)
Climate: Average daily temp, July 20.6°C, Jan -5.9°C; Yearly precip 796 mm; Hours of sunshine 2044.6 per year

Cityscape Hamilton Harbour (Burlington B) extends 8 km W from the channel at Burlington Beach to the steep embankment of Burlington Heights. Until the end of WWII, the harbour and escarpment squeezed urban development along an E-W axis and the 100-m limestone face of the escarpment posed a considerable transportation obstacle to suburban development. Though a series of expressways were constructed during the 1960s and 1970s, the division between the "mountain," as the escarpment is known locally, and the older city below plagues planning. The city's older industries are clustered along the waterfront and CNR tracks. Laboratories, parts distribution centres and light in-

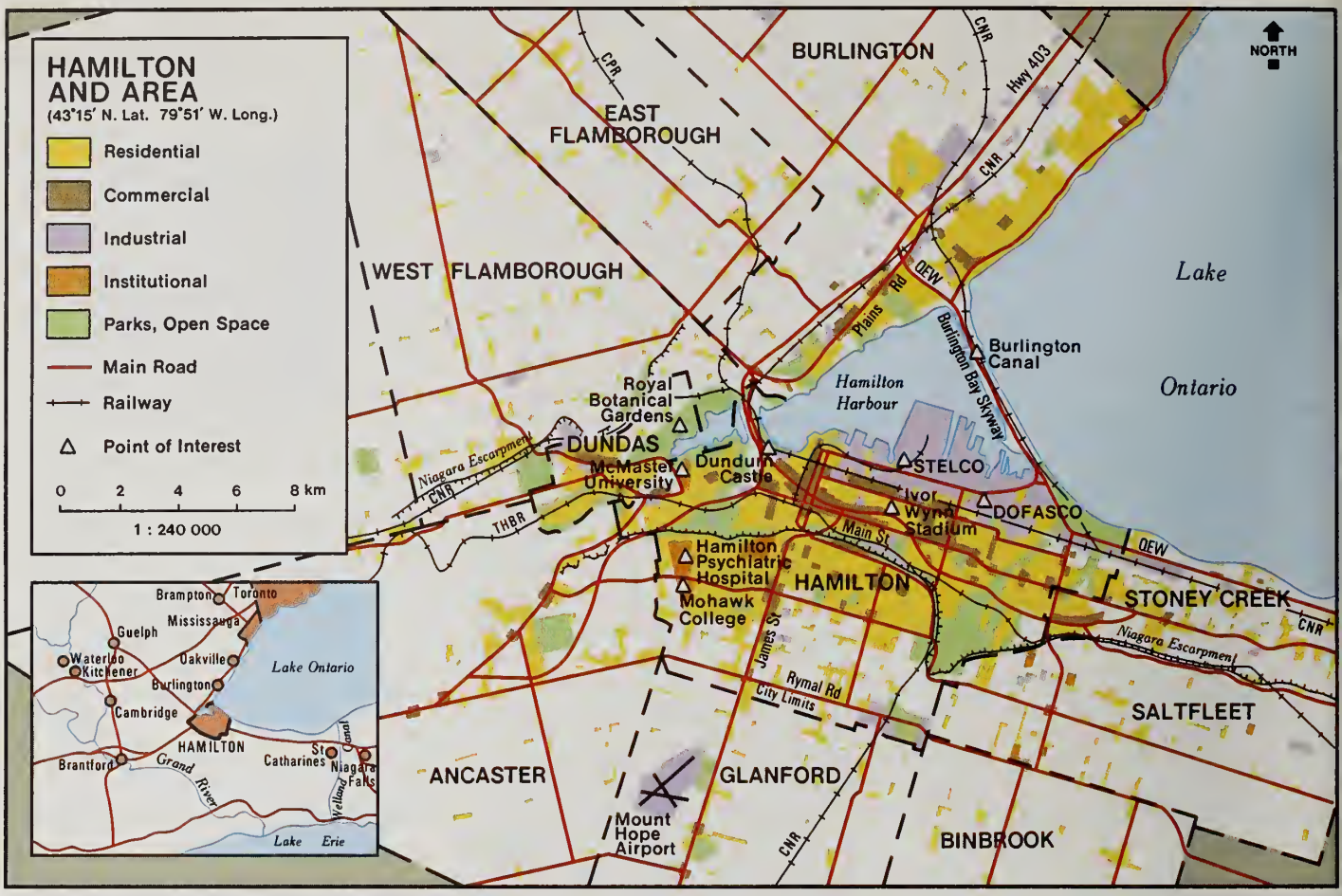
Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



Industry groupings
1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figure II, Catalogue 31-209, Statistics Canada.



dustries have been locating outside the city and along the highway corridors for the past 20 years. The cultural, financial and administrative core has remained near the corner of James and King at Gore Park, extending recently to the W. Residential areas include the old elite Durand District between James and Queen; the innovative west-end middle-class community of Westdale; and extensive working-class areas to the E and NE. Ethnic neighbourhoods abound, usually in association with parish churches and small business districts.

During the 1960s and 1970s, the skyline changed radically, as high-rise dwellings began to appear near the city's core and spread to adjacent areas. Comparatively few office towers were constructed, reflecting Toronto's proximity and Hamilton's industrial emphasis. The IBM, Stelco, Century 21 and Government of Ontario buildings have been notable exceptions. Though many handsome stone structures were lost in the construction boom, 19th-century structures such as the Commercial Block (1858), residential Sandyford Place (1858) and the renowned St Paul's Church (1857) remain. The city operates an extensive park system, the famous Royal BOTANICAL GARDENS and, through the Hamilton Historical Board, Dundurn Castle (1835), Whitehern (1848), a military museum and a children's museum.

Population The city's population growth has paralleled its economic cycles. After the Great Western Ry plan failed, Hamilton is estimated to have lost 20-25% of its population 1857-64. Immigration from the UK brought increases to 1900. The phenomenal industrial expansion 1900-13 led to territory annexations and attracted industrial and construction workers from the UK, US, Italy and Poland. Refugees from central Europe and the Baltic states arrived during the 1920s. Natural increase was blunted by the economic hardship of the 1930s. During WWII, workers from Québec, the Martimes and the West came to labour in the war industries. After the war, immigration (Dutch, German, Italian, Polish) reached a peak in 1954. Portuguese, S Asian and W Indian immigrants arrived during the 1960s and 1970s. Industrial uncertainties and the expansion of Ancaster and Dundas have decreased the population of the city proper 0.9% (1971-81).

Economy and Labour Force Two of Canada's 4 largest steel firms (STELCO and Dofasco) are located in Hamilton. The 1968 move of Stelco's head office to Toronto and construction of a new mill outside the city at Nanticoke shook civic optimism. Westinghouse, International Harvester, Firestone, Dominion Glass, Otis Elevator, National Steel Car, Canada Canners and Procter and Gamble also have large plants here. Most Hamilton industries have suffered from increased energy costs and economic recessions of the 1970s and 1980s. Hamilton is thought of as a workingman's city, highly unionized. Currently, some 220 local unions have a membership of 70 000 — at one-third the total work force, roughly the national average. The NINE-HOUR MOVEMENT began in Hamilton in 1872 and the KNIGHTS OF LABOR and AFL actively recruited in the late 19th and early 20th centuries. The CIO campaigned in the 1930s and 1940s for unions that would represent all men in a plant and after serious strikes at 3 major plants in 1946 concluded agreements ensuring higher pay and increased benefits. Another major strike occurred at STELCO in 1981.

Transportation Hamilton's unique location has ensured a significant transportation function for the city. During the middle decades of the 19th century it was an important wholesale and immigrant distribution centre. In the 20th, its transportation pattern has been shaped by industrial giants, such as International Harvester and Stelco, which retain considerable private interest in waterfront development. In tonnage, the port ranks 4th in Canada, ahead of all Atlantic ports and Toronto. The CNR maintains industrial freight facilities and a limited passenger service to Toronto and Niagara Falls. The Toronto, Hamilton and Buffalo Ry, now controlled by the CPR, primarily maintains business loops within the city. Intercity bus service has expanded in recent years with the growth of the Ontario government's fleet between Hamilton and Toronto. An Ontario rail commuter service also operates between Burlington and Toronto. Nordair connects Hamilton by direct flights with Windsor, Ottawa and Montréal.

Government and Politics From incorporation as a city (1846), Hamilton has had a council-committee form of government: aldermen elected by wards conduct general business together and meet in committees. As of Jan 1974, 17 council members assumed additional duties on the council of the new Regional Municipality of Hamilton-Wentworth, joined by officals from other jurisdictions. The regional government planning authority manages social services, police protection and water and sewer facilities. Certain local responsibilities are still managed by special commissions, some with regional or federal connections. Elected trustees constitute the public and separate school boards. Since WWII, Hamilton's mayors have served long terms. Party machines with federal and provincial party connections have remained an important aspect of local elections. Though organized labour has endorsed a few candidates, unions and the parties of the left have not always had a forceful presence on city council.

Cultural Life MCMASTER UNIVERSITY, with an enrolment of nearly 11 000 full-time and 6000 part-time degree students, has been an important city institution since 1930. Hamilton's central library was opened atop the new civic market 1980. Its substantial Art Gallery includes



General View of Hamilton (1853), by Robert Reginald Whale, oil on canvas (*courtesy National Gallery of Canada*).

works by Cornelius KRIEGHOFF and William KURELEK. The Hamilton Philharmonic Orchestra, Mohawk College Singers and McMaster Chamber Orchestra continue the city's music traditions. Unfortunately, the Royal Hamilton Conservatory of Music ceased operations 1981 for want of funding. Theatre Aquarius and dramatic productions at McMaster and by small theatre groups maintain long association with the stage. Touring companies perform in the attractive Hamilton Place complex. The *Hamilton Spectator*, the SOUTHAM chain's first newspaper (1846) and various ethnic and weekly suburban journals provide newspaper communications. TV station CHCH is one of the country's few independent and unaffiliated television operations. Several ethnic clubs have co-operated to establish the Hamilton Multi-Cultural Centre. In sports, the city has shown a special interest in running, with the annual race around the bay and regular track meets. In professional sport, the city has one team — its beloved HAMILTON TIGER-CATS — and is home to the CANADIAN FOOTBALL HALL OF FAME.

JOHN C. WEAVER

Reading: M. Katz, *The People of Hamilton, Canada West* (1975); John C. Weaver, *Hamilton: An Illustrated History* (1982).

Hamilton, Francis Alvin George, teacher, politician (b at Kenora, Ont 30 Mar 1912). An enthusiastic supporter of the DIEFENBAKER government's "Northern Vision" and an idea man in Cabinet, Hamilton was also a spokesman for western agriculture. After numerous defeats, he was elected to Parliament for Qu'Appelle in 1957; he had been leader of the Saskatchewan Tories since 1949. Appointed minister of northern affairs and natural resources in 1957, he promoted the "Roads to Resources" concept and northern development. In 1960 he became minister of agriculture. The moving force behind the Agricultural Rehabilitation and Development Agency, he engineered several wheat sales to China that gave a much needed boost to western agriculture. He was re-elected MP for Qu'Appelle-Moose Mountain in Sept 1984.

PATRICIA WILLIAMS

Hamilton Inlet, together with Lk MELVILLE, forms the largest estuary, over 250 km long, 40 km wide (at the western end) and 150 m deep, on the Labrador coast. The 2 are separated, 90 km from the sea, by a narrow passage, 2 km wide and 30 m deep, at Rigolet. Four major rivers, the CHURCHILL, North West, Kenamu and Goose, draining a substantial portion of the UNGAVA PENINSULA, enter the system. Hydroelectric development at CHURCHILL FALLS constitutes a major industrial benefit to the region. The existing generating station, with a capacity (5225 MW) more than 10 times that of a conventional station, was completed in the early 1960s. Further developments on the Churchill at Gull Island (1700 MW) and Muskrat Falls (600 MW) are under consideration. The region was first visited by John DAVIS in 1586 and provided sites for French and English traders in the 18th century. The inlet was named for Charles Hamilton, governor of Newfoundland 1818-24. Rigolet was founded by the HBC in 1837. The estuary was surveyed 1949-53 as part of the Blue Dolphin expedition sponsored by the Arctic Institute of N America. There are no major commercial fisheries at present within the inlet, but Hamilton Bank just offshore is the centre for a large international cod fishery.

P.C. SMITH AND R.J. CONOVER

Hamilton Tiger-Cats, FOOTBALL team formed through a 1950 merger between the Hamilton Tigers, who had won 2 Canadian Rugby Union Championships (1906, 1908) and 5 GREY CUPS (1913, 1915, 1928, 1929, 1932) competing as one of the Big Four (Interprovincial Football Union), and the Hamilton Wildcats, who were formed as a service club during WWII, won the 1943 Grey Cup and remained in the Ontario Rugby Football Union after the war. Future CFL Commissioner Jake GAUDAUR played on the new team, which won the 1953 Grey Cup. Beginning in 1957 under coach Jim Trimble (who retired after 1962), the Tiger-Cats played in every national final through 1967, except for those of 1960 and 1966, winning 4 Cups (1957, 1963, 1965 and 1967). Led by hard-nosed players such as John Barrow, Angelo Mosca and Vince Scott, these teams were characterized by tough defence. Another victory came in 1972, but Hamilton's Grey Cup appearance in 1980 resulted in a loss to Edmonton and in 1984 to Winnipeg. They play in 29 230-seat Ivor Wynne Stadium and were purchased by Harold Ballard in 1978.

DEREK DRAGER

Han territory straddled the Yukon-Alaska boundary, extending along the YUKON R from a few km S of Dawson northward to about 50 km S of Circle, Alaska. Before the KLONDIKE GOLD RUSH there were 3 Han BAND communities along the Yukon R: Nuclako-Ft Reliance near Dawson, Johnny's Village near Eagle and Charley's Village in Alaska, though the Han ranged far up the Klondike, Fortymile and other rivers. Han speech is distinct from neighbouring Athapaskan languages, but there was interaction with surrounding groups. By 1979, out of a total Han population of 300, only about 30 spoke the language.

In the spring, families moved to camps along the Yukon R where they prepared their equipment, caught whitefish and pike, and hunted moose, caribou and other game. After breakup, at the beginning of summer, they joined other band members at fish camps to catch and dry king and chum salmon. Large summer communities served as points for band and intertribal festivities and for salmon fishing. As fall approached, the Han left the river to hunt, repair their caribou surrounds, and fish in smaller rivers. In late autumn they returned to the Yukon and, during the winter, intermittently left the river to hunt and operate their caribou surrounds.

Han society was divided into 3 exogamous matrilineal clans. Clan membership carried responsibilities such as hospitality and protection to clan mates, and ceremonial obligations to those in opposite clans, such as cremating their dead. There was no formal tribe organization and status and band leadership were attained through individual ability and achievement. The primary social unit was the nuclear family, which often worked in partnership with a closely related family. Cross cousins were encouraged to marry; a young man usually lived at first with his wife's parents, then established his own residence and, wealth permitting, obtained additional wives. Polyandry also was known.

Han ideology was similar to that of other Athapaskan groups of the Yukon. Shamanism was practised by both men and women to predict the outcome of the hunt, cure illness, and destroy enemies. Artistic endeavours were manifested primarily by decorations on clothing and accessories and in songs.

Indirect European influence, principally from coastal Alaska, did not reach the Han until the end of the 18th century. After 1847 the Han dealt directly with HUDSON'S BAY COMPANY traders at Ft Yukon, but the first white settlers were American traders at Ft Reliance and Eagle, 1874-80. By 1885 the focus of trade had changed from the native FUR TRADE to servicing the fledgling placer mining industry. Thereafter, the Han obtained a relatively complete line of Euro-American hardware, clothing and food staples from the trading posts. Gold strikes on the Fortymile R late in 1886 opened the isolated area to outside settlement, and within 10 years Han lifestyle was completely disrupted by the Klondike Gold Rush. Today, many of their highly acculturated descendants live in their original homeland at Dawson and Eagle. *See* NATIVE PEOPLES, SUBARCTIC and general articles under NATIVE PEOPLE.

A. MCFADYEN CLARK

Reading: J. Helm, ed, *Handbook of North American Indians*, vol 6: *Subarctic* (1981); C. Osgood, *The Han Indians* (1971).

Handball is perhaps the oldest game played with a ball. It became popular in the 16th century and was first played in England under the name of "Fives." The Spanish also developed a variation at that time called "Peloto." The modern game is played on a court having 1, 3 or 4 walls, with 2, 3 or 4 players, or 2 teams of 2 participating. The 4-wall game is most popular today. The ball is struck with gloved hands and must strike the front wall of the court volley. Returns are made so as to make it difficult for the opponent to return to the front wall. A game

is won when one player or team scores 21 points. Points are only scored when serving. In 1863 handball matches were reported in Victoria, BC, and Saint John, NB. In Canada the sport is governed by the Canadian Handball Assn.

STAN C. FISHER

Handsome Lake Religion is the religion practised by a segment of the population of IROQUOIS communities in Canada and the US. Its adherents are known as "the Longhouse people" because ceremonies are held in a building called the LONGHOUSE. Its beliefs and practices are a blend of ancient Indian traditions and innovations introduced by the SENECA prophet Handsome Lake between 1799 and 1815. In Canada it is represented on Indian reserves at Caughnawaga (near Montréal), Grand River (near Brantford), Oneida (on the Thames R) and St Regis (near Cornwall).

Short versions of the *Gaiwiio*, "the good words" or the Code of Handsome Lake, are recited at the Green Corn Festival in late August or early September and at the Midwinter Ceremonial in January or February. In the autumns of alternate years the *Gaiwiio* is recited in full at a solemn convocation of the Six Nations by designated speakers. Each speaker holds a bundle of WAMPUM strings as his credentials, regalia acquired from his predecessors in office who taught him the *Gaiwiio*. Other rites such as the Great Feather Dance, the drinking of strawberry juice, commentaries on the *Gaiwiio*, and public confessions of moral lapses are performed. Members may also attend other Indian religious rites and Christian churches. The teachings of Handsome Lake played an important role in reconstructing Iroquois society after an almost complete collapse of the social and cultural order in the late 1700s. *See also* NATIVE PEOPLE, RELIGION.

DEREK G. SMITH

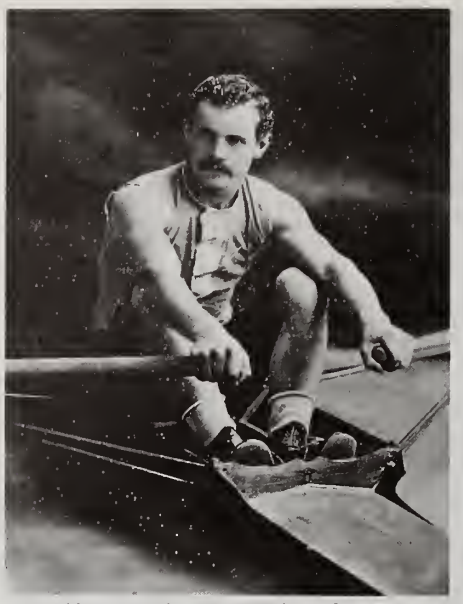
Reading: A.F.C. Wallace, *The Death and Rebirth of the Seneca* (1972).

Hanington, Daniel Lionel, lawyer, politician, premier of NB (b at Shediac, NB 27 June 1835; d at Dorchester, NB 5 May 1909). Clerk of circuits 1867-70 and a school trustee, he first sat as a Liberal-Conservative MLA for Westmorland in 1870. He was defeated in 1874 for opposing the Common Schools legislation, but was re-elected in 1878 and sat as minister without portfolio until 1882 when he was named premier upon J.J. FRASER's resignation. Sympathetic to the Acadians, he named P.A. LANDRY his provincial secretary. Defeated by a non-confidence vote introduced by A.G. BLAIR in 1883, his government resigned. His forces were defeated again in 1886, but he continued to sit for Westmorland until 1892 when he was appointed puisne judge of the NB Supreme Court.

DELLA M.M. STANLEY

Hanlan, Edward, "Ned," oarsman (b at Toronto 12 July 1855; d there 4 Jan 1908). Hanlan learned to row in Toronto harbour on a makeshift shell fashioned from a wooden plank. He proved himself to be the best sculler in Ontario in a series of races between 1873 and 1876. In 1877 he won the Canadian championship on Toronto Bay and in 1878 took the US title on the Allegheny R. He defeated all challengers and by 1879 was the unquestioned master of rowing in N America. In May 1879 Hanlan beat the English champion on the Tyne R, Eng, by an astonishing 11 lengths. He defended his title the next year against the world professional champion E.A. Trickett of Australia. After defending his world crown 6 times he lost it to William Beach in 1884.

Hanlan was Canada's first athlete to gain international recognition and its first world champion. During a time when rowing was immensely popular all over the world, Hanlan was celebrated and showered with gifts wherever he went. Though lectured sternly by the English press for his flamboyance, he was appreciated for his fine rowing style, with its long, smooth strokes and sharp, clean "catch." He continued to row in the 1890s, winning more than 300 races.



As world rowing champion in the early 1880s, Ned Hanlan was the first Canadian athlete to gain international recognition (*courtesy Public Archives of Canada/C-25324*).

JAMES MARSH

Hanna, David Blythe, accountant, railway director (b at Thornliebank, Scot 20 Dec 1858; d at Toronto 1 Dec 1938). He came to Canada in 1882 to work with the GRAND TRUNK RY and worked with several other railway companies before joining William MACKENZIE and Donald MANN on the CANADIAN NORTHERN RY in 1896. When the Canadian government purchased Canadian Northern he resigned but was appointed first president of the board of directors of the newly formed CANADIAN NATIONAL RY. He retired 1922, but was briefly first chairman (1927-28) of the Liquor Control Board of Ont. He recounted his career in *Trains of Recollection* (1924).

ERIC J. HOLMGREN

Hannam, Herbert Henry, educator, farm leader (b at Swinton Park, Grey County, Ont 27 Sept 1898; d at Ottawa 12 July 1963). After attending Ontario Agricultural Coll, Herb Hannam taught school and was livestock editor of *The Canadian Countryman*. He joined the UNITED FARMERS OF ONTARIO as educational secretary in 1928, becoming its secretary-treasurer in 1933 and secretary of its sister organization, the United Farmers Co-operative Co, in 1936. He wrote *Co-operation: The Plan for Tomorrow which Works Today* (1938) and *Pulling Together for Twenty Five Years* (1940), 2 pamphlets widely used in co-operative and agrarian circles. He helped organize the Ontario Federation of Agriculture and the Canadian Chamber of Agriculture (later Canadian Federation of Agriculture) during the mid-1930s. In 1939 he was elected to the latter's presidency, which became a full-time, paid position in 1943. Hannam was an effective spokesman for Canadian agriculture. He was also a strong supporter of Farm Radio Forum which he helped start in 1939. Following WWII, Hannam was one of the first to see the importance of food production and marketing in a world with a rapidly growing population.

IAN MACPHERSON

Hanover, Man, Rural Municipality, pop 7428 (1981c), area 71 886 ha, inc 1881, located SE of Winnipeg, encompasses the communities of Blumenort, Grunthal, Kleefeld, Mitchell, New Bothwell, Randolph and Sarto. The town of STEINBACH is no longer part of the RM although the municipal office is located there. Hanover includes land set aside in 1873 as the East Reserve for MENNONITES from southern Russia. Several hundred families arrived in the 1870s and organized self-governing agricultural villages. A second influx in the 1920s followed the Russian Revolution. Difficult farming conditions, disagreements with provincial education policies, and secular influences on the Mennonite way of life caused some of these settlers to move away. Anglo-Saxon, French Canadian, German Lutheran, Ukrainian and Polish settlers also helped build the RM's communities.

Soil and drainage conditions encouraged a diversified agriculture — special crops, livestock, poultry, dairying and cereal grains. Blumenort is a Manitoba poultry centre; Grunthal, a dairy and milk products centre. Kleefeld is known for its beekeeping; New Bothwell for its cheddar cheese; the Steinbach area for cash crops and poultry. Business in the RM mostly serves local markets. In the 1970s several Hanover communities became locales for commuters who wished to combine urban employment with rural homes and life-styles.

D.M. LYON

Reading: L. Penner, *Hanover: One Hundred Years* (1982).

Hansard is the unofficial name of the record of parliamentary debates. The name comes from T.C. Hansard, who printed the British debates 1812-92. It provides a statement in both official languages of spoken proceedings in both Houses of Parliament, partly for the immediate convenience of legislators but also as an indispensable historical archive. In its present form Hansard dates from 1880, when an official debates reporting branch, which now has its own director, was added to the parliamentary staff. Before that, from 1875 to 1879, a record was provided, though not by regular staff. Before 1875 somewhat haphazard collections were preserved, some of them known as Scrapbook Hansards, based on contemporary newspaper reports which covered Parliament in detail. Several of the colonies kept Hansards irregularly before Confederation, the earliest being NS in the 1820s.

The modern Hansard is an efficient enterprise which, during the session, produces a copy of each previous parliamentary day's debates by 9:00 AM. The printed copies come from shorthand reports taken on the floor of the House by reporters working 10-minute shifts. Each reporter then dictates his notes to a second person, and today electronic records supplement the printed material. The HOUSE OF COMMONS has a Broadcast Branch which keeps a complete audio and video record. Hansard is published by the Queen's Printer and in addition to the daily editions, is issued regularly in bound, well-indexed volumes readily available in libraries. Provincial debates, not all of which are referred to as Hansards, are published in a variety of ways.

NORMAN WARD

Happy Valley-Goose Bay, Nfld, Town, pop 7103 (1981c), inc 1955, is the result of the amalgamation of 2 towns situated on a low-lying sandy plateau at the western end of HAMILTON INLET, Labrador. Happy Valley was a townsite chosen by people relocated from Otter Cr by the Government of Canada in 1941, when it was decided to build an airport at nearby Goose Bay. By June 1943 the airport was the world's largest, used by the RCAF, the USAF and the Canadian



Army. As construction accelerated, Happy Valley grew, as over 3000 were employed on the project. The town continued as a small civilian community servicing the base, which remained a permanent airport after the war. In 1973 Happy Valley amalgamated with Goose Bay. The base is part of the DEW Line and Pinetree Line radar installations, and functions as a refueling and support installation for Strategic Air Command and as a training base for fighter pilots of the USAF, RAF and Luftwaffe.

JANET E.M. PITT AND ROBERT D. PITT

Harbour Grace, Nfld, Town, pop 2988 (1981c), inc 1945, with a commodious harbour in western CONCEPTION BAY, named for the French *Havre de grâce*. A base of pirate Peter EASTON, 1612-13, its settlement was begun about 1618, perhaps by former settlers of the CUPIDS colony. Until 1923 it had the second-largest population in Newfoundland. Prospering from the Labrador cod and seal fisheries, the Anglo-Irish community was by the 19th century the location of one of Newfoundland's earliest denominational schools (1843). In 1859 it was the site of sectarian riots during the general election, and in 1883 of bitter sectarian violence resulting in 5 deaths. Also, the Methodist movement was introduced to British N America from Harbour Grace in 1765 or 1766 by Rev Lawrence Coughlan, a convert of John Wesley. Several pioneering attempts at transatlantic and round-the-world flights were made from here 1919-32. In 1932 Amelia Earhart, leaving Harbour Grace, was the first woman to pilot a plane over the Atlantic. The community is today a fish-processing and service centre and supports several small industries. JANET E.M. PITT AND ROBERT D. PITT

Harding, Victor John, professor of pathological chemistry (b in Eng 23 Oct 1885; d at Toronto 3 July 1934). Graduating in chemistry from Owen's Coll, Manchester (DSc, 1912), Harding began an association with McGill in 1910. He became associate professor of physiological chemistry in 1917. In 1920 he left McGill to become professor of pathological chemistry at U of T. His research was initially on analytical methods in organic chemistry, including amino acids and the chemistry of the ninhydrin reaction. He became recognized primarily for his investigations on carbohydrate metabolism in pregnancy and on toxemias associated with pregnancy. He trained many graduate students, some of whom became prominent biochemists in Canada and the US. DAVID B. SMITH

Hardware, *see* COMPUTER SCIENCE.

Hardy, Arthur Sturgis, lawyer and politician, premier of Ontario 1896-99 (b at Mount Pleasant, near Brantford, UC 14 Dec 1837; d at Toronto 13 June 1901). After a promising early career as a lawyer and city solicitor in Brantford, Hardy was elected Liberal MPP for S Brant in 1873. Bills he introduced as provincial secretary (1877-89) touched on social issues and on the administration of justice, while as commissioner of crown lands (1889-96) he was responsible for important timber and mining legislation and for the establishment of ALGONQUIN PARK. He succeeded Sir Oliver MOWAT as premier and attorney general in July 1896. Following a narrow electoral victory in 1898, Hardy resigned for reasons of health in 1899. WENDY CAMERON

Hardy, Hagood, pop musician (b at Angola, Indiana 26 Feb 1937). He is a major figure in the Canadian recording industry. Raised in Oakville, Ont, Hardy began his career as a vibraphonist in Toronto jazz clubs, travelled (1961-67) with US jazzmen, including Herbie Mann and George Shearing, and then turned to pop music. He led The Montage until 1974 and thereafter worked in Toronto recording studios as a composer of music for jingles and for radio, TV and many films (*Second Wind, Rituals, Anatomy of a Seduction,* etc). His Salada Tea jingle, revised and recorded as *The Homecoming* (1975), was an international hit. MARK MILLER

Hare, a group of Athapaskan-speaking people whose ancestors lived in small, nomadic bands along the lower MACKENZIE R valley of the NWT, had a precontact population of 700-800. They pursued a hunting, fishing and gathering way of life centered on caribou, moose, freshwater fish, small game and berries, and exploited a territory from the Yukon border to forested zones W and NW of GREAT BEAR LAKE. Several cultural features distinguished the Hare from neighbouring KUTCHIN, MOUNTAIN, SLAVEY and DOGRIB. They spoke their own dialect of Athapaskan and were noted for their timid relations with other native groups. The name Hare, given by early Europeans, reflected their heavy dependence on the snowshoe hare for food and clothing. Since the hare goes through a population cycle every 7 to 10 years, these Indians periodically experienced devastating starvation (*see* RABBIT STARVATION).

The Hare traditionally viewed their world in animistic terms. They observed many taboos to insure good hunting, and relied on SHAMANS to cure illness, protect them against enemies and intercede with the spirits. They had a rich oral FOLKLORE, and participated in drum dances and competitive gambling. Their communities were held together by kinship ties on both the father's and the mother's side. Though the Hare lacked formal leaders, outstanding hunters and shamans had considerable influence. The Hare were governed by an ethic that balanced sharing and interdependence with autonomy and freedom. There was no concept of individual ownership of land, and people were free to hunt and fish in any part of their territory.

First recorded contact with Europeans came during the explorations of Alexander MACKENZIE in 1789. Early in the 19th century the Hare were drawn into the FUR TRADE as forts spread N along the Mackenzie R. Their trading activities were centered on Ft Good Hope and also on Fts Norman and Franklin. A Roman Catholic mission was established in 1859 at Ft Good Hope, and the people's conversion to Christianity began. For much of the 19th century and until the decline of fur prices after WWII, most of the Hare combined trapping with subsistence hunting.

In recent decades the Hare have had to contend with a growing dependence on a wage-labour economy and the effects of alcohol, and tuberculosis and other diseases. Although they gave up title to their ancestral lands in a 1921 treaty with the federal government, they have retained the right to hunt, fish and trap in their traditional territory (*see* INDIAN TREATIES). Nevertheless, many have been attracted to the amenities of a settled life in larger towns. A notable exception to this trend was the creation, in the early 1960s, of a new village at Colville Lk, 142 km NE of Ft Good Hope, in an area rich with game and fish. Ft Good Hope and Colville Lk, with a combined population of 430 in 1978, are now the major population centres of the Hare people. *See also* NATIVE PEOPLES and general articles under NATIVE PEOPLE. JOEL S. SAVISHINSKY

Reading: Hiroko Sue Hara, *Hare Indians and Their World* (1980); J. Helm, ed, *Handbook of North American Indians,* vol 6: *Subarctic* (1981); Joel S. Savishinsky, *The Trail of the Hare* (1978).

Hare, term applied to those members of order LAGOMORPHA whose young are born fully haired, with eyes open, and able to run about a few minutes after birth. All N American hares belong to genus *Lepus;* 3 species are native to Canada, one has been introduced. The northernmost species, arctic hare (*L. arcticus*), found in the tundra zone beyond TREELINE, is the largest Canadian species, with adults weighing 3.2-5.4 kg. Snowshoe or varying hare (*L. americanus*) is widespread throughout Canadian forested areas and provides meat to humans in remote communities. Snowshoe hares exhibit enormous population fluctuations, peaking every 9-10 years. Numbers vary from approximately 1 hare per 50 ha to upwards of 200 per ha. The remaining native species, white-tailed jackrabbit (*L. townsendii*), largely nocturnal and solitary, is found throughout the prairies. In 1912 the European or Cape hare (*L. europaeus*) was introduced to Ontario as a game animal. Restricted to Ontario, it is sometimes a garden pest. Unlike native species, it does not turn white in winter. Young hares (leverets) are born in the open and are weaned after 2-3 weeks (5-6 in white-tailed jackrabbits). Gestation averages 36 days and, depending on the species, a litter contains 1-7 young, with up to 4 litters over a summer. Female hares are usually larger than males; hares are larger than RABBITS. M.L. WESTON

Hare, Frederick Kenneth, environmental scientist, professor, administrator (b at Wylye, Eng 5 Feb 1919). A U of London graduate and wartime meteorologist with the British Air Ministry, Hare came to Canada in 1945 as a geography professor at McGill. He earned his PhD (U de Montréal) studying arctic climatology and biogeography. He has served as dean of arts and science at McGill, master of Birkbeck Coll, London and president of UBC. A professor of geography and physics at U of T since 1969, he was the first director of the Institute for Environmental Studies there 1974-79, and became provost of Trinity Coll, U of T, in 1979. His research interests include world climate, notably atmospheric carbon dioxide, CLIMATE CHANGE and arid-zone climates. Long active in movements to protect and conserve the natural environment, Hare led a federal study on nuclear-waste management in Canada and a similar program for the UN Environment Programme. He has served as director of the Washington-based energy-research group, Resources for the Future, and in 1984 was chairman of the Climate Planning Board in Canada. A frequent spokesman on the atmospheric greenhouse effect, Hare believes that the main environmental issue confronting Canada in the next 70 years will arise from climatic change induced by the expansion of fossil-fuel consumption. He has written 160 books and articles, including *The Restless Atmosphere* (1953) and, with Morley K. Thomas, *Climate Canada* (1974).

DAVID W. PHILLIPS

Harkin, James Bernard, environmentalist (b at Vankleek Hill, Ont 30 Jan 1875; d at Ottawa 27 Jan 1955). He worked in Ottawa as a newspaperman 1893-1901 and then served as secretary to Clifford SIFTON and Frank OLIVER, successive ministers of the interior. When a distinct parks branch was established by the ministry in 1911, Harkin became its first commissioner. With skillful eloquence he promoted the concept of unspoiled but publicly accessible wilderness, believing that PARKS represented the moral value of outdoor recreation, a haven from degenerate cities. His boundless energy pushed the parks system into 25 years of expansion. An acknowledged leader in wildlife conservation, he was instrumental in framing the Migratory Birds Convention Act 1917 and was responsible for its administration. He retired in 1936.

MAXWELL SUTHERLAND

Harkness, Douglas Scott, teacher, farmer, politician (b at Toronto 29 Mar 1903). A schoolteacher, farmer and war hero, Harkness was elected to the House of Commons in 1945. Tory critic for northern affairs and natural resources between 1945 and 1957, he became minister of agriculture in 1957 and was especially interested in crop insurance and debt adjustment. Appointed minister of defence in Oct 1960, Hark-

ness advocated nuclear weapons for Canada and was soon in conflict with John DIEFENBAKER. He resigned from the government in Feb 1963 over the issue, but sat in the House until 1972.
PATRICIA WILLIAMS

Harlow, Robert, novelist, teacher (b at Prince Rupert, BC 19 Nov 1923). He was a graduate of UBC (1948) and U of Iowa (1951) and worked for the CBC, 1951-65. In 1965 he became head of UBC's creative writing dept, where he encouraged and influenced several prominent Canadian writers early in their careers. Harlow's novels include *Royal Murdoch* (1962), *A Gift of Echoes* (1965) and his best-known and finest work, *Scann* (1972), which make up the Linden trilogy, named after the imaginary northern BC town that figures in the settings of all 3 books. Later works are *Making Arrangements* (1978) and *Paul Nolan* (1983). NEIL BESNER

Harness Racing, or trotting, is the competition for purse money between horses bred and trained to "trot" or "pace," driven by a driver in coloured silks who is mounted on a 2-wheeled cart called a "sulky." The horses are called standardbreds and have long pedigrees. As a rural pastime, Canadians raced horses on ice before the advent of pioneer roads. The modern sport consistently records the highest annual attendance of any professional sport in Canada or the US, and is conducted in all 10 provinces. Parimutuel betting on races is permitted under the supervision of Agriculture Canada. Racing conduct, rules and licensing are under the jurisdiction of provincial racing commissions and the Canadian Trotting Assn, while registration and identification are the responsibility of the Canadian Standardbred Horse Society.

Horses are owned, bred, trained and raced for pleasure and profit by individuals from all walks of life and by corporations, syndicates, breeding farms and partnerships. Familiar as the gentle, tractable "working horse" of our agricultural heritage, harness horses are close to the people who work with them and who worry over them and love them, while fans greet their favourites as old friends. Classes of racing are arranged on the basis of age, in the case of many stakes or futurities, or by money earnings, making racing available for all competent horses from slower performers to the speedy stars. Many thousands are employed full-time or part-time, or participate for recreation. Racetracks are operated by private owners, by exhibition and fair associations, and even by fraternal and charitable organizations.

Canadians are expert horsemen and hold numerous records in the sport. Consistently more than half of the top 10 N American drivers have been native Canadians. Dave McClary of London, Ont, drove the first 2-minute mile (1.6 km) with a standardbred (1898), while Joe O'Brien of Alberton, PEI, has driven more 2-minute miles than any driver. Ben White of Whitevale, Ont, is the first to win the Hambletonian Stakes 4 times. In 1981 William O'Donnell of Springhill, NS, became the first to exceed $4 million in yearly winnings. Hervé FILION has won more harness races than any other rider in the history of the sport. Armbro Farms of Brampton, Ont, and Gunnholme Vu Farm of Lloydminster, Alta, are among the top breeders. Among many famous Canadian-bred horses are Tacony, the first Canadian-bred world champion (1853); Gratton Bars, the first to win the top 3 pacing stakes in N America — all in one 3-week period of 1928; Jade Prince, the first 2-year-old world champion pacer (1976); and Niatross, the first to run a mile in under 1 minute, 50 seconds.

The Canadian Trotting Assn, formed in 1939, a leader in applying computer technology to sport, is the first to link all tracks under its jurisdiction in a computer network supplying instant results and information. MARGARET NEAL

Harper, Vern, or Asini, meaning "stone" in Cree, native dissident, native way teacher (b at Toronto 17 June 1936). As an organizer of political protests and of an urban native alternative school, Harper is a representative of the more radical wing of the native movement of the 1970s. After a troubled early life, he became politically active as VP of the Ontario Métis and Non-Status Indian Assn (1972-74). With his wife Pauline Shirt Harper (b at Saddle Lk Alta 13 July 1943) he organized the Native People's Caravan, a cross-Canada trek ending in a lengthy encampment in Ottawa (1974-75) which succeeded in bringing together native organizations to work on mutual problems and in publicizing native grievances. The ideology of the demonstration had strong traditionalist and spiritual elements which reappeared in the Wandering Spirit Survival School of Toronto, founded by Pauline and Vern Harper in 1976. He is author of *Following the Red Path: The Native Peoples' Caravan, 1974* (1979). BENNETT MCCARDLE

Harper, William Edmund, astronomer (b at Dobbinton, Ont 20 Mar 1878; d at Victoria 4 June 1940). After graduating from U of T in 1906, Harper joined the Dominion Observatory, Ottawa, and later conducted a national search for a site for a proposed new observatory. In 1918 he transferred to the new institution, the Dominion Astrophysical Observatory in Victoria, becoming its second director in 1936. His field was the measurement of distances and motions of stars, and especially the study of spectroscopic binaries. He is said to have computed more orbits for these systems than anyone else and, such was his industry, it is likely that he did, at least until the advent of electronic computers. He was an active popularizer of astronomy and was awarded an honorary doctorate by U of T in 1935. A.H. BATTEN

Harrington, Gordon Sidney, lawyer, politician, premier of NS (b at Halifax 7 Aug 1883; d there 4 July 1943). Educated at Dalhousie (LLB, 1904), Harrington practised law in Glace Bay. After serving in the CEF, 1915-20, he became MLA for Cape Breton Centre 1925-33 and Cape Breton S 1933-37. His support from the miners contributed to the Conservatives' victory in the 1925 election and led to his appointment as minister of labour in the E.N. RHODES government. He succeeded Rhodes as premier in 1930. An effective, though sometimes caustic, speaker and a skillful administrator, Harrington followed the orthodox policies of the day in a politically hopeless battle against the GREAT DEPRESSION. Attempts to manipulate the voting lists in the election defeat of 1933 tarnished the record of a competent administration. ERNIE FORBES

Harris, Alanson, manufacturer (b near Ingersoll, UC 1 Apr 1816; d at Brantford, Ont 3 Oct 1894). A sawmill operator in Brant County, Harris bought a foundry in Beamsville in 1857 and began manufacturing farm implements. His firm prospered by aggressive marketing practices and by technological leadership secured through the acquisition of Canadian rights to American patents, and later through the development of its own machinery designs. In 1872 he moved to Brantford and in 1879 began marketing his products in western Canada. His firm, A. Harris, Son and Co, merged in 1890 with its major competitor, the Massey Manufacturing Co, to form Massey-Harris Co Ltd (later MASSEY-FERGUSON LIMITED), Canada's largest farm-implement manufacturer. JOSEPH LINDSEY
Reading: Merrill Denison, *Harvest Triumphant* (1948); E.P. Neufeld, *A Global Corporation* (1969).

Harris, Lawren Stewart, painter (b at Brantford, Ont 23 Oct 1885; d at Vancouver 29 Jan 1970). Catalyst and leader in the creation of the GROUP OF SEVEN, founding member and first president of the Canadian Group of Painters, and the painter who influenced Jock MACDONALD, and through him other Toronto painters, to paint abstractly. Harris had a profound influence on 3 generations of art in Canada. Harris's father was Thomas Morgan Harris, the secretary of the A. Harris, Sons and Co., a manufacturer of farm machinery which in 1891 amalgamated with Massey to form the Massey-Harris Co: Lawren Harris was thus a rich man. After attending Toronto's St Andrews College, Harris went to the University of Toronto where he was encouraged by his mathematics professor to study art in Berlin. After 4 years of study (1904-08), Harris re-

Lawren Harris developed into a magnificent landscape painter, transforming the powerful forms of nature into works of force and elegance, as in *Above Lake Superior* (1924) *(courtesy Art Gallery of Ontario/gift from the Reuben and Kate Leonard Canadian Fund, 1929).*



turned to Canada. In 1908 he went on a sketching trip to the Laurentians; in 1909, with J.W. Beatty, he sketched in Haliburton. That fall he went to Memphremagog, Qué. At the same time, he drew and painted houses in downtown Toronto; by the winter of 1911-12, he was sketching with J.E.H. MACDONALD and had become friendly with Tom THOMSON. In 1913, Harris and MacDonald visited and were inspired by an exhibition of Contemporary Scandinavian Art at the Albright Art Gallery (now the Albright-Knox) in Buffalo.

By the early 1920s, when the Group of Seven was formed, Harris had developed into a magnificent landscape painter, transforming the powerful forms of nature into works of force and elegance in works such as *Above Lake Superior* (*c*1924) and *Maligne Lake* (1924). In these and other paintings he reduced the shapes of mountains, shoreline, trees, lakes and clouds, always parallel to the picture plane, to their essentials for an austere, monumental effect. He painted for 5 successive autumns in Algoma and Lake Superior (1917-22), in the Rockies from 1924 on, and in the Arctic in 1930. As artist-in-residence at Darmouth Coll, NH, he moved progressively through drawing into nonobjective art. In Santa Fe, NM, he worked with Dr Emil Bisttram, leader of the Transcendental Group of Painters, which Harris also helped found in 1939. His Vancouver work (1940-70) continued to explore abstraction inspired by the rhythms of nature. Harris's belief in theosophy is intimately linked to his development as a nonobjective artist. Through abstract paintings, such as *Abstract Painting No 20*, many of which use forms from landscape, he sought to portray a binding and healing conception of the universe — to make the sublime visual. His paintings have been criticized as being cold, but in fact they reflect the depth of his spiritual involvement. His world view makes him unique among Canadian painters, although his philosophy kept him aloof from spontaneously created art — a crucial factor in later painters' abstraction. Nevertheless, his landscape paintings, such as *Lake and Mountains* (1928) and some of his abstractions, are among the icons of Canadian art.

In his own lifetime Harris was the subject of 2 retrospectives, in 1948 and 1963. In 1978 the Art Gallery of Ontario held an exhibition, *Urban Scenes and Wilderness Landscapes, 1906-1930*. In 1982-83 a national travelling exhibition of his drawings was held. The bulk of his work is found in the National Gallery of Canada, Art Gallery of Ontario, and the McMichael Canadian Collection, Kleinburg, Ont. JOAN MURRAY

Reading: B. Harris and R.G.P. Colgrove, eds, *Lawren Harris* (1969); Joan Murray and Robert Fulford, *The Beginning of Vision* (1982).

Harris, Robert, artist (b at Vale of Conway, Wales 18 Sept 1849; d at Montréal 27 Feb 1919). He is best known for his painting *The Fathers of Confederation*, which was burned in the fire that destroyed the Parliament Buildings in Ottawa in 1916. He emigrated to PEI with his family in 1856, including his brother William Critchlow HARRIS. He studied in Boston, Paris and Rome and travelled extensively in Europe, Canada and the US. He did illustrations for publications in Boston, Halifax, Montréal and Toronto, and was commissioned by Gordon Brown of the *Globe* in 1880 to go to Lucan to sketch the prisoners accused of murdering the DONNELLYS. A distinguished portrait painter, Harris portrayed over 200 of the leading personalities of the day, including Sir John A. MACDONALD, George Monro GRANT and Lord ABERDEEN. He lived much of his life in Montréal teaching at the Art Assn there. He was a founding member of the Royal Canadian Academy in 1880 and of the Pen and Pencil Club in 1890. Elected president of the RCA in 1893, he worked for 13 years to promote young Canadian artists by having



Robert Harris, *Ruth Harris*, oil on canvas. Harris was born in Wales and at age 7 moved to PEI, where he developed into a distinguished portrait painter (*private collection*).

them represented at all major international exhibitions of the period. Two of his most popular paintings, *A Meeting of the School Trustees* and *Harmony*, are in the National Gallery of Canada. In 1928 his widow built the Robert Harris Memorial Gallery and Library in Charlottetown, PEI. This building was replaced in 1963 by the Confederation Centre and its gallery houses an extensive collection of Harris works and archives. MONCRIEFF WILLIAMSON

Reading: Moncrieff Williamson, *Robert Harris* (1971).

Harris, Walter, Tsimshian artist (b at Kispiox, BC 10 June 1931). A hereditary chief of the Gitksan village of Kispiox, Harris is a senior artist at the Gitanmaax School of NORTHWEST COAST INDIAN ART at KSAN, Hazelton, BC. Versed in the culture of the Skeena River people, he helped to erect the traditional plank-and-beam woodcarving building at the school; later he taught in that building while fulfilling major commissions. Though a competent and prolific printmaker, Harris is primarily noted as a carver. His impressive "Mother of Grouse" pole at Kispiox commemorates his family's crests, replicating one that disappeared from his home village long ago. CAROL SHEEHAN

Harris, Walter Edgar, analytical chemist, professor (b at Wetaskiwin, Alta 9 June 1915). A recognized leader in the development of teaching and research in analytical chemistry in Canada, Harris studied chemistry at U of Alberta and Minnesota. He joined the dept of chemistry at Alberta in 1946, teaching and carrying on research in polarography, gas chromatography and theories of chemical separation, and developed a vigorous analytical chemistry division. A consultant in analytical education at universities throughout N America, he was also a government adviser on disposal of hazardous wastes. His books include (with H.W. Habgood) *Programmed Temperature Gas Chromatography* (1966), (with H.A. Leitinen, 1975) *Chemical Analysis* and (with B. Kratochvil) *Chemical Separations and Measurements* (1974). W.F. ALLEN

Harris, William Critchlow, architect (b at Boothe, near Liverpool, Eng 30 Apr 1854; d at Halifax 16 July 1913), brother of painter Robert HARRIS. Brought to Charlottetown as a child, he attended Prince of Wales College and in 1870 joined architect David STIRLING in Halifax. In 1875 he established his own practice in Charlottetown. His buildings reflect a talented and original approach to the High Victorian Gothic style. Over 90 are extant in PEI, NS and NB. They include St James Anglican Church, Mahone Bay, NS (1886); All Souls' Chapel, Charlottetown (1888); and his masterwork, St Paul's Anglican Church, Charlottetown (1895).

GRANT WANZEL AND KAREN KALLWEIT

Harrison, David Howard, physician, politician, premier of Manitoba, farmer, businessman (b at London, Canada W 1 June 1843; d at Vancouver 8 Sept 1905). Educated at U of T and McGill, he practised medicine in St Mary's, Ont, until 1882, when he settled in Manitoba and carried on extensive farming operations. Elected an MLA for Minnedosa in 1883, he was appointed minister of agriculture in John NORQUAY's government on 27 Aug 1886. Harrison became premier of Manitoba on 26 Dec 1887, but when the legislature met on 12 Jan 1888 his lack of support was apparent and his ministry resigned on 19 Jan 1888. LOVELL C. CLARK

Harrison River, 15 km long, flows SW from Harrison Lk to join the FRASER R about 100 km upriver from Vancouver in southern BC. A famed holiday resort, Harrison Hot Springs, is located where the river leaves the lake. It is named after Benjamin Harrison, deputy governor of the HBC 1835-39. DANIEL FRANCIS

Harriss, Charles Albert Edwin, composer, impresario, educator, organist-choirmaster, conductor (b at London, Eng 16 Dec 1862; d at Ottawa 31 July 1929). Trained as organist and choirmaster in English cathedrals, in 1882 Harriss was appointed to St Alban's, Ottawa, and then to Christ Church Cathedral, Montréal, returning to Ottawa in 1900. Honorary director of examinations of the Royal Schools of Music, first director of the McGill Conservatory, Harriss also arranged many concerts and festivals, bringing outstanding British artists to Canada, and organized massive choirs. In 1924 he became music director of the British Empire Exhibition in Wembley (London, Eng). His numerous works were performed throughout the British Empire. He received an honorary fellowship from the Royal Academy of Music and the Lambeth doctorate from the archbishop of Canterbury. MABEL H. LAINE

Harron, Donald, actor, writer, broadcaster (b at Toronto 19 Sept 1924). While studying at U of T, he performed for CBC Radio and the New Play Soc. He had major roles at the STRATFORD FESTIVAL in the early 1950s and then for over a dozen years worked on stage, TV and in films in England, New York and Los Angeles. As the ill-dressed, malapropish farmer from Parry Sound, Charlie Farquharson (and more recently as Toronto matron Valerie Rosedale), he has performed on Canadian radio and American TV, and written such best-selling books as *Histry of Canada* and *Jogfree of Canada*, offering social and political satire while entertaining. Harron also wrote the libretto for *Anne of Green Gables*, Canada's longest-running stage musical, and hosted CBC Radio's "Morningside" 1977-82. A warm, intelligent and thoughtful entertainer, he is notorious for his witty manipulation of language. In 1984 he published *Debunk's Illustrated Guide to the Canadian Establishment*.

ALLAN M. GOULD

Hart, Evelyn Anne, ballerina (b at Toronto 4 Apr 1956). Her distinctive physique, dramatic intensity and sublimely lyrical dancing have made her one of the most compelling stage personalities in Canada. By common standards a late starter, Hart trained briefly at the NATIONAL BALLET SCHOOL, with teachers in London, Ont, and

principally at the school of the ROYAL WINNIPEG BALLET, entering the company in 1976. She became a soloist in 1978 and a principal dancer in 1979. In 1980 Hart won the gold medal for best female soloist at the International Ballet Competition in Varna, Bulgaria. She has appeared around the world as a guest artist as well as with other Canadian companies. MICHAEL CRABB

Hart, John, financier, politician, premier of BC (b at Mohill, Ire 31 Mar 1879; d at Victoria 7 Apr 1957). Arriving in Victoria in 1898, Hart worked in a financial firm before founding his own business, Gillespie, Hart and Co, in 1909. Elected a Liberal MLA for Victoria in 1916, and never defeated, he served as "almost a perpetual finance minister" from 1917 until 1949, except for the years 1924-33 when he retired from politics for business reasons. In Dec 1941 Hart became Liberal premier of a coalition government, a position he held until he retired in 1947. Under him the BC Power Commission was established to undertake rural electrification and a program of highway construction was begun, including the Hart Hwy from Prince George to Dawson Creek. PATRICIA E. ROY

Hart, Julia Catherine, née Beckwith (b at Fredericton 10 Mar 1796; d there 28 Nov 1867). Hart wrote the first work of fiction by a native-born Canadian to be published in Canada. Her novel *St Ursula's Convent; or, The Nun of Canada, Containing Scenes from Real Life* (1824) was written when she was 17 and it is a sentimental, moralistic melodrama. As a young girl she experienced both the English and French cultures — a dual heritage reflected in her novel. Her second novel, *Tonnewonte* (1825), is set in the US. In this work she wrote to entertain and to set forth her idealism about the freedom and serenity of western frontier life. DOUGLAS LOCHHEAD

Hart House String Quartet was formed in Toronto in 1923 when Geza de Kresz, violinist, Milton Blackstone, violist, Boris Hambourg, cellist and, a short time later, Harry ADASKIN, violinist, began rehearsing together. The ensemble gave its first concert in the Hart House Theatre in 1924 before an invited audience. So successful was this concert that the Massey Foundation undertook to establish the group permanently by guaranteeing the players' salaries, and as a result the Hart House String Quartet began an internationally respected career lasting until 1946. Hambourg remained with the quartet throughout its career but the other members changed. De Kresz withdrew in 1935 and was replaced by James Levey. Adaskin left in 1938 and was succeeded by Adolph Koldofsky, followed in 1942 by Henry Milligan. Blackstone left in 1941 and was replaced by Allard de Ridder, followed by Cyril Glyde in 1944. The quartet gave 10 annual concerts at Hart House and 10 at Convocation Hall, U of T. It made numerous Canadian tours, gave many concerts in the US and toured Britain and Europe twice. In the early days of broadcasting it was contracted by the CNR, and continued radio engagements into the late 1930s and early 1940s for the CBC. Its repertoire included music from classic, romantic and modern composers. It gave several first Canadian performances and several premieres of the works of Canadian composers. Occasionally the quartet performed with an outstanding guest artist, such as Maurice Ravel, Sir Ernest MACMILLAN and Ernest Seitz. It was internationally acclaimed for its sensitive and skillful playing. Its Victor recordings are treasured by knowledgeable collectors and fortunate owners. *See also* CHAMBER MUSIC; MUSIC HISTORY. MABEL H. LAINE

Hart Trophy is awarded annually to the player chosen by hockey writers as being "most valuable" to his NATIONAL HOCKEY LEAGUE team. It was donated to the NHL in 1923 by Dr David A. Hart, father of Cecil Hart, former manager of the Montréal Canadiens. The oldest and most prestigious individual award in hockey, it was retired to the HOCKEY HALL OF FAME in 1960 and replaced by the Hart Memorial Trophy. Gordie HOWE won it 6 times, Eddie SHORE 4, Howie MORENZ 3 and Bobby ORR 3. Wayne GRETZKY won it his first 4 seasons in the league. JAMES MARSH

Hartland, NB, Town, pop 846 (1981c), inc 1918, is located at the mouth of the Becaguimec Stream, 124 km upriver from Fredericton on the SAINT JOHN R. First settled by William Orser, a New York LOYALIST, the community developed in the 19th century from being the commercial centre for the surrounding farms to being the site of many small manufactures. This varied economic base shifted towards specialization in the 20th century with the development of potato-chip production (Humpty Dumpty Ltd) and trucking (Day and Ross Ltd, one of the 10 largest transport companies in Canada). Although the town's main street has been considerably altered by fire and flood in the last few decades, Hartland is steeped in history. Three New Brunswick premiers have hailed from here. The 391 m Hartland Covered Bridge attracts visitors yearly from around the world. FRED FARRELL

Hartman, Barney, skeet shooter (b at Swan River, Man 2 Nov 1916). Judged by his peers the greatest skeet shooter in the world, Hartman was 10 times captain of the National Skeet Shooting Assn all-American team and 4 times recorded perfect 100x100 with the 410 gauge. He claimed nearly 30 world titles in 12, 20, 28, 410 gauge and all-round categories. He once broke a string of 2002 clay targets without a miss and he frequently shattered records. He won a silver and 4 bronze medals in world competition and for 9 of 12 years as amateur and professional boasted the world's best average. BOB FERGUSON

Hartman, Grace, labour leader (b at Toronto 14 July 1918). Hartman was the first female unionist to hold the top position in a Canadian union. In 1954 she joined the National Union of Public Employees (TLC), where she held several local and provincial positions. When the CANADIAN UNION OF PUBLIC EMPLOYEES (CUPE) was formed in 1963, by a merger of her union with the National Union of Public Service Employees (CCL), she was elected to its national executive as a regional VP for Ontario. Hartman successfully campaigned for full collective-bargaining rights for municipal and school-board employees. She promoted women's rights inside and outside of the labour movement. In 1981 she was jailed for counselling an illegal strike; she insisted that hospital workers, legally barred from striking, must have full collective-bargaining rights.

In 1965 Hartman was elected one of CUPE's 5 general VPs; in 1967 she became the national secretary-treasurer, in 1975 the national president, and in 1976 Canada Labour Congress general VP. She retired in 1983. LAUREL SEFTON MACDOWELL

Harvest Excursions Before the introduction of the combine, prairie harvests required large numbers of labourers for short periods of time. Harvest excursion trains, 1890-1930, brought workers west — about 14 000 in 1908. Railways offered harvest tickets from any station as far away as the Maritimes to Winnipeg for $15, and a return fare of $20. Excursion trains provided crude accommodation: packed 4 per compartment, passengers slept on slatted wooden seats. Delays, crowding and drunkenness on occasion led to destructive riots. In the 1920s railways demanded and got RCMP detachments on the trains to keep order. The harvesting work paid $1.75-$2.25 for a 10-12-hour day with board, and usually lasted 15 days. A threshing crew of perhaps 2 dozen was paid $2-$3.25 each a day



A 1911 advertisement for men needed to harvest grain in western Canada. Excursion trains brought workers from as far east as Halifax (*courtesy Public Archives of Canada/C-54925*).

with board. Although the journey was rough and the work was gruelling, the excursions introduced Canadians and Britons to the Prairies. Many decided to return permanently to HOMESTEAD. The collapse of the wheat economy in 1930 and changing farm technology ended the era of the harvest excursion. PETER A. RUSSELL

Harvey, Douglas, hockey player (b at Montréal 19 Dec 1924). He rejected offers from major-league football and baseball teams and played amateur senior hockey for Montreal Royals before joining MONTREAL CANADIENS in 1947-48. He was the greatest defenceman of his era, controlling the tempo of the game with pinpoint passing, subtle playmaking and dramatic rushes. He was the defensive leader of the powerful Canadien team that won 5 consecutive Stanley Cup victories 1956-60. He won the JAMES NORRIS TROPHY for outstanding defenceman 7 times, was first all-star 10 times and scored 88 goals and 452 assists in 1113 regular-season games and 8 goals and 64 assists in 137 playoff games. His career in Montréal ended when he became active in the NHL players association and he was traded in 1961 to New York Rangers where he was player-coach for a year. He played for several teams in the minors before returning to the NHL with Detroit and St Louis. He was briefly coach of LA Kings (1970). JAMES MARSH

Harvey, Jean-Charles, journalist, writer, lecturer (b at La Malbaie, Qué 10 Nov 1891; d at Montréal 3 Jan 1967). A lively and outspoken thinker, Harvey was at the heart of almost every cultural, political and social debate of his time. After working as a reporter for *La Patrie* and *La Presse,* Harvey took an advertising position with a Montmagny company. The firm's bankruptcy inspired his first novel, *Marcel Faure* (1922). In Feb 1922 he joined *Le Soleil,* where in 1927 he became editor-in-chief. He lost his job when his novel, *Les Demi-civilisés* (1934), was indexed by Cardinal VILLENEUVE on 26 Apr 1934. He continued to publish and founded the weekly *Le Jour* (1937-46). In 1952 Harvey became a radio news commentator. A year later he moved to *Le Petit Journal,* where he was technical director (1956-66). He published numerous works, lectured across Canada and gave regular radio broadcasts. Faithful to his principles and with independence of spirit, humanitarian ideals and attachment to nature, Harvey was one of the great French Canadian journalists. GUILDO ROUSSEAU

Harvey, Sir John, soldier, colonial administrator (b in Eng 23 Apr 1778; d at Halifax 22 Mar 1852). Of fairly humble origin, he rose to become a lt-gen in the British army. During the WAR OF 1812 he distinguished himself against a superior American force at the battle of Stoney Creek, Upper Canada. After a number of minor posts he was appointed lt-gov of PEI in 1836, where he prevented disputes between absentee landlords and their tenants from erupting into violence. He was sent to NB in 1837 and negotiated an agreement with the Assembly that ushered in an "age of harmony" there. Dismissed 1841 for seeking to settle the NB-Maine boundary dispute by direct negotiations with Maine, he was made lt-gov of Newfoundland later that year and restored a degree of political tranquillity. In 1846 he was transferred to NS, where he presided over the transition to RESPONSIBLE GOVERNMENT. Harvey was perhaps the most successful colonial governor of his day. P.A. BUCKNER

Harvey, Moses, clergyman, essayist, naturalist (b at Armagh, Ire 21 Mar 1820; d at St John's 3 Sept 1901). He was of Scottish descent and was ordained a Presbyterian minister in 1844. After serving in Maryport, Eng, he immigrated to Newfoundland in 1852. His ministry at St Andrew's Free Presbyterian Church in St John's was long and successful, but he is best known as a champion of Newfoundland and prolific writer of hundreds of publications. He contributed over 600 articles to the Montréal *Gazette*, some under the pen name "Delta." Elected to the Royal Soc of Canada in 1892, he served with distinction as secretary to the Newfoundland Fisheries Commission, calling for the establishment of a "world class marine sciences research laboratory in Newfoundland." His name is associated with early specimens of the giant squid *Architeuthis* from the 1870s. Truly a Victorian savant and an outstanding man of letters, Harvey was author of *Across Newfoundland with the Governor* (1879), *Text-Book of Newfoundland History* (1885) and *A Short History of Newfoundland: England's Oldest Colony* (1890). F.A. ALDRICH

Harvie, Eric Lafferty, oilman, philanthropist (b at Orillia, Ont 2 Apr 1892; d at Calgary 11 Jan 1975). Harvie was called to the Alberta bar in 1915. He served overseas in WWI, was wounded in France and achieved the rank of captain. As a Calgary lawyer, he was involved in the oil business and in 1944 purchased the mineral rights held by British Dominions Land Settlement Co. With these he formed Western Leaseholds, Ltd, and Western Minerals, Ltd; in 1947-48, when oil was discovered on several of his leases in the Leduc and Redwater fields, he became wealthy. In 1955 he turned to philanthropic endeavours. His major achievement was forming the Glenbow Foundation in Calgary and later overseeing the creation of Heritage Pk. A modest man, he kept most of his good works secret, but he was known for his assistance to the Calgary Zoological Soc, BANFF CENTRE SCHOOL OF FINE ARTS and Luxton Museum. He was a founding officer of the Canada Council. HUGH A. DEMPSEY

Harwood, Vanessa, ballet dancer (b at Cheltenham, Eng 14 June 1947). One of Betty OLIPHANT's first pupils in Canada, Harwood attended the NATIONAL BALLET SCHOOL, graduated into the NATIONAL BALLET OF CANADA in 1965, and became a soloist in 1967 and a principal dancer in 1970. Known for her interpretation of *Swan Lake* and *The Dying Swan*, Harwood is admired for her virtuosity and her seductive stage presence. She has made numerous guest appearances in the US, Australia and Europe. PENELOPE DOOB

Hastings, Charles John Colwell Orr, obstetrician, medical officer of health (b in Markham Township, Canada W 23 Aug 1858; d at Toronto 17 Jan 1931). Educated at Victoria Coll Medical School in Toronto with postgraduate training in Great Britain, Hastings was one of the first full-time obstetricians to practise in Toronto. As Toronto's MOH 1910-29, he purified the water supply and established an internationally recognized public-health nursing system. He was a leading pioneer of health education programs, medical and dental inspection in public schools, and neighbourhood baby clinics in Canada. These innovations lowered Toronto's death rate from communicable diseases (from 15.3 per 1000 in 1909 to 10.3 per 1000 in 1925) and made the city a cleaner and healthier place to live. Hastings's accomplishments were recognized with his election as president of the Canadian Public Health Assn in 1916 and the American Public Health Assn in 1918. Through his efforts, Toronto's Health Dept became internationally renowned for its achievements in preventive medicine.
HEATHER MACDOUGALL

Haszard, Francis Longworth, lawyer, politician, premier of PEI, judge (b at Bellevue, PEI 20 Nov 1849; d at Charlottetown 25 July 1938). Elected to the Legislative Assembly in 1904, Haszard became premier in 1908, serving until 1911 when he was appointed master of the rolls and judge of the Supreme Court. He retired from the bench in 1930. NICOLAS J. DE JONG

Hatfield, Richard Bennett, politician, premier of NB (b at Woodstock, NB 9 Apr 1931). The longest-serving premier of New Brunswick, he has promoted national unity and linguistic equality and worked for the patriation of the CONSTITUTION and a CANADIAN CHARTER OF RIGHTS AND FREEDOMS. Educated at Acadia and Dalhousie Law School, he practised law briefly and was sales manager of Hatfield Industries, the family potato chip business 1958-65. In 1961 he was elected Conservative MLA for Carleton County. Unsuccessful in his 1966 bid for the party leadership, he was named House leader in 1968 and elected party leader in 1969. The next year he led his party to victory over L.J. ROBICHAUD.

Hatfield's government has consolidated the Liberal program of Equal Opportunity and implemented the Official Languages Act. Political reforms include the Political Process Financing Act and single-member electoral districts, both part of plans to reorganize government structure and responsibility. In spite of controversy over the Bricklin car venture, Point Lepreau nuclear power plant, spruce-budworm spraying and party fund-raising activites, Hatfield's Conservatives were re-elected 1974, 1978 and 1982, and he has succeeded in expanding Conservative support in the francophone regions. A premier of national reputation, he promotes NB as the microcosm of Canada. DELLA M.M. STANLEY



Richard Hatfield, the longest-serving premier in the history of New Brunswick. He first became premier in 1970 (*courtesy Canapress*).

Hatheway, George Luther, farmer, lumberman, politician, premier of NB (b at Musquash, NB 4 Aug 1813; d at Fredericton 5 July 1872). Elected in 1850 as Reform MLA for York and defeated in 1857, he was re-elected in 1861 and named chief commissioner of public works by S.L. TILLEY. Opposed to the Québec Resolutions, Hatheway left Tilley's pro-Confederation government and was elected in 1865 as an anti-confederate. He declined to lead the government, preferring to be commissioner of public works for A.J. SMITH, and retired in 1866. On accepting the reality of Confederation, he was re-elected in 1870 and in 1871 agreed to form a coalition government. As premier and provincial secretary, he and G.E. KING passed the Common Schools Act, thereby introducing a free, tax-supported, non-sectarian school system.
DELLA M.M. STANLEY

Haultain, Herbert Edward Terrick, mining engineer, educator (b at Brighton, Eng 9 Aug 1869; d at Toronto 19 Sept 1961). A graduate of U of T who acquired practical mining experience in Europe, he returned to Canada in 1905 as professor of mining and engineering at U of T. He remained in that position for more than 30 years. He developed the "Ceremony of the Calling of the Engineer," a private ritual for engineers graduating from Canadian universities, and was instrumental in founding the Technical Service Council, formed for the initial purpose of keeping engineers in Canada. He also designed and built the Superpanner and Infrasizer, instruments used in dressing ore. PHYLLIS ROSE

Haven, Jens, founder of the Moravian mission in LABRADOR (b at Wust, Jutland, Denmark 23 June 1724; d at Herrnhut [E Germany] 16 Apr 1796). After 10 years at the Moravian settlement at Herrnhut (1748-58), he was sent to the Inuit Mission in Greenland. In 1764 he went to Labrador, hoping to found a mission for the Labrador Inuit. An earlier attempt (1752) had failed. Newfoundland's new governor, Hugh PALLISER, whose jurisdiction included Labrador, supported Haven in the hope that the Moravians could help resolve conflicts between the Inuit and the white people. In May 1769, 40 470 ha of land in Labrador were granted to the Moravian Church, and in Aug 1771 Haven and his followers established the first Moravian Mission at NAIN on the northern coast. During Haven's 13 years in Labrador other missions were established at Okak and Hopedale. In 1784 he returned to Herrnhut. A strong-minded man, he believed it was his destiny to work among the Inuit of Labrador, a people he loved.
JOHN PARSONS

Reading: John Parsons, *Labrador* (1970).

Haviland, Thomas Heath, Sr, politician, businessman, public official (b at Cirencester, Eng 30 Apr 1795; d at Charlottetown 18 June 1867). A member of the ruling elite before RESPONSIBLE GOVERNMENT, Haviland was at the centre of PEI life until his death. He arrived in 1816 and was appointed to a series of increasingly lucrative offices, including assistant judge of the Supreme Court, colonial secretary, and clerk of the Executive Council. He was also agent for absentee landowners and acquired substantial holdings of his own. An MLA 1854-58, in 1857 he was elected mayor of Charlottetown, a post he held until his death. Haviland was a prominent Anglican, a leading Tory and president of the Bank of PEI. P.E. RIDER

Hawk, common name for several species of diurnal BIRDS OF PREY from widely separate families. These birds are superficially alike, being smaller than EAGLES and having large, keen eyes,

hooked bills and sharp, curved talons. True hawks belong to the family Accipitridae, which also includes eagles and Old World vultures and contains over 200 species worldwide. Females of all species are considerably larger than males. Ten species of true hawk breed in Canada. Buteos are the large hawks commonly seen, in spring and summer, soaring over open areas or perched on dead trees or telephone poles. The most common species across southern Canada is the red-tailed hawk (*Buteo jamaicensis*). All 6 Canadian species build their own nests and most nest in trees or on the sides of cliffs. Ferruginous and rough-legged hawks (*B. regalis, B. lagopus,* respectively) have adapted to ground nesting in open, treeless prairie or arctic tundra. Buteos feed largely on rodents and are considered beneficial to humans. Those that breed in Canada normally migrate S in winter, most moving to the southern and central US. Swainson's and broad-winged hawks (*B. swainsoni, B. platypterus*) winter in S America. Of the accipiters (forest hawks), sharp-shinned and Cooper's hawks and northern goshawks (*Accipiter striatus, A. cooperii* and *A. gentilis*) breed across Canada in forested areas. They tend to use different prey species and may be found nesting in close proximity in mixed woodland. Sharp-shinned and Cooper's hawks feed almost exclusively on small birds. Goshawks feed heavily on hares, squirrels and grouse. Although secretive by nature, all 3 species are bold hunters and will protect their nests against all intruders. The marsh hawk or northern harrier (*Circus cyaneus*) breeds across Canada. A slow-flying, open-country hawk, it is most often observed over marshes and meadows hunting for mice and small birds. R.W. FYFE

Hawkesbury, Ont, Town, pop 9 877 (1981c), inc 1896, located on the Ottawa R, 100 km NW of Montréal and 95 km E of Ottawa. Founded in 1798, the town was eventually named for Charles Jenkinson, Baron Hawkesbury. Thomas Mears built the first gristmills and sawmills, and the *Union,* the Ottawa R's first steamer. Demand for timber during the Napoleonic Wars created a boom. Timber and pulp-and-paper industries have been supplanted by textiles, synthetic fibres and metal tubes. The Grenville Canal on the Québec side of the Ottawa opposite Hawkesbury is an important link in the river's transportation system. Part of Hawkesbury was submerged by a Hydro Québec dam built 1950-62. K.L. MORRISON

Hawkins, Ronald, "Rompin' Ronnie," rock singer (b at Huntsville, Ark, 10 Jan 1935). "The Hawk," a father figure in Canadian rock music, was a rockabilly performer when he first toured Ontario in 1958. He settled in Toronto, despite the international success of such early recordings as "Mary Lou," "40 Days" and the classic "Who Do You Love?" Some of his bands in the 1960s (eg, The BAND, Crowbar) had major careers of their own, as did individually many former Hawkins musicians. He made several comebacks in the 1970s and in 1982 starred on CTV's "Honky Tonk." MARK MILLER

Hawley, Sanford Desmond, jockey (b at Oshawa, Ont 16 Apr 1949). Riding professionally since 1968, Hawley has been one of N America's most successful jockeys. He has won 25% of the races he has entered, the highest winning percentage among N American jockeys; he was Canada's leading jockey in 1969 and won the N American title in 1970, 1972 and 1973. In 1973 he became the first rider to win over 500 races in a single year and, in 1980, won his 4000th career race, the youngest jockey to reach this plateau. Hawley has twice won the LOU MARSH TROPHY, awarded annually to Canada's outstanding athlete. He has also been honoured in the US, winning the prestigious Eclipse Award for his racetrack performances. He rode winners in the QUEEN'S PLATE 4 times. J. THOMAS WEST



Hawthorn (*Crataegus*), with flowers and fruit (berries) (*artwork by Claire Tremblay*).

Hawthorn, small, deciduous TREE or shrub of genus *Crataegus,* family Rosaceae (rose). Hawthorns are normally armed with strong thorns (modified branches), and have fragrant, insect-pollinated, white, pink or, occasionally, red flowers in showy clusters. The leaves are serrate or lobed and brilliantly coloured in autumn. The red, applelike fruit is fleshy and has 1-5 bony seeds. Most species occur in the north temperate zone. Because of the differing treatment of the many hybrids and asexual clones found in nature, the number of species is variously estimated from 100 to 1100, although the lower numbers appear more realistic. In eastern Canada, hawthorns are very common and are represented by many species; in the West, they are less common. The berries were eaten and used medicinally by Canadian Indians and early settlers, who also made hawthorn wine. Hawthorns are ORNAMENTALS, used in landscaping as trees or in hedges. *See* PLANTS, NATIVE USES.

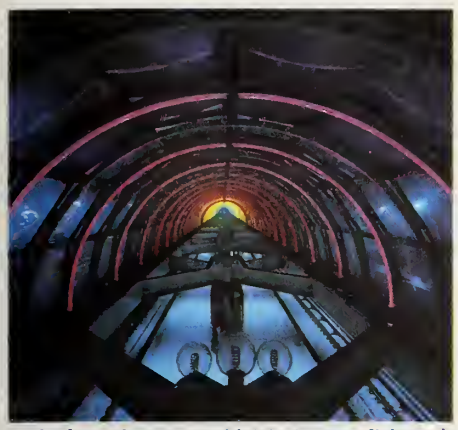
Hay River, 702 km long, rises out of several headstreams in northeastern BC and flows NE across Alberta to empty into GREAT SLAVE LK. Its lower reaches are broken by 2 spectacular waterfalls and a 5 km stretch of rapids surging through a deep gorge. The community of Hay River, located at the river's mouth, is one of the largest in the NWT. The river valley is a principal route into the middle north and is followed by a highway and a railway. The name refers to the luxurious growth of hay and grass along the river's banks. DANIEL FRANCIS

Hay River, NWT, Town, pop 2863 (1981c), inc 1963, is located on the S shore of GREAT SLAVE LK at the mouth of the HAY R, 201 air km SW of YELLOWKNIFE. The original homeland of the Slavey DENE, Hay River first became settled in the late 1800s with an HBC trading post and Anglican and Catholic missions. The present community dates back to 1948 with the construction of the Mackenzie Hwy from Hay River to Grimshaw, Alta. The community became an important transportation and communications centre. It is the staging point for the shipping industry up the MACKENZIE R and also the centre of the Great Slave Lk commercial fishery. In 1963 a serious flood at the old townsite required the evacuation of the entire population to a safer area upriver. In 1964 the community's economy was stimulated by the completion of a CNR railway link. Today, Hay River remains one of the few NWT communities that is largely dependent on private enterprise. ANNELIES POOL

Hay River Reserve, NWT, IR, pop 298 (1980e), is located on the E bank of the E channel of the HAY R, 201 air km SW of YELLOWKNIFE. It is the only Indian reserve in the NWT and was created in 1974 when local DENE residents requested protection of their traditional life-style and lands. In the summer of 1981, forests immediately S were heavily damaged by fire and this affected trapping, a major source of income for local residents. Today, many of those who live on the reserve work in the shipping industry in the nearby town of HAY RIVER. ANNELIES POOL

Hayden, Melissa, stage name of Mildred Herman, ballet dancer and teacher (b at Toronto 25 Apr 1923). During her long performing career she became internationally known as a ballerina of dazzling virtuosity and dramatic intensity. Hayden trained first in Toronto with Boris VOLKOFF before leaving at age 16 for further studies in New York. There she danced with Ballet Theatre (later the American Ballet Theatre) and other companies. In 1950 she joined the New York City Ballet where, except for a return to ABT in the mid-1950s and other brief guest engagements, she danced until her retirement in 1973. Until 1983 Hayden had her own teaching studio in New York and she continues to travel widely to teach and stage Balanchine ballets. MICHAEL CRABB

Hayden, Michael, sculptor (b at Vancouver 15 Jan 1943). Hayden studied at the Ontario College of Art and is a sculptor in light. His work utilizes electronic and computer technology to produce pieces of extraordinary colour and scale to complement the vast spaces of contemporary urban architecture. One of his pieces, *Arc-en-ciel* (1978), was created for the vaulted atrium ceil-



Michael Hayden, *Arc-en-ciel* (1978), neon lightwork sculpture installed in the vaulted atrium ceiling of Toronto's Yorkdale subway station (*photo by Michel Proulx / Keltia Canada*).

ing of the Yorkdale (Toronto) subway station, designed by Arthur ERICKSON and Associates. The piece can be viewed from outside the station and the most spectacular perspective is from the air. It is widely recognized as a model of the successful integration of sculpture and architecture. Hayden lives in Los Angeles and has had over 30 solo exhibitions in Canada, the US and Europe. KARYN ELIZABETH ALLEN

Hayes, Kate Simpson, pen name Mary Markwell, writer, journalist (b Katherine Hayes at Dalhousie, NB 1856; d at Vancouver 1 15 Jan 1945). Hayes moved to Prince Albert, North-West Territories, in 1879, then after a short-lived marriage settled in 1885 with her 2 children in Regina where she founded a literary and musical society. She wrote for the *Regina Leader*, was territorial legislative librarian, and as Mary Markwell published numerous plays, sketches, short stories, songs and verses. Her *Prairie Potpourri* (1895) was the first literary work published in the Territories. Her strong suffrage convictions led her long-time companion and father of 2 of her children, Nicholas Flood DAVIN, to introduce a motion in Parliament (8 May 1895) in favour of women's suffrage. In 1899 she joined the *Manitoba Free Press*, becoming women's editor; with Kit Coleman, she co-founded the Canadian Women's Press Club (1904).

SUSAN JACKEL

Hayes River, 483 km long, rises in Molson Lk (399 km²) NE of Lk Winnipeg, flows NE to Oxford Lk (401 km²) and Knee Lk, through the rock and bush of the Canadian SHIELD, across the clay flats of the Hudson Bay Lowlands and into the bay at YORK FACTORY. It has a DRAINAGE BASIN of 108 000 km² and a mean discharge of 694 m³/s. Its main tributaries, the Fox and Gods rivers, drain numerous lakes N and S of its course. The river, named for Sir James Hayes, a charter member of the HBC, was the chief FUR-TRADE route between Lk Winnipeg and York Factory for nearly 200 years. Though swift and rough in places, it was easier to travel than the turbulent Nelson, which the traders joined, via the shallow Echimamish R, at Cross Lk. JAMES MARSH



Haynes, Douglas Hector, abstract painter, teacher (b at Regina 1 Jan 1936). He graduated from the art dept of the Provincial Institute of Technology and Art (now Alberta Coll of Art) in 1958, studied at the Royal Academy of Fine Arts, The Hague (1960-61), and travelled widely throughout Europe (1967-68). He first became known for his painted constructions done on burlap, string and other materials (1963-69). In 1970 he visited New York C, renewed an interest in the work of A. Gottlieb and R. Motherwell and shifted his attention to painting. Around 1977, stimulated by Jack BUSH, his work became more personal and accomplished. Elected a member of the Royal Canadian Academy in 1974, Haynes was chairman of the dept of art and design at U of A (1976-80). KEN CARPENTER

Hays, Charles Melville, railway president (b at Rock 1, Ill 16 May 1856; d in the N Atlantic 15 Apr 1912). At 17 Hays entered the passenger department of the Atlantic & Pacific Ry at St Louis, Mo. His railway career advanced rapidly, and in 1889 he became general manager of the Wabash, St Louis and Pacific Railroad. He came to Canada in 1896 as general manager of the GRAND TRUNK RY, becoming president in 1909. The GRAND TRUNK PACIFIC RY, of which he became president in 1905, was largely his creation. Under his directorship the GTR suffered intense labour strife, and one of LAURIER's ministers described Hays as heartless, cruel and tyrannical. He went down in the *Titanic*. ERIC J. HOLMGREN

Hays, Harry William, farmer, rancher, businessman, politician (b at Carstairs, Alta 25 Dec 1909; d at Ottawa 4 May 1982). He was mayor of Calgary 1959-63, federal minister of agriculture 1963-65 and senator 1966-82. He was a director of numerous companies and president and life member of many agricultural organizations. A master Holstein breeder, he was originator of the Hays Converter breed of beef cattle, the first to be recognized for registry. In a lifetime devoted to agriculture, Hays can best be described as an innovator. He instituted the export of cattle by air. As federal minister of agriculture (1963-66) he instituted the Veterinary College at Saskatoon and the Canadian Dairy Commission, expanded the crop insurance system, a national farm accounting system, established new fairs and exhibition classifications, and the importation of exotic breeds of cattle, the Showcase Herds. As senator, he was chairman of the agricultural committee and co-chairman of the Joint Senate House of Commons Committee on the Constitution. S.B. WILLIAMS

Hazardous Wastes Waste is defined as any substance for which the generator or owner has no further use. Hazardous wastes may be defined as substances whose disposal in the environment constitutes a potential hazard to people, natural resources or both, or could potentially interfere with amenities. Disposal of hazardous wastes should be carried out in such a manner that the associated threats to man, resources and amenities are both minimal and acceptable.

J.M. BEWERS

Terrestrial Environment

In the 19th century it was realized that WASTE DISPOSAL must take place in an organized and safe manner, if only to control the spread of disease. The ever-increasing variety of consumer goods generates wastes that are becoming increasingly hazardous. Standard landfills and sewage treatment facilities are inadequate for disposal of hazardous wastes, particularly hazardous industrial wastes, and additional harmful products remain in the environment as runoff or fallout of fertilizers, pesticides, etc (*see* POLLUTION). It is estimated that a million people produce 50 000-250 000 t of hazardous wastes each year. In Canada about 1 million t of hazardous wastes were produced in 1978.

The dumping of untreated hazardous chemicals can have far-reaching effects. The discharge of inadequately treated liquid waste to RIVERS and streams has created problems to communities downstream, and dumps of waste chemicals have created major health hazards to people living in their vicinity. Buried chemicals can produce vapours which rise to the surface and escape into the air. Liquids can seep through the Earth, mix with GROUNDWATER and affect drinking-water wells far from the dump.

The insidious nature of the effects of low levels of some chemicals in the environment makes it difficult to set safe levels. The effects of cancer-causing chemicals may not show up until many years have passed, and may be very difficult to prove. Nevertheless, most hazardous wastes can be treated to render them relatively harmless to humans or the environment. Hazardous wastes can be categorized into groups amenable to special treatments, ie, to recycling, physical or chemical reactions, incineration, biological treatments, solidification, deep-well injection or long-term storage. Recycling, by far the preferred method for recoverable materials (eg, waste oil, solvents), provides viable industries in many countries, including Canada. Some wastes can be treated chemically to form stable, nontoxic materials, eg, some acids can be neutralized to harmless brine or precipitated as insoluble salts which can be landfilled. Other materials (eg, chromium) can be treated to change the charge on the atom to produce a less toxic form. Liquid and solid organic wastes can be incinerated in properly designed furnaces (usually rotary kilns), so that only carbon dioxide and water vapour reach the air in appreciable quantities. Hazardous materials (eg, acids, alkalis) can be scrubbed out and solids can be electrostatically precipitated. Thus, even difficult to destroy chemicals like polychlorinated biphenyls (PCBs) can be safely detoxified, if the incineration time and temperature are sufficient. Many industries treat biodegradable liquid wastes with bacteria before discharge to surface waters. Heavy metal wastes (eg, electroplating liquors) can be incorporated into a concretelike mass which resists leaching from burial sites. In some regions waste liquids (eg, brine) can be injected into underground permeable formations overlain by impermeable rock (deep-well injection).

No practical detoxification methods are yet known for some hazardous wastes: some can be stored for future treatment; others (eg, radioactive wastes) must be stored indefinitely. In the latter case, the disposal problem should be considered in evaluating the perceived need for the product and, if production proceeds, storage sites must be chosen with the utmost care, considering local geology and the possibility of seismic activity (*see* NUCLEAR SAFETY).

Although most wastes can be treated for safe disposal, many are not now so treated because of short-term economic reasons. The costs of proper waste treatment are rarely built into production costs, and more profit can be made if wastes are disposed of untreated. Consumers must be prepared to pay for proper disposal and a loss of export markets may result from competition from countries where waste disposal is less costly. Legislation to control unsafe practices exists, but illegal dumping is still a problem and improvements to laws and their enforcement can and should be made.

When plants are sited, isolation must be balanced against the risks of transporting wastes long distances. Proper siting, design and regulation can make a disposal facility as safe as any other industry. However, the public perception of a danger often results in opposition to the siting of new treatment plants. This opposition may be overcome by public information sessions followed by participation in the planning process. In 1986, under the direction of Donald CHANT, the Ontario Waste Management Corp will build N America's first comprehensive hazardous waste treatment facility. PETER A. ADIE

Marine Environment

The OCEAN has long been used, both deliberately and accidentally, for the disposal of human and industrial wastes. Potential deleterious effects of hazardous wastes on the marine environment include hindrance to legitimate uses of the sea (eg, fishing); degradation of the quality of seawater, making it less suitable for recreation, desalination or other uses; and less tangible reductions in the aesthetic attractiveness of the ocean environment. The main types of deliberate waste disposal into the ocean include direct discharge from land through outfalls or other pipelines; dumping from ships or other platforms; and incineration on, or aqueous discharges from, ships or marine and coastal platforms. Waste materials discharged on land or into freshwater reservoirs (rivers and lakes) may also reach the sea indirectly through runoff. Wastes routinely discharged by pipeline or outfall into the coastal zone in Canada include sewage, metal refining wastes, animal and foodstuff processing wastes and pulp and paper industrial wastes. Nuclear fuel reprocessing wastes can be added to the list in some other countries. In Canada and other coastal states, heat is also discharged to coastal waters in cooling water from power utilities and other industrial plants. Wastes dumped into the Canadian coastal environment predominantly comprise sediments dredged from nearshore areas for navigational purposes; agricultural and industrial wastes are also dumped occasionally. Some countries use incineration at sea for the disposal of persistent organic materials. Ships and other platforms discharge bilge wastes, tank washings, drilling muds, ballast and oil (often illegally). Major global concern has shifted from contamination of the ocean with oil to the dumping of low-level radioactive wastes in the deep ocean. Several European countries and the US have carried out such dumps, but the major continuing disposal of this type occurs in the eastern N Atlantic by 4 European countries under the auspices of the Nuclear Energy Agency of the Organization for Economic Cooperation and Development. In Canada the only deliberate dumping of radioactive material has been of small quantities of single isotopes for sediment transport studies.

Indirect (ie, by way of freshwater discharges) and direct releases of chemical wastes have resulted in several cases of metal and organic matter contamination of nearshore areas, particularly within embayments having restricted water exchange with offshore areas. Various Canadian East Coast, West Coast and Arctic Coast bays and FJORDS have been affected in this way. Large-scale contamination is difficult to detect because of the great assimilative capacity of the ocean and of large marginal sea areas (eg, Gulf of ST LAWRENCE; Bay of FUNDY). Land discharges are, however, by far the largest source of anthropogenically mobilized (ie, made or moved by humans) material entering the ocean. The cumulative effects of these discharges and of atmospheric precipitation of chemicals into the ocean are evident for some radionuclides, heavy metals and artificial organic compounds.

Deliberate dumping of material into the marine environment is now generally governed by the 1972 International Convention for the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, commonly referred to as the London Dumping Convention. Contracting parties (nation states) are required to establish and administer appropriate national legislation, eg, in Canada, the Ocean Dumping Control Act regulates all marine dumping. The London Convention specifies a "black list" of substances (eg, organohalogen, mercury or cadmium compounds, persistent plastics, oils, high-level radioactive wastes) which may not be dumped into the marine environment, other than as trace quantities in other materials. A further "grey list" defines potentially hazardous substances (eg, arsenic, lead, copper, zinc and organosilicon compounds, cyanides, fluorides and pesticides not included in the black list) which require special precautions in disposal. These substances may be dumped only under the provisions of special permits issued by the national authorities. The convention also specifies the procedures and criteria by which a national authority may determine suitability of all other substances for marine disposal and the locations and methods for dumping.

Land discharges are not governed by international convention in the same way as ocean dumping. The major regional convention covering discharges of waste from land is the Paris Convention to which most Western European countries are signatories. Canadian Acts governing discharges of material from land include the Fisheries Act, the Environmental Contaminants Act, the Navigable Waters Protection Act and the Arctic Waters Pollution Prevention Act (*see* ENVIRONMENTAL LAW).

Various views are held regarding the use of the ocean as a receptacle for wastes. Some regard the ocean as "waste space" which could be put to greater use as a waste-receiving environment because its capacity to assimilate wastes, without deleterious effects, is very large. Others feel strongly that the ocean environment should be preserved in as pristine a state as possible since any major disturbance of the vast and complex oceanic ecosystem will be very difficult to reverse. J.M. BEWERS

Hazen, Sir John Douglas, lawyer, politician, judge (b at Oromocto, NB 5 June 1860; d at Saint John 27 Dec 1937). A Fredericton alderman, 1885-88, he was elected mayor in 1888 and MP for Saint John in 1891. Defeated in 1896 when LAURIER came to power, he was elected MLA for Sunbury in 1899 and named leader of the Opposition. Under his leadership the modern Conservative Party emerged as an effective political force in NB, winning power in 1908 and leading battles against political corruption and federal efforts to reduce Maritime parliamentary representation. In 1911 he entered PM BORDEN's Cabinet as minister of marine and fisheries, minister of naval affairs and MP for Saint John. A member of the Imperial War Cabinet and the International Fisheries Commission, Hazen was appointed chief justice of NB in 1917.
DELLA M.M. STANLEY

Head, Sir Edmund Walker, 8th Baronet, scholar, public servant, lieutenant-governor of NB 1848-54, governor general of British N America 1854-61, governor of the HUDSON'S BAY CO 1863-68 (b at Wiarton Place, near Maidstone, Eng 16 Feb 1805; d at London, Eng 28 Jan 1868). He was educated at Oxford, where he took first-class honours in classics at Oriel College and was elected a fellow of Merton. An author, editor and translator, Head wrote articles on law, government, language and philology as well as ballads and poems. He served on the Poor Law commission 1836-47 and was appointed lieutenant-governor of NB in 1848. An able administrator, Head helped to prepare NB for full RESPONSIBLE GOVERNMENT. His interest in defence, railways and a larger British N American federation made him a logical choice for the post of governor general of BNA in 1854. Head's refusal to grant George BROWN dissolution of the House during the DOUBLE SHUFFLE of 1858 caused considerable controversy. As the visitor to King's College (UNB) and McGill, Head contributed to their mid-century reorganization.
CARMAN MILLER

Reading: D.G.G. Kerr, *Sir Edmund Head* (1954).

Head, Sir Francis Bond, soldier, author, colonial administrator (b at Higham, Eng 1 Jan 1793; d at Croydon, Eng 20 July 1875). Descended from the minor gentry, Head served in the Royal Engineers. Retiring as a major (1825), he became a mining supervisor in S America and earned the nickname "Galloping Head" for his rides across the Andes. The author of several popular travel books, he was appointed an assistant poor-law commissioner in 1834 and then lieutenant-governor of Upper Canada in 1835. When he arrived at Toronto in Jan 1836, he was welcomed by the Reformers and appointed several moderate Reformers — including Robert BALDWIN — to the Executive Council, but he rarely consulted the councillors, who resigned in a few months. The Reform-dominated Assembly censured him and he dissolved the House and won an overwhelming victory at the polls in 1836 by using the loyalty cry, although his widespread support among moderates quickly dissipated when he engaged in a bitter vendetta against all Reformers. Head cannot be held primarily responsible for the REBELLION OF 1837 in Upper Canada but his unprecedented interference in the election and his uncompromising hostility to the Reformers encouraged extremists, as did his decision to denude the colony of British troops. His excesses led to his recall early in 1838 and he never held office again. PHILLIP A. BUCKNER

Head, Ivan Leigh, public servant (b at Calgary 28 July 1930). A law graduate of U of A, Head taught law there 1963-67 after stints in private practice and the Dept of External Affairs. In 1967 he served as a constitutional adviser to P.E. TRUDEAU, staying on as special assistant after Trudeau became PM the next year. Combative, strong-willed and idealistic, Head quickly became one of the PM's inner circle, and his key external affairs functionary. Head was a strong force behind Trudeau's call for a "north-south dialogue" to aid developing countries, and in 1978 became president of the International Development Research Centre. NORMAN HILLMER

Head-Smashed-In Buffalo Jump, archaeological site located on the southern end of the Porcupine Hills in SW Alberta. Beginning nearly 6000 years ago and continuing until as recently as 150 years ago, native people of the Northwest Plains used Head-Smashed-In as one of the many ingenious traps designed to kill large numbers of buffalo. They used skilful decoy techniques to round up herds of buffalo and stampeded them across the Porcupine Hills and over a 10 m high cliff. Hunters waiting below the cliff killed and butchered the animals, obtaining great quantities of meat, hide and bone. Deposits of butchered bone and stone tools extend to a depth of over 11 m at the base of the cliff. Head-Smashed-In has been designated an Alberta Historical Resource Site, and is on the prestigious list of UNESCO World Heritage Sites. *See also* ARCHAEOLOGY; BUFFALO HUNT; PREHISTORY.
JACK BRINK

Heagerty, John Joseph, physician, public-health official, historian (b at Montréal 26 Dec 1879; d at Ottawa 7 Feb 1946). Entering federal service as a bacteriologist in 1911, Heagerty joined the new Dept of Health in 1919 and became director of public-health services in 1938.

He was noted for his work in Canada's campaign against venereal disease in the 1920s and his proposals for national health insurance in 1943. He also broadcast lectures on Canadian medical history and wrote the 2-vol *Four Centuries of Medical History in Canada* (1928) and *The Romance of Medicine in Canada* (1940).

JANICE DICKIN MCGINNIS

Health Policy Canada's national health-insurance program (also called medicare) is designed to ensure that every resident of Canada receives medical care and hospital treatment, the cost of which is paid through general taxes or through compulsory health-insurance premiums.

Medicare developed in 2 stages. The first was the Hospital Insurance and Diagnostic Act of 1957, which gave the Canadian government authority to enter into an agreement with the provinces to establish a comprehensive, universal plan covering acute hospital care and laboratory and radiology diagnostic services. Nine years later, the Medical Care Act of 1966 extended health insurance to cover doctors' services. While the basic principles of medicare are determined by federal legislation, responsibility for health under the Constitution falls under provincial jurisdiction. Therefore, there are certain variations in the plan from province to province. However, to be eligible for federal cost sharing, the provinces must meet, in their health policies, criteria of accessibility, universality, comprehensiveness, portability and administration.

Until 1977, federal contributions to acute hospital care and doctors' services matched (approximately), dollar for dollar, provincial spending. At that time, unhappy that its share of health costs was in effect under provincial control, the federal government altered the arrangement by passing the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act. Instead of 50-50 cost sharing, the federal government transferred to the provinces a lump sum based on a 3-year moving average of the Gross National Product (GNP) and per capita cash payment.

The new arrangement allowed the provinces more flexibility, in that they were not limited to using federal funds only for insured hospital and medical services; federal money could now be applied to programs such as extended health care in nursing homes or drug-benefit plans not included in medicare. At this time, however, hospital costs were rising at a rate far exceeding general inflation, leaving the provinces with a heavier share of the health-cost burden. Matters worsened when, beginning in 1982, the federal government further restricted TRANSFER PAYMENTS.

History of Health Policy Prior to Confederation in 1867, there was little organized health care. Local communities had authority to set up their own health boards, and some did so in response to EPIDEMICS such as the cholera outbreak that devastated Toronto in 1832. The formal legislation authorizing such boards was passed by the Parliament of Upper Canada in 1834, but it was not until 50 years later that the PUBLIC HEALTH Act compelled local governments to set up health boards and impose sanitary regulations.

At meetings of the CANADIAN MEDICAL ASSOCIATION, an organization created the same year as Confederation, doctors called for public-health measures, safe water and the reporting of contagious diseases. Not until 1882 did Ontario legislation establish a provincial board of health. Three years later, with a smallpox epidemic raging in Québec, Ontario put public-health doctors on trains crossing the border into Ontario to inspect passengers; the doctors were empowered to arrest anybody who refused to be vaccinated.

Dental Care Until the late 1800s there was a scarcity of dentists in Canada. Tooth decay among children was so prevalent that one Toronto dentist estimated that 50% of the schoolchildren at the turn of the century had rotten teeth. Today, provincial health-insurance plans provide some dental coverage, although such coverage varies from province to province, being generally limited to dental care in hospitals. Some provinces, eg, Nova Scotia and Newfoundland, cover dental care for children, while Alberta provides coverage for citizens over 65. PEI has launched mobile child DENTISTRY units staffed by salaried dentists. In 1976 it was estimated 18% of the population of Canada (ranging from a low of 3% in the Maritime provinces to 43% in BC) had some form of dental care provided through private insurers.

Mental Health Under the CONSTITUTION ACT, 1867, the provinces were made responsible for asylums for the mentally ill (*see* MENTAL HEALTH). At that time, almost everywhere in the world the insane were kept at home or brutally treated. In Toronto, when a new and better jail was built in 1800, the old jail became an asylum. The Canadian National Committee for Mental Hygiene was founded in 1918, largely due to the efforts of Dr Clarence M. HINCKS, who with the help of leading Canadians raised funds for a survey of conditions in asylums across Canada. These institutions were generally disgraceful, dirty and overcrowded. The committee brought this to the attention of the public, and the provinces soon began to spend more money on institutions for the mentally ill. By the 1950s, discoveries of drugs that could help control the behaviour of mental patients led to a new trend in care. Many patients from psychiatric hospitals were returned to the community (*see* PSYCHIATRY).

Prior to medicare, the only treatment available to the less affluent was in provincially owned psychiatric hospitals. Although the psychiatric care provided in general hospitals has greatly improved, the gaps in the continuum of care for the mentally ill are only beginning to be closed.

Health Insurance The idea of health insurance had emerged in Germany in the late 1880s and spread throughout Europe, but SOCIAL SECURITY programs were scarcely a priority in infant Canada. By WWI, Saskatchewan had created a plan under which municipalities could tax the population to build hospitals, hire doctors and pay for hospital care. In 1919 the federal Liberal Party made a health plan a plank in its election campaign, but nothing came of it. During the GREAT DEPRESSION, the push for government assistance in meeting health-care costs gained momentum. People could not pay doctors' bills; indigents flooded the hospitals; municipalities, especially those on the Prairies, were bankrupt.

Prior to the enactment of a national hospital-insurance scheme, BC and Saskatchewan operated public, universal hospital-insurance plans. Alberta and Newfoundland had plans that provided partial coverage. By 1956, 50% of Canadians were covered by voluntary private or nonprofit prepayment plans, but public pressure for a nationwide program to protect people from catastrophic health-care costs was growing. This led to a federal government offer to share, on a grant-in-aid basis, the costs of a Canada-wide plan, on condition that the majority of provinces take part and a majority of the population be covered. By mid-1957, 8 provinces indicated that they would join in such a proposal. By 1961 all provinces had hospital plans in operation and 99% of the population was covered. This included coverage for all standard-ward hospital care, apart from nominal charges levied in a few provinces, primarily BC, which has consistently charged patients a small daily fee ($8.50 in 1983).

Medical-services insurance was born, with considerable difficulty, in 1962 in Saskatchewan. The Saskatchewan medical profession fiercely opposed the intentions of T.C. DOUGLAS's provincial government to require doctors to collect their fees solely from the government plan. On July 1, 90% of the doctors closed their offices in protest. The "strike," during which only emergency services were provided, lasted 23 days and made international headlines. The doctors won the right to bill patients if they so chose and to charge more than would be reimbursed to the patients under the provincial plan. Today, extra billing by doctors is an increasingly contentious issue across Canada.

A year before the Saskatchewan battle, PM John Diefenbaker had appointed Justice Emmett HALL, then chief justice of Saskatchewan, as chairman of a royal commission on health services. In a 2-volume report (1964-65), Hall recommended medicare for all of Canada. Known as the "founding father" of medicare, in 1980 he was again asked to review the system, at which time he claimed it was, despite its problems, "by world standards one of the very best health services today." Following the 1964 report, PM Lester Pearson promised that Canada would have a federal medicare program by 1967, and the necessary legislation was passed before the close of 1966. Not all provinces were eager to join the plan. A majority of Canadians were already insured under a variety of private or nonprofit plans, including a major one, Physicians Services Incorporated (PSI), run by doctors in Ontario. Nevertheless, by 1972 all the provinces and the territories had joined in.

Contrary to a widely held belief that doctors oppose medicare, the plan is supported by the Canadian Medical Association. Indeed the medical association itself proposed a national insurance plan in the 1940s. However, within the limits established by the federal Acts, each province has its own version of the plan. Some, such as BC and Ontario, pay to a limited extent for chiropractic services, optometry and physiotherapy, whereas Nova Scotia and Newfoundland do not. Saskatchewan and Manitoba pay for their plans from general revenues, whereas Alberta and Ontario charge insurance premiums for those who can pay. Some provinces also cover prescription-drug costs for senior citizens and social-assistance recipients.

Nevertheless, implementation of medicare by the provinces has led to considerable tension between the provincial governments and provincial medical associations. Doctors feared, and still do, that medicare would become "state medicine," with governments the sole paymaster and doctors virtually civil servants. There have been no further strikes such as that in Saskatchewan, although medical specialists in Québec did withdraw their services for a short time when Québec implemented its plan in 1970. The Québec plan is unique in that under it patients are not entitled to be reimbursed if they see doctors who bill patients directly. Thus, virtually all Québec doctors bill the plan and there is no extra billing.

Among Canadian doctors fears of state medicine escalated in the wake of the Hall Commission's 1980 report. The report cautioned that extra charges to patients (by 1984 Canadians were paying $70 million to physicians who extra billed) constituted a barrier to accessibility to medical care that was contrary to the principle and spirit of medicare and that charges by doctors or hospitals would lead to a 2-tier health system, with different standards of care for those who could pay and those who could not.

Conflict among the various protagonists — the federal government, the provinces and the Canadian Medical Association (which represents the majority of Canada's 47 000 doctors) — was inevitable. The federal government claims that it contributes more than 50% ($9.3 billion)

of medicare's costs by block grants to provinces and has sought to abolish extra charges to patients for insured services. In 1983 it unveiled provisions designed to curb barriers to access and to eliminate extra billing. It requires that 100% of residents be entitled to insured health services, compared with 95% in previous legislation. The new Canada Health Act provides for a reduction of the federal contribution to any province that does permit such patient charges by an amount equal, dollar for dollar, to the amount patients paid. The allied provincial and territorial health ministers deny that extra charges threaten medicare, claiming that the extra revenue is needed to supplement health funds in the face of rising costs and shrinking federal cost sharing. Each province allots roughly 33% of its budget to health.

The Canadian Medical Association claims that medicare is underfunded and that this has resulted in overcrowded hospitals, outdated equipment and waiting lists of patients requiring nonurgent surgery. The CMA estimated that 150 000 patients were on waiting lists in mid-1983. The medical profession fervently defends the right to bill patients directly and remains fiercely opposed to the elimination of extra billing.

Canada's medicare system compares well with health systems elsewhere in the world. Health-insurance administration costs in Canada were 3% of expenditures, compared with over 10% in the US, yet there is no convincing evidence that the Canadian health-care system is underfinanced. MARILYN DUNLOP

Reading: R. Badgley and S. Wolfe, *Doctors' Strike* (1967); D. Coburn, C. D'Arcy, P. New and G. Torrance, eds, *Health and Canadian Society* (1981); S.E.D. Shortt, ed, *Medicine in Canadian Society* (1981).

Heaps, Abraham Albert, labour politician (b at Leeds, Eng 24 Dec 1885; d at Bournemouth, Eng 4 Apr 1954). An impoverished English Jew who immigrated to Canada 1911, Heaps, an upholsterer, became a distinguished parliamentarian as member for Winnipeg N 1925-40. He first gained prominence in Winnipeg as a self-taught statistician for the local Trades and Labor Congress, a labour alderman and a leader of the WINNIPEG GENERAL STRIKE. Arrested and charged with seditious conspiracy in June 1919, he cleared himself after a 10-month ordeal in jail and court proceedings. Though an independent Labour (later CCF) MP and a class-conscious socialist, Heaps developed personal and political relationships with PMs Mackenzie KING and R.B. BENNETT. His wit and deep humanism earned him few real enemies, but they included Arthur MEIGHEN, whose prime ministership in 1926 Heaps gladly helped bring to an abrupt end, and Tim BUCK, who tried to unseat him in 1935. Heaps's tireless efforts as the most credible economic critic in the Commons during the 1920s and 1930s contributed to the passage of vital though limited social legislation by Liberal and Conservative governments. He was unsuccessful in his advocacy of constitutional amendments that would have made direly needed labour legislation possible. His most keenly felt failures were his unheeded warnings about the dangers of fascism and his desperate lobbying on behalf of anti-Nazi refugees. Ironically, spurious charges of pacifism and disloyalty played the key role in the defeat that ended his political career in the 1940 election. Heaps retired to private life in Montréal and died while on a visit to England. ALLEN SEAGER

Heard, Robert Donald Hoskin, chemist, biochemist (b at St Thomas, Ont 13 Feb 1908; d at Montréal 1957). Well known for research on the biochemistry of steroid hormones, Heard was largely responsible for the 1944 choice of a Canadian site for the annual prestigious Laurentian Hormone Conference. He was a BA and MA (1930) of U of T and as an 1851 Exhibition Scholar received his PhD from U of Manchester (1932). After a year at Oxford, he returned to U of T as a Banting Grantee. His university appointments in biochemistry, at Dalhousie in 1937 and McGill in 1942, enabled him to continue his outstanding teaching and research career until his early death. Author of many scientific papers with his students and collaborators, Heard was noted for developing methods for labelling steroid hormones with radioactivity and for using these "tracers" to reveal the pathways of formation and interconversion of ovarian and adrenal hormones. J.L. WEBB

Hearne, Samuel, explorer, fur trader (b at London, Eng 1745; d there Nov 1792). He joined the HBC in 1766 and was chosen to search for a western passage, by river or sea, across the barren lands. His first 2 attempts ended ingloriously, as he was bullied, robbed and deserted by his Indian guides. He left PRINCE OF WALES'S FT again, 7 Dec 1770, with MATONABBEE, a skilful leader of great prestige among the Chipewyan. They walked across trackless wastes, cold, wet and hungry, patiently following the seasonal migrations of the caribou. They travelled W, likely to Alcantara Lk, and then N to the COPPERMINE R. Hearne followed the shallow river to the Arctic Ocean, realizing that it was useless as a trade route. Furthermore, an intensive search yielded a single lump of copper. Hearne earned the contempt of his companions when he refused to join them in the massacre of a helpless party of Inuit, their traditional enemies, at a place he called Bloody Falls. The exhausted Hearne followed his guides as they hurried S, impatient to meet their wives. They crossed GREAT SLAVE LK Dec 24, and Hearne suffered from the extreme cold, losing his toenails. Wintering in the forest, where they could hunt and build canoes, Matonabbee's band brought Hearne to base 30 June 1772. Hearne admitted that his expedition brought no material advantage to the HBC. In 1774 he tried to meet competition from Canadian pedlars by directing construction of CUMBERLAND HOUSE, the HBC's first inland post. In 1776, he was appointed chief at Prince of Wales's Ft, which he surrendered to the French in 1782. He retired 1787, criticized for his timidity and in failing health, and spent the last few years of his life writing and speaking about his remarkable adventure. The literary artistry of *A Journey from Prince of Wales's Fort in Hudson's Bay to the Northern Ocean,* published 3 years after Hearne's death, secured his fame in letters as well as exploration. He left a dramatic description of his own sufferings and a vivid portrait of Matonabbee and his resourceful people. JAMES MARSH



Hearst, Sir William Howard, lawyer, politician, premier of Ontario (b in Arran Twp, Canada W 15 Feb 1864; d at Toronto 29 Sept 1941). A lawyer in Sault Ste Marie, he was elected a Conservative MPP in 1908. A leading spokesman for northern Ontario, he entered the Cabinet of Sir James P. WHITNEY as minister of lands, forests and mines in 1911. He played an important role in the negotiations that in 1912 added the Keewatin Terr to Ontario, increasing the province's size by 56%, and succeeded to the premiership in 1914. A strong supporter of the war effort (he was knighted for his contribution in 1917), he also enfranchised women, enacted prohibition, established a department of labour and authorized construction of the Queenston hydroelectric plant, the largest in the world when it opened in 1921, establishing ONTARIO HYDRO as the province's primary producer of electricity. When his government was defeated in 1919, he resumed his law practice. He served on the INTERNATIONAL JOINT COMMISSION 1920-40. BRIAN D. TENNYSON

Heart Disease In industrial countries more people die from diseases of the heart and blood vessels than from any other single cause. Over the last 30 years, extensive cardiovascular research has resulted in such revolutionary techniques as cardiac catheterization, heart-lung machines, artificial valves, cardiac pacemakers, echocardiography (a machine that uses ultrasound to produce a picture of the heart) and nuclear diagnostic technology. In addition, the management of heart disease by drugs has also improved with the discovery of new agents capable of controlling the force of cardiac contraction. These drugs include inotropic agents, beta blockers (which reduce the amount of work the heart must do) and calcium antagonists.

Coronary artery disease, the most common type of heart disease and the leading cause of death in N America, is almost always the result of atherosclerosis, the clinical name for hardening of the coronary arteries. Atherosclerosis is characterized by the accumulation of fatty deposits and the formation of fibrous tissue in the walls of arteries which then become narrow, thus diminishing the flow of blood and oxygen to the heart muscle. Although atherosclerosis develops quite early in life as the result of a diet rich in animal fat, cigarette smoking and the leading of a sedentary life, symptoms usually develop in the 4th or 5th decade of life. The disease may result in a sudden death in approximately 50% of the patients who have coronary artery disease without knowing it. The average age of death due to coronary artery disease is 52 years. In the remaining 50% of patients the disease may produce attacks of crushing pain (angina pectoris) in the central chest. The surgical management of coronary artery disease enjoys unprecedented popularity because of very low operative mortality (1 to 3%) and because relief of pain is obtained in about 90% of cases. Close to 200 000 such operations were performed in N America in 1983.

Another form of heart disease is that associated with the heart valves. They can be damaged by rheumatic fever, bacterial infections or other disease processes. A defective valve fails to close completely or cannot open fully, thus disturbing the smooth unidirectional flow of blood required for normal functioning of the body. Some malfunctioning valves can be repaired through surgical techniques, but in some cases the valve is so severely damaged that it must be replaced with an artificial (prosthetic) one. The

outlook for patients with valvular heart disease has changed dramatically with the introduction of prosthetic valves some 25 years ago. Despite occasional malfunction, clot formation and infection which occur with valve prostheses, a high percentage of patients can now live normal lives.

The heart is a pump made of special muscle whose contractions are triggered and synchronized by electrical impulses produced by its own natural pacemaker. When the natural pacemaker falters, an artificial pacemaker, using batteries and timers, can be used to produce electrical impulses which are transmitted along tiny wires secured to the heart. The pacemaker is a small battery-powered unit usually implanted under the skin and wired to the heart to control its rate and rhythm of contraction. These devices are now very small and durable.

One baby in about a hundred is born with an abnormality of the cardiovascular system. In general, such congenital defects include incorrectly formed valves, holes in the walls (septa) that separate the 2 sides of the heart, and abnormalities in the blood vessels leading in and out of the heart. These fall into 2 broad categories: conditions in which the baby is "blue" (cyanotic heart disease) and those in which the baby's color is normal (acyanotic heart disease). Most congenital heart defects can be corrected surgically in infancy or early childhood. The surgical risk is relatively low (about 5%) and the long-term results are excellent.

The last 30 years have witnessed remarkable achievements in cardiovascular medicine and surgery. Some of these achievements have been made by Canadians. Dr W.G. Bigelow of Toronto, along with Dr J.C. Callaghan of Edmonton, pioneered the work on total body hypothermia (cooling off of the body to reduce oxygen requirements during surgery) and laid the foundations for modern cardiac pacemakers. Dr Callaghan was also the first to use successfully the heart lung machine for open-heart surgery in Canada in 1956 and the first to insert an artificial valve and correct the tetralogy of Fallot. Dr W. Mustard of Toronto's Sick Children Hospital pioneered techniques in pediatric cardiovascular surgery and the "Mustard Repair" for transposition of the great vessels in children has gained international acceptance. Dr. A.M. Vineberg of Montréal studied myocardial revascularization for many years and developed an implantation procedure that was widely used before the introduction of coronary artery bypass procedures and is still sometimes used.

J.C. CALLAGHAN

Heart's Content, Nfld, Town, inc 1967, pop 625 (1981c), is a fishing town on a protected, urn-shaped harbour in eastern TRINITY BAY. Besides being one of Newfoundland's oldest enduring fishing settlements, it is prominent in the history of international communications. Originally a summer fishing station, by the late 1600s it was a year-round settlement populated mainly by English West Country fishermen who also later developed a shipbuilding industry. In July 1866 the *Great Eastern,* the largest steamship then afloat, made the first successful landing of a transatlantic submarine telegraph cable at Heart's Content. Subsequently, the Anglo-American Telegraph Co established a cable station, which brought an influx of company employees and services. The station closed 1965, mainly because of new technological developments, but the station building was restored as a communications museum.

JANET E.M. PITT AND ROBERT D. PITT

Heath, David, photographer (b at Philadelphia, Pa 27 June 1931). He first gained recognition in 1965 with the publication of *A Dialogue with Solitude,* a subjective and moving portfolio of black-and-white photographs exposing the troubled facets of N American society. Abandoned by his parents at age 4, Heath became interested in PHOTOGRAPHY as a teenager and continued to pursue it while serving in the infantry in Korea. In the late 1950s, he moved to New York C, where he worked as a fashion and magazine photographer and was influenced by documentary photographer Eugene Smith. He won a Guggenheim Fellowship in 1963, and taught at various colleges and universities before moving to Toronto and Ryerson in 1970. In addition to teaching, he has mounted several solo exhibitions, including a retrospective at the National Gallery in Ottawa in 1981.

LOUISE ABBOTT

Heavysege, Charles, poet (b at Huddersfield, Eng 2 May 1816; d at Montréal 14 July 1876). Heavysege immigrated to Montréal in 1853 as a woodcarver. In 1860 he became a reporter for *Montreal Transcript* and later for the *Montreal Daily Witness.* A quintessential pious Victorian, he published a series of long religious poems under the influence of Milton, Shakespeare and the Bible: *The Revolt of Tartarus* (1852), *Jephthah's Daughter* (1865) and "Jezebel, A Poem in Three Cantos" (1868). His Old Testament spirit also found expression in 2 dramatic works, the famous *Saul: A Drama in Three Parts* (1857; 1859) and *Count Filippo: or, The Unequal Marriage* (1860), an Italianate verse tragedy of adultery and retribution. His one novel, *The Advocate* (1865), was unsuccessful. *Saul* found many admirers, among them Henry W. Longfellow and Sir John A. MACDONALD. Coventry Patmore's praise in the influential *North British Review* was particularly positive. The play was premiered in a CBC radio adaptation in 1974.

ROTA HERZBERG LISTER

Hebb, Donald Olding, psychologist (b at Chester, NS 22 July 1904). He was a brilliant pupil who completed grades 1 to 4 in one year and 5 to 6 the next. But school proved too easy and when he graduated from Dalhousie, his record was undistinguished. A book by Freud stimulated him to go back to university and he earned an MA in psychology from McGill (1932) and a PhD from Harvard (1936). At that time, the brain was regarded as a relay station to process incoming and outgoing impulses; behaviour was just stimulus and response. Hebb believed more went on in the brain. He worked with Wilder PENFIELD 1937-39 and noted that loss of large parts of the brain did not necessarily diminish intelligence. He studied the development of behaviour in rats, primates and infants. He was convinced that neural circuits linking incoming and outgoing neurons were the loci for thought and emotions. In 1949 he published *The Organization of Behaviour* which revolutionized psychology by putting "mind" back into the brain. His studies of development showed the importance of environmental stimulation in early childhood that led to the US adoption of Operation Headstart, a program to help children in disadvantaged families. He showed the requirement of constant input for normal brain activity by the abnormal response of subjects to sensory deprivation.

DAVID T. SUZUKI

Hébert, Adrien, painter (b at Paris, France 12 Apr 1890; d at Montréal 20 June 1967), son of celebrated church sculptor Louis-Philippe HÉBERT. Adrien came to Canada with his family in 1894. He trained at the Monument National de Montréal under Edmond DYONNET and Joseph St-Charles (1904-06), and taught there in 1914. He also studied 1912-14 in Paris at the École des Beaux-Arts with Fernand Cormon. In 1917 he taught drawing in Montréal, and sold his own work to magazines. He became an associate of the Royal Canadian Academy of Arts in 1932. He is known for scenes of the Montréal waterfront that concentrate on industrial buildings, machinery, early tramcars and factory smoke.

ANNE MCDOUGALL

Hébert, Anne, poet, playwright, novelist (b at Ste-Catherine-de-Fossambault, Qué 1 Aug 1916). Hébert's father Maurice, a provincial civil servant and writer, guided her in the early stages of her literary career. Through her mother, Hébert is a descendant of 19th-century historian François-Xavier GARNEAU and has carried on the family's literary tradition spectacularly. She was also cousin and friend of Hector de Saint-Denys GARNEAU, whose poetry affected her deeply and whose lonely death in late 1943 strongly influenced her. From that point, she felt impelled to open revolt, as her subsequent writings demonstrate. She grew up, studied and lived in Québec C until her mid-30s. From 1950 to 1954, she worked on Radio-Canada broadcasts and wrote scripts for the NFB. She then went on a scholarship to Paris where, with frequent visits to Québec, she has lived for the past 30 years.

Hébert's road to maturity as a poet had 3 stages. In 1942 she published her first collection, *Les Songes en équilibre,* which portrays herself as existing in a dreamlike torpor. In 1953 appeared *Le Tombeau des rois,* where the self triumphs over the powerful dead who rule the dreams. Finally, in 1960 (when Québec was in the spring of the QUIET REVOLUTION), the powerful verse of *Mystère de la parole* reveals the liberated self. Her first volume of prose, *Le Torrent,* a collection of tales which appeared in 1950, shocked the reading public but has become a classic. Her first novel, *Les Chambres de bois* (1958), contained particularly original imagery, though it was not until 1970 that Hébert convincingly demonstrated her virtuosity in the great novel, KAMOURASKA. Here she skilfully combines 2 plots in a 19th-century Québec setting. The writing has a breathless, anguished and romantic rhythm that underlines well-controlled suspense. The novel earned her France's Prix des Libraires and was made into a film by Claude JUTRA. Like almost all of Hébert's works, *Kamouraska* has been translated into English. In *Les Enfants du sabbat* (1975), Hébert tells a tale of sorcery in Québec. *Héloïse* (1980) is about ghost-vampires in the Paris subway. *Les Fous de Bassan* (1982, Prix Fémina) is set in Gaspé, where 2 teenagers from an Anglo-Protestant village are killed. Hébert has written several plays, published as *Le Temps sauvage;* in the play of that name a mother vainly attempts to shield her children from the outside world.

Anne Hébert's career, studded with literary honours and awards (including the MOLSON PRIZE in 1967 and election to the RSC 1960), is founded on a disciplined life that has always been devoted to writing. Her poetry and prose have become models for other writers and have been analysed in hundreds of studies, particularly in Québec, but also in France and English Canada.

PIERRE H. LEMIEUX



Poet Anne Hébert, writing in LaFontaine Park, Montréal, Qué (*courtesy National Film Board/Photothèque*).

Hébert, Henri, sculptor (b at Montréal 3 Apr 1884; d there 11 May 1950). The son of sculptor Louis-Philippe HÉBERT, he studied at the Monument National, Montréal, under painter Edmond DYONNET and at the Art Assn with William BRYMNER. He twice went with his parents to Paris, studying under Thomas and Injalbert. He taught several years at McGill while sculpting many busts, and has left some 20 monuments, the most famous being of Louis-Hippolyte LA FONTAINE (in both Québec C and Montréal), *Évangeline* (Grand Pré, NS) in collaboration with his father, the *Monument aux Morts* (Montréal) and *Jacques de Lesseps* (Gaspé). MICHEL CHAMPAGNE

Hébert, Louis, apothecary, colonist (b at Paris *c*1575; d at Québec Jan 1627). Hébert visited Canada 3 times between 1604 and 1613 with the expeditions of de MONTS, CHAMPLAIN, and Jean de BIENCOURT de Poutrincourt. In 1617 he decided to settle in Québec C with his wife and 3 children. He was ceded 10 ARPENTS of land near the site of the present cathedral of Québec, and his family is renowned for having been the first to cultivate land in Canada. His wife, Marie Rollet, was the first Frenchwoman to scratch the soil of New France. It is said that, thanks to his medical knowledge among other reasons, Hébert was on good terms with the Indians. JACQUES BERNIER

Hébert, Louis-Philippe, sculptor (b at Ste-Sophie de Mégantic, Qué 27 Jan 1850; d at Montréal 13 June 1917). Around 1869 he left the family farm to join the army of pontifical ZOUAVES destined for Rome and Tripoli. The wealth of art he then discovered stunned and stimulated him. Once home, he worked in the studio of painter Napoléon BOURASSA, and over 6 years learned the craft of sculptor. Thereafter he received increasingly important commissions, finally becoming the principal Québec sculptor of his generation. He was the first Canadian-born commemorative sculptor, and his more than 40 monuments include *Queen Victoria* (Ottawa); *Maisonneuve, Jeanne Mance, Mgr Bourget* and *Edward VII* (Montréal); *Mgr de Laval* (Québec); and 6 sculptures in front of the Québec parliament. He also sculpted busts, commemorative medals and numerous statues in wood, bronze and terra-cotta. For many years he taught at Montréal's Conseil des arts et manufactures.

A member of the Royal Academy of Canada (1880), Hébert was awarded the Medal of Confederation (1894), made a chevalier of France's Legion of Honour (1901), and Companion of St Michael and St George (Great Britain, 1903). In 1971, the St-Jean-Baptiste Soc of Montréal honoured his memory with the Prix Philippe-Hébert, given to an artist of outstanding ability and stature in Québec arts. MICHEL CHAMPAGNE

Reading: Bruno Hébert, *Philippe Hébert, sculpteur* (1973).

Hébert, Pierre, director of animated films, engraver (b at Montréal 19 Jan 1944). Stimulated by Norman MCLAREN, Hébert experimented with scratching directly on film early in his career and directed films dominated by effects made possible through optical printing: *Opus I* (1964), *Op hop hop op* (1965) and *Autour de la perception* (1968). Later he was attracted to a more political and profound type of animation and, using simple techniques, produced 2 original works, *Père Noël, Père Noël* (1974) and *Entre chiens et loup* (1977). Hébert's latest films, *Souvenirs de guerre* (1982) and *Étienne et Sara* (1984), are a synthesis of his previous work. PIERRE VÉRONNEAU

Hébert, Yves, pen name Yves Sauvageau, actor, playwright (b at Waterloo, Qué 17 May 1946; d at Granby, Qué 12 Oct 1970). After studies in education at the École normale de Sherbrooke (1963-65), he enrolled in the National Theatre School (1965-68). He had previously founded a theatre company in Waterloo called La Lanterne (1962-63) and had performed with the Atelier and the Union théâtrale de Sherbrooke. When he left the National Theatre School he toured Canada with the Jeunes Comédiens of the THÉÂTRE DU NOUVEAU MONDE (1968-69). Later he joined the Enfants de Chénier (1969-70), directed by Jean-Claude GERMAIN at the Théâtre du même nom. He won 2 awards in Radio-Canada's Jeunes Auteurs competition (1966) for 2 short plays published under his pseudonym. His major plays were published and produced posthumously. ANDRÉ G. BOURASSA

Hecate Strait is a body of water 48-140 km wide, underlain by a shallow basin (less than 45 m at the N end), separating the QUEEN CHARLOTTE IS from mainland BC. Marine weather conditions are severe: winter storms originating in the Gulf of Alaska bring high waves through the strait and winds persistently higher than 40 km/h off the S end of Moresby I. The open strait and numerous sheltered inlets are rich in marine life. Halibut, groundfish, herring, shellfish and salmon fisheries are centered around PRINCE RUPERT. Hecate Str was navigated for trade and plunder by the HAIDA, whose water-based settlements on the E coast of the Charlottes date from at least 9000 years ago. Spanish explorer Jacinto Caamaño (1792) was the first European into the waters of the strait, although its name is that of a British paddlewheel sloop that surveyed the N Pacific coast 1860-63. Offshore oil drilling under the southern strait began in the 1950s, but was halted in 1972. PETER GRANT

Hecla, Man, pop 25 (1983e), an Icelandic fishing hamlet on Lk WINNIPEG's largest island, is part of Hecla Provincial Park, a 86 350 ha marine park 176 km N of Winnipeg, which includes several islands. Hecla is joined to the mainland by a causeway. Icelandic immigrants opened homesteads on the island beginning 1876. Isolated for many years, they built a self-sufficient community based mainly on fishing for food and export, but including farming, lumbering, lake transport, trapping and quarrying. In the 1890s Winnipeggers began building cottages here. Roads, electricity and a ferry service came only after WWII. In the early 1950s the fishery began to decline and young islanders moved to opportunities elsewhere. Proposals to establish a park and restore the hamlet of Hecla were welcomed initially, but land expropriation and relocation policies caused controversy. Hecla park has several year-round facilities, including a hotel-convention complex. Black I has the greatest geological and biological diversity in Manitoba and is the site of high-grade-silica sandstone quarrying. *See also* ICELANDERS. D.M. LYON

Hector, the brig which carried 178 Scottish immigrants to the PICTOU area of northern Nova Scotia in 1773. Pictou was located on the "Philadelphia Plantation," an 81 000 ha tract granted to 14 Scots proprietors and settled desultorily since 1767. Active promotion of the land began in Sept 1772 when John Pagan of Glasgow and John Witherspoon, principal of Princeton College, New Jersey, advertised for settlers in Scottish newspapers, offering land on easy terms and passage to America at £3 5s per adult passenger. Most who accepted this offer came from Loch Broom in Ross and adjacent areas of Sutherland, principally from lands administered by the Board of Forfeited Estates. They were tenants fleeing high rents and bad harvests rather than clearance for sheep, and were not by Highland standards poor.

With a piper, the party left Loch Broom in early July 1773, collecting a few people on Clydeside along the way. The voyage was difficult: 18 children were buried at sea before the passengers stepped ashore into the Nova Scotia wilderness on Sept 15. Complaining about the location of their lands, the settlers were denied provisioning unless they accepted the land offered. They seized the provisions by force, and many left the settlement. The 78 who remained were producing crops by 1774 and within a few years were welcoming other immigrants. Although the *Hector* is popularly regarded as the first vessel to bring Highland immigrants to what is now Canada, several other ships (including the *Falmouth* and the *Alexander*) had previously carried Highlanders to the Island of St John [PEI]. Nevertheless, the *Hector*'s voyage remains the most celebrated in the stories of early Highland settlement in BRITISH NORTH AMERICA. J.M. BUMSTED

Hector, Sir James, geologist, naturalist (b at Edinburgh, Scot 16 Mar 1834; d at Wellington, NZ 5 Nov 1907). As surgeon and geologist to the PALLISER EXPEDITION (1857-60), Hector explored the country from the Red R settlement (Winnipeg) to Vancouver I. In the plains he recognized 3 topographic levels; in 1857 measured the first stratigraphic section including coal layers; attempted to subdivide Cretaceous and Tertiary strata on a geological map published in 1861; and recognized erratics as evidence of extensive former glaciation. He described and sketched the general structure of the Rocky Mts. KICKING HORSE PASS and River were named to commemorate an accident Hector had with his horse. On Vancouver I he studied coal deposits at Nanaimo. In 1861 Hector settled in New Zealand, where he became director of the geological survey. He travelled in BC for a few months after his retirement in 1903, his second and only other visit to Canada. W.O. KUPSCH

Heeney, Arnold Danford Patrick, public servant, diplomat (b at Montréal 5 Apr 1902; d at Ottawa 20 Dec 1970). A clergyman's son, he was educated at U of Manitoba and Oxford. A successful lawyer in Montréal, he was invited to become principal secretary to PM Mackenzie KING in 1938. Two years later he was named clerk of the Privy Council and secretary to the Cabinet. He organized the work of the Cabinet War Committee, the key ministers, and made his office a clearing point for information and advice. In 1949 he became undersecretary of state for external affairs. He then served as ambassador to NATO, twice in Washington and as chairman of the Civil Service Commission. Until shortly before his death, he was Canadian head of the INTERNATIONAL JOINT COMMISSION and the Permanent Joint Board on Defence. J.L. GRANATSTEIN

Hees, George Harris, politician (b at Toronto 17 June 1910). One of the DIEFENBAKER ministers who resigned during the Feb 1963 crisis, Hees was an able and energetic promoter of Canada. A businessman and athlete, he was elected to Parliament as MP for Broadview (Toronto) in 1950, and held the seat until 1963. Contrary to the wishes of the Tory establishment, who saw him as a brash playboy, he was elected national party president in 1953; his successful tenure was marked by visits and speeches in all parts of the country. Appointed minister of transport in 1957, he was an able administrator; in 1960 he became minister of trade and commerce and immediately organized a successful export drive. Hees did not stand for election in 1963, but was returned for Northumberland in 1965. He ran unsuccessfully for the Tory leadership in 1967. He was appointed minister of veterans affairs by Brian MULRONEY in 1984. PATRICIA WILLIAMS

Heggtveit, Anne, alpine skier (b at Ottawa 11 Jan 1939). She started skiing at age 2 and by 7 was senior ladies combined champion at Camp Fortune. In 1954, at age 15, she became the youngest-ever winner in the half-century history of the Holmenkollen giant slalom in Norway. In 1960 she won Canada's first Olympic skiing gold medal in the slalom as well as the world slalom and alpine combined titles. MURRAY SHAW

Height of Land, a region of high ground that may act as a watershed. Heights of land were important in the historic FUR TRADE for their influence on the determination of routes and PORTAGES, and they have affected many transportation routes since then. Heights of land were important to native people in demarcating territoriality, as they were later to European colonists. A political boundary, like the boundary between Labrador and Québec, may correspond to a height of land. JOHN ROBERT COLOMBO

Heintzman & Co Ltd, a Canadian piano manufacturing firm established in Toronto by German immigrant Theodore August Heintzman in 1866, is renowned for high-quality craftsmanship. By the beginning of the 20th century the firm had opened branches in other Canadian cities and developed an export trade. Heintzman built its first grand pianos about 1886, and player pianos were produced for several years until their popularity waned in the 1920s. By the early 1960s the firm manufactured about 1500 upright and grand pianos each year, retailing from 16 branches. The bulk of production was moved to a new factory built in Hanover, Ont, in 1962, followed by grand-piano manufacturing and headquarters when the Heintzman firm merged with the Sherlock-Manning Piano Co. The new company, sold in 1981 to Canadian furniture firm Sklar Manufacturing Ltd, continues to produce the Heintzman piano. Early Heintzmans are in the Glenbow Museum in Calgary and the Western Development Museum in Yorkton, Sask. FLORENCE HAYES

Helava, Uno Vilho, inventor (b at Kokemaki, Finland 1 Mar 1923). He invented the analytical plotter for automatically drawing maps from photographs. Helava trained as a surveying engineer and came to Canada in 1953 as a research fellow in photogrammetry at the NATIONAL RESEARCH COUNCIL. By 1957 he had patented a method of using computers to produce maps from aerial photographs, automatically corrected for the curvature of the Earth and atmospheric distortion. The first prototype was built in 1963, using the analogue computer then available, and Helava left Canada to promote his invention. About 70 plotters were built by an Italian-American partnership, chiefly for military clients. In the late 1970s (digital) microcomputers made the Helava system much cheaper, and several hundred plotters have been built. Because of its affinity with other technologies (eg, digital transmission of photographs from orbiting satellites), the Helava system is expected to become the world's standard method of making maps by the end of the century. DONALD J.C. PHILLIPSON

Helders, Johan (John) Anton Joseph, internationally acclaimed amateur pictorial photographer (b at Rhenen, Netherlands 3 May 1888; d at Homestead, Fla 4 Feb 1956). Helders arrived in Canada from the Dutch East Indies in 1924, first settling in Vancouver where his interest in photography was nurtured by John VANDERPANT. Two years later, Helders became maître d'hôtel of the Château Laurier, Ottawa. For the next decade, he was one of Canada's leading fine-art photographers. His prints won awards at salons all over the world and were published in the leading photographic periodicals. A fellow of the Royal Photographic Soc of Great Britain, he served as director for Canada of the Photographic Soc of America. Helders's salon photography diminished after he moved back to Vancouver in 1939. JOAN M. SCHWARTZ

Helicopter, an aircraft that derives its lift and propulsive force from horizontally rotating rotors or blades and is capable of ascending and descending vertically. The torque generated by the blades is balanced either by a vertical tail rotor or by having 2 sets of blades rotating in opposite directions. The helicopter originated as a toy centuries ago, a feathered top which rose in the air when spun between the hand or by means of a string. In the 19th century a few powered helicopter models were made, and the advent of the internal-combustion engine brought a spate of unsuccessful helicopter prototypes in many countries; but the first man to get airborne and descend safely was Paul Cornu of France on 13 Nov 1907. Control was the problem, and the men who showed the way to the practical helicopter were Juan de la Cierva of Spain, with his autogyros, Heinrich Rocke of Germany, and Igor Ivanovich Sikorsky of Russia and the US. The persistence and ingenuity of the many contributors has produced a truly versatile machine, suited to war and peace, and capable of performing tasks beyond the capability of other vehicles.

In Canada, the Froebe brothers of Homewood, Man, designed and built a helicopter, which flew in 1938. Mechanical problems were encountered and the project was abandoned, but the helicopter survived and is now in the Western Canada Aviation Museum in Winnipeg. The SG-IV-C helicopter was designed and built in Montréal by Bernard Sznycer and Selma Gottlieb, and flew on 9 July 1947. After successful completion of the initiated test program, the SG-N-D Grey Gull, the first production machine, was produced, flown on 6 Feb 1948, and granted a Certificate of Airworthiness on 15 Mar 1951. However, financial backing was withdrawn in 1954. There have been no more Canadian designs, and all helicopters used in Canada are of foreign origin.

Military use of helicopters started in the RCAF in 1947, with the RCN and army following later. Air-force operations have been mainly concerned with search, rescue and mercy mission, and with heavy lift capability; the navy has been concerned with anti-submarine operations and has developed aids to permit operation from small ships in rough weather, notably the haul-down recovery system; and the army with battlefield operations. The RCAF was heavily involved in the construction of the Mid-Canada Line, and Squadron Leader R.T. Heaslip was awarded the MCKEE TROPHY in 1956 for his contribution to the success of these operations.

Helicopters have been used for forestry protection, crop dusting, surveying, exploration, commuter services, and the support of other industries such as building and off-shore oil. The brilliant pioneer Carl AGAR imported several Bell 47 helicopters in 1947 for spraying the rugged terrain of the Okanagan Valley, and later for oil exploration. Agar's company became one of the world's major helicopter companies. Today, over 1000 helicopters are used commercially in Canada. PHILIP MARKHAM

Hell's Gate is a rocky gorge of the FRASER RIVER CANYON S of Boston Bar, BC. Explorer Simon FRASER recorded a difficult portage (1808) around Hell's Gate. Its name is associated with the disastrous impact of CNR construction on the river's salmon resources. After landslides (1913-14) blocked much of the sockeye run, the catch from the river's stocks plummeted and has never fully recovered. Fishways were constructed here in 1944 to permit spawning fish to pass the rapids. Hell's Gate now has an aerial tram ride and highway tourist facility. PETER GRANT

Hellyer, Paul Theodore, politician, journalist (b at Waterford, Ont 6 Aug 1923). A successful businessman, Hellyer sat in the House of Commons 1949-57 and was re-elected in a by-election Dec 1958. From 1958 until 1963, when the Liberals gained power, Hellyer was instrumental in developing the party's defence policy and urged Lester PEARSON to accept nuclear weapons. After the election victory, Pearson appointed him minister of national defence, and under Hellyer's leadership, the Canadian ARMED FORCES were unified. The controversy surrounding the unification likely did not help his political career. In 1968 he ran unsuccessfully for the Liberal leadership. The victor, Pierre TRUDEAU, placed him in charge of housing policy. After the report of his Task Force on Housing and Urban Development did not win Cabinet approval, Hellyer resigned from the Cabinet and later from the Liberal Party. He tried to form a new political movement, Action Canada. When it faltered, he drifted towards the Conservative Party, unsuccessfully running for the leadership in 1976. He has not re-entered the House of Commons, but his political views are widely known through a syndicated column he has written since 1974. JOHN ENGLISH

Helmcken, John Sebastian, surgeon, politician (b at London, Eng 5 June 1824; d at Victoria 1 Sept 1920). In 1847 Helmcken sailed to York Factory and back as surgeon on the HBC supply ship *Prince Rupert* and in 1848-50 was appointed surgeon and clerk to the HBC at Fort Rupert and then at Fort Victoria. Son-in-law of James DOUGLAS, he was Speaker of the Legislative Assembly of Vancouver I 1856-66 when he was elected to the Legislative Council of the HBC. In 1870 he was one of 3 CONFEDERATION delegates to Ottawa from BC. When BC entered Confederation in 1871, Helmcken retired from politics and devoted himself to medicine and his reminiscences. In 1885 he became first president of the BC Medical Society. ERIC J. HOLMGREN

Reading: D. Blakey Smith, ed, *The Reminiscences of Doctor John Sebastian Helmcken* (1975).

Helmcken Falls, located on the Murtle R at the entrance to BC's Wells Gray Provincial Park, an area noted for its many waterfalls, is the highest in the park and fifth highest in Canada. Situated in the SW corner (about 270 km SE of PRINCE GEORGE), a region characterized by volcanic upheavals, the lava-layered falls have a 135 m vertical drop. They were named after the prominent BC physician John Sebastian HELMCKEN in 1913 by Premier Sir Richard MCBRIDE.

DAVID EVANS



Helmcken Falls, located on the Murtle R in BC's Wells Gray Provincial Park, is the 5th-highest waterfall in Canada (*photo by Valerie J. May*).

Hemlock, evergreen CONIFER, genus *Tsuga*, PINE family (Pinaceae). Early settlers named the hemlock after a European flowering WEED because the odour was similar when needles were crushed. Ten species are recognized: 6 in eastern Asia, Japan and Taiwan, and 4 in N America. Of the latter, 3 occur in Canada: eastern hemlock (*T. canadensis*), in southern Ontario, Québec and the Maritimes; western hemlock (*T. heterophylla*) and mountain hemlock (*T. mertensiana*), on the West Coast from Alaska to northern California. Hemlocks are tall, stately trees with slender, usually drooping, leader and branches. Leaves are needlelike but blunt. Cones are nonwoody and small, about 2 cm long (up to 7 cm in mountain hemlock). POLLINATION occurs in spring and winged seeds are shed in late summer or fall. The root system is shallow and wide-spreading. Hemlock wood is fairly hard, and these trees are harvested extensively for pulp, paper and lumber. JOHN N. OWENS

Hémon, Louis, writer (b at Brest, France 12 Oct 1880; d at Chapleau, Ont 8 July 1913). Hémon immigrated to Canada in 1911. After working (1911-12) as a bilingual stenographer with a Montréal life insurance company, he went to the Lac St-Jean region. There he wrote *Maria Chapdelaine: récit du Canada français*, the novel that gave him worldwide success. Unfortunately, Hémon never knew of his fame, for he died in an accident. MARIA CHAPDELAINE was serialized first in Paris in 1914 and 2 years later appeared in Montréal in book form. But it was only after its 1921 French publication that the novel became a success. Today, this account of Québec peasant life is often seen as a symbol of individual and collective alienation. At the time, the novel was used to support a nationalist ideology of fidelity to the past and its traditions. Other works by Hémon are *La Belle que voilà* (1923), *Colin-Maillard* (1924), *Battling Malone* (1925), *Monsieur Ripois et la némésis* (1950), *Lettres à sa famille* (1968) and *Récits sportifs* (1982). JACQUES COTNAM

Hénault, Gilles, writer (b at St-Majoric, Qué 1 Aug 1920). After studying at Collège Mont Saint-Louis, he began a program of self-directed reading and writing, and published several poems. Turning to journalism, he became friendly with various literary figures including Jean-Aubert LORANGER and in particular Éloi GRAMMONT, *dit* de Grandmont, with whom he co-founded the "Cahiers de la file indienne" (1946), a journal they intended to devote to experiments in automatic writing. His decision to join the Communist newspaper *Combat* with Pierre Gélinas (the newspaper was closed down in 1947 by Maurice DUPLESSIS'S PADLOCK ACT) temporarily shut other journalistic doors against him. Hénault then worked as a union organizer in a Sudbury nickel mine and published a number of dissident poems. He returned to Montréal in 1953 and worked in radio, TV and film as journalist, scripwriter and host. In 1959 he became literary and artistic editor for *Le* DEVOIR and was director 1966-71 of the Musée d'art contemporain de Montréal. He received awards for his poems and translations in 1962, 1972 and 1979. He was writer-in-residence at U of O in 1975-76 and was in charge of the plastic art dept of UQAM in 1983-84.

ANDRÉ G. BOURASSA

Henday, Anthony, explorer (probably b on the Isle of Wight, Eng; *fl* 1750-62). Henday travelled farther into western Canada than any white person had before him, and his journal contains important glimpses of how the native population lived at that time. A labourer for the HBC at York Fort [YORK FACTORY], Man, he volunteered for a mission to encourage distant tribes of Indians to come and trade. Travelling with some Cree, he set out in June 1754 via the Hayes R. The party paddled up the Saskatchewan and then proceeded on foot, apparently along the Battle R valley, meeting many Assiniboine en route. In the autumn they seem to have been SE of present-day Red Deer, Alta, when they found a great camp of "Archithinues" (Blackfoot or Gros Ventre). Henday and some of the Cree spent part of the winter nearby. In the spring they descended the N Saskatchewan. Middlemen in the fur trade, the Cree collected furs from other Indians as they travelled E. The best were sold at French posts conveniently located on the lower Saskatchewan. The remainder were taken to York, where the party arrived in June 1755. In 1759 Henday went west again for a year, this time with some "Archithinues." He left the HBC's service in 1762 and probably returned to England. Described by Andrew GRAHAM as a "bold, enterprising" man, he felt ill rewarded for his great hardships. JANE E. GRAHAM

Reading: A.J. Ray, *Indians in the Fur Trade* (1974); Glyndwr Williams, "The puzzle of Anthony Henday's journal, 1754-55," *The Beaver* (winter 1978).

Henderson, Alexander, photographer (b at Edinburgh, Scot 1831; d at Montréal Mar 1913). Soon after his 1855 marriage, Henderson immigrated to Canada with his wife and settled in Montréal where he worked in accounting for several years. Taking up photography as a hobby, he made it his profession in 1866. He first did portraits, but attained an international reputation with his landscape photography, receiving medals in London, Dublin, Paris and New York. He documented the principal cities and resort areas of Québec and Ontario, and many Québec villages. Especially fond of the wilderness, he made many photographic trips by canoe to the Blanche, the Rouge and other eastern rivers. In 1872 he began a series on the construction of the INTERCOLONIAL RY. He made his first trip to the West for the CPR in 1885 and was eventually hired by the CPR in 1892 to set up a new photographic department, his duties including 4 months spent in the field each year. He retired in 1897. STANLEY TRIGGS

Henderson, John Tasker, radio-physicist (b at Montréal 9 Dec 1905; d at Perth, Ont 2 Jan 1983). Educated at McGill and London, Henderson joined the NATIONAL RESEARCH COUNCIL (1933) in charge of its radio section, where he worked on "atmospherics" (later discovered to be the effect of the ionosphere on radio signals) and built the Cathode Ray Direction Finder invented by A.G.L. MCNAUGHTON and W.A. STEEL. In 1939 he was secretly informed about British advances in RADAR and, in the next few months, Henderson laid the foundations for radar research and manufacture in Canada. He returned to the NRC after RCAF and diplomatic service 1942-47 and became head of its electricity section, which built several cesium atomic clocks (accepted in 1968 as the international time-keeping standard). DONALD J.C. PHILLIPSON

Hendry, Thomas Best, playwright, theatre administrator (b at Winnipeg 7 June 1929). Tom Hendry began acting and writing for the CBC in Winnipeg in the early 1950s. With John HIRSCH in 1957 he founded Theatre 77, which merged with the Winnipeg Little Theatre in 1958 to become the MANITOBA THEATRE CENTRE, English Canada's first regional theatre. He was administrator of MTC 1958-63, producer of Winnipeg's Rainbow Stage 1958-61, secretary general of the Canadian Theatre Centre 1964-69 and literary manager of the STRATFORD FESTIVAL in 1969. Hendry has fostered Canadian playwriting as a founder of the Playwrights Co-op and Toronto Free Theatre (1971) and the Playwrights Colony at the BANFF CENTRE SCHOOL OF FINE ARTS (1974). His most important dramas include *Fifteen Miles of Broken Glass* (first produced in 1966), *Satyricon* (1969), *Gravediggers of 1942* (1973), *Byron* (1976) and *Hogtown: Toronto the Good* (1981).

ANTON WAGNER

Hennepin, Louis, Récollet missionary, explorer (b at Ath, Belgium 12 May 1626; d *c*1705). In 1675 Hennepin was sent to Canada with René-Robert Cavelier de LA SALLE, commandant of Ft Frontenac, where Hennepin was chaplain 1676-77. In 1678 he was asked to join La Salle's expedition through the Great Lks and, in 1680, with 2 others was sent ahead to explore the upper Mississippi. His journal was the source for *Description de la Louisiane* published in 1683, a year after his return to France. It described the places visited, notably NIAGARA FALLS, and the Iroquois and the Sioux who held the travellers in captivity for 6 months. Hennepin was vainglorious and rebelled against church discipline; he seldom held a position for long. In 1697 he published *Nouvelle Découverte d'un très grand pays* and in 1698 *Nouveau Voyage d'un pais plus grand que l'Europe* in which he claimed he had travelled to the Mississippi's mouth. This attempt to appropriate La Salle's discovery was another self-serving embellishment to justify retelling the 1683 narrative. Hennepin's books were enormously popular in Europe, but he was excluded from Canada and passed into obscurity.

PETER N. MOOGK

Reading: Father Louis Hennepin's Description of Louisiana (1938); L. Hennepin, *A New Discovery of a Vast Country in America* (1698/1903).

Henry, Alexander, fur trader (b in New Jersey Aug 1739; d at Montréal 4 Apr 1824). He was one of the first English traders known as the "pedlars from Quebec" to do business in the North-West following 1763. He came to Québec as a young merchant supplying the British army. Travelling to Michilimackinac, the fur-trade entrepôt, he was present at the 1763 Indian attack there, was taken prisoner and lived with the Indians for a year. For several years he traded on Lk Superior, but by 1775 he was on the Saskatchewan R. By 1781 he had retired to Montréal as a general merchant. He joined the NWC but sold his interest in 1796. His memoir, *Travels and Adventures in Canada and the Indian Territories* (1809), is a classic of Canadian travel literature. DANIEL FRANCIS

Henry, Alexander, "the Younger," fur trader (d at Fort George [Astoria, Ore] 22 May 1814), nephew of Alexander Henry, "the Elder." After entering the fur trade in 1791 he served the NORTH WEST COMPANY for 23 years at posts ranging from Lk Superior to the Pacific Ocean. His journals are among the finest accounts of the western trade and are interesting for their comments on native languages and cultures.

DANIEL FRANCIS

Henry, George, or Maungwudaus, meaning "the great hero," or "courageous," Mississauga (Ojibwa) interpreter, Methodist mission worker, performer (b on the NW shore of Lk Ontario *c*1807; d after 1851). Educated in Methodist mission schools, George Henry seemed designed for a role in the church as interpreter and translator. A more exciting career, however, attracted him. In 1844 he organized an Indian troupe which toured Britain and the continent, 1845-48, putting on Indian dances and exhibitions. After his return from Europe Maungwudaus performed for several years in Canada and the US, and later became a well-known Indian herbalist. He wrote a pamphlet, *An Account of the Chippewa Indians, who have been travelling among the Whites, in the United States, England, Ireland, Scotland, France and Belgium* (1848), excerpts from which are found in P. Petrone, *First People, First Voices* (1983). DONALD B. SMITH

Henry, George Stewart, farmer, businessman, Conservative politician, premier of Ontario (b in King Twp, Ont 16 July 1871; d near Toronto 2 Sept 1953). As Ontario entered the automobile age, he provided the province with its first high-

way system, but he has been remembered as the dour premier of Depression days. Serving in the legislature for 30 years (1913-43), as minister of public works and highways 1923-31 and then as premier 1930-34, he was dedicated to building good roads. Paved highways were extended from 670 to 3888 km and Canada's first concrete bridge was constructed. With less success he tried to promote a metropolitan Toronto area to plan development. But "Honest George" was drab and prosperous and in 1934 no match for the populist Mitch HEPBURN.

BARBARA A. MCKENNA

Henry, Robert Alexander Cecil, "Red," businessman, public servant (b at Montréal 20 Sept 1884; d at St Petersburg, Fla 1 Jan 1962). Educated at McGill, Henry worked for the CPR before entering the federal public service in 1908. He worked in the departments of the Interior and Railways and Canals until 1923 and then headed the economics bureau of the CNR 1923-28. In 1929 he became deputy minister of railways and canals, but left in 1930 to become general manager of Beauharnois Light, Heat and Power Co in Montréal. Beauharnois's relations with Mackenzie KING's government were called into public question 1931-33, but there was no proof of misconduct on Henry's part. In 1939 Henry joined the War Supply Board and, as a member of the executive committee of the Dept of Munitions and Supply, was C.D. HOWE's right-hand man and troubleshooter. After ill health 1941-44, Henry returned to full duty as deputy minister of reconstruction 1944-45. In later years he was a consultant on the development of the St Lawrence Seaway.

ROBERT BOTHWELL

Henry, William Alexander, lawyer, politician, judge (b at Halifax 30 Dec 1816; d at Ottawa 3 May 1888). Henry achieved a solid legal and political reputation, cemented by his role as a FATHER OF CONFEDERATION. First elected in 1840 for Antigonish, he rose to provincial Cabinet rank in 1852, but broke with the Liberals (1857) and thereafter served as a minister under Conservative governments. Henry attended the 3 Confederation conferences as Nova Scotia's attorney general and enthusiastically promoted the movement at home; he reputedly helped draft the BNA Act in London. Defeated in the 1867 federal election, he was politically rewarded in 1875 with appointment to the Canadian Supreme Court, where his service was able, but not brilliant.

LOIS KERNAGHAN

Hensley, Sophia Margaretta, née Almon, author, lecturer (b at Bridgetown, NS 31 May 1866; d at Barton, NS 10 Feb 1946). An early protégé of Sir Charles G.D. ROBERTS, Hensley published articles, poetry and fiction that reflected her interest in women's issues and social tolerance. Active in literary and philanthropic circles, she studied or lived in England, France and the US before re-establishing herself in NS (1929). In addition to writing 10 books and periodical contributions under her own name, she used the pseudonyms Gordon Hart, J. Try-Davies and Almon Hensley. Like Roberts, Bliss CARMAN and many other Canadian literary contemporaries of her generation, she published internationally while always describing herself as "a Canadian in thought, feeling and expression."

GWENDOLYN DAVIES

Henson, Josiah, founder of the BLACK settlement at Dawn, Upper Canada (b at Charles Co, Md 15 June 1789; d at Dresden, Ont 5 May 1883). Born a slave, Henson escaped to Canada in 1830. Four years later he founded the Dawn community near Dresden, Upper Canada, for American fugitive slaves. Aided by a white American missionary, Hiram Wilson, he and his associates organized a manual-labour school, the British-American Institute. He was active on the executive committee until the institute closed in 1868. Although a poor administrator, constantly engaged in disputes over finance and management, Henson served as Dawn's spiritual leader and patriarch and made numerous fund-raising trips in the US and England. He published his autobiography in 1849, and he was allegedly Harriet Beecher Stowe's model for the leading character in *Uncle Tom's Cabin.*

JANE H. PEASE AND WILLIAM H. PEASE

Reading: Josiah Henson, *An Autobiography of the Rev. Josiah Henson ("Uncle Tom") from 1789 to 1881,* ed, John Lobb (rev ed 1881; repr 1969).

Hepburn, Douglas, weightlifter (b at Vancouver, BC 16 Sept 1927). Hepburn's birth was difficult, and he has suffered from a club foot and a withered leg all his life. These infirmities did not deter him from training with weights, nor did they lessen his determination to excel. Competing in the heavyweight category (over 90 kg) at the 1953 World Weightlifting Championships in Stockholm, Sweden, Hepburn defeated the 1952 Olympic champion by a total of 10 kg. In 1954 he won the heavyweight title at the British Empire and Commonwealth Games held in Vancouver. He then turned to professional wrestling and business.

RICHARD CAMPION

Hepburn, Mitchell Frederick, politician (b at St Thomas, Ont 12 Aug 1896; d there 5 Jan 1953). Confident and affable, "Mitch" was a popular farmer who won a narrow victory in Elgin W in the 1926 federal election and was re-elected with a healthy majority in 1930. That year he was elected leader of the provincial Liberal Party and broadened its base by allying with the Progressives, conciliating the liberal and labour left, and trying to resolve the split over the Roman Catholic school question and prohibition. His speeches on behalf of Ontario farmers and for freer trade were noted more for their wit than for economic insight. Aided by the Depression, the ineptness of Conservative Premier George HENRY, and funding from business and mining interests, Hepburn won an overwhelming victory in the 1934 provincial election. In office, Hepburn implemented a number of populist measures — the auction of government limousines and the closing of the lieutenant-governor's residence. He cancelled power contracts with 4 Québec companies, tried to bring order to provincial finances, improved labour legislation and aided the iron-ore industry. He regarded the compulsory pasteurization of milk as his greatest accomplishment. Less successful was his attempt to aid parochial schools.

The most celebrated event of his first administration was the strike at General Motors in Oshawa in 1937 (*see* OSHAWA STRIKE). Hepburn, while sympathetic to the unemployed, was opposed to unionization and to letting the Congress of Industrial Organization into Canada. He supported GM in its refusal to negotiate with the CIO organizers, and when Ottawa refused to dispatch a unit of the RCMP, he organized his own volunteers — Hepburn's Hussars. Ultimately, the strike was settled with what amounted to an acceptance of the union. The strike ruptured Hepburn's relationship with PM KING (which had never been close), and in Jan 1940 he passed a resolution in the Ontario legislature critical of King's war effort. King thereupon called an election, which he won handily. Hepburn's day was over; he helped to scuttle the 1941 federal-provincial conference and supported A. MEIGHEN in the S York by-election of 1942, but his struggle with King ruined his party and destroyed his health. In 1942 he resigned as premier and in 1943 as provincial treasurer. The Liberals asked him to lead the party in the 1945 election, but the party was routed and Hepburn lost his seat.

JOHN SAYWELL

Reading: N. McKenty, *Mitch Hepburn* (1967).

Heraldry, the creation or study of armorial bearings. Signs and symbols both convey messages, and symbols also play on our emotions. An arrow showing direction elicits no emotional response, but grasping the symbolic value of a flag requires emotional involvement: pride, devotion, patriotism or admiration. An EMBLEM is a sign with a conventionally accepted meaning. The parliamentary mace had its probable origin as an instrument of physical discipline in assemblies, but today it is accepted by convention as an emblem of authority, and as a symbol it arouses respect in viewers. Symbols are found in religion, in the arts and in customs. Coats of arms are visual symbols which reflect the beliefs, aspirations and history of individuals or of groups.

During the Crusades (11th-13th centuries), the European nations felt the need to identify themselves with crosses of various colours, and at the same time to reduce casualties with improved armour. The knight, whose head was entirely covered by a helmet, adopted for recognition a personal symbol which he displayed on his surcoat, shield and banner. Such symbols became the main components of a coat of arms (of which a crest is only a part). Coats of arms, or arms, have survived because they became hereditary within families and their use was extended to corporate and civic entities.

In 1407 a college of arms was created in France by Charles VI, and the use of arms continued until 1790. The first known heraldic instance in Canada occurred 24 July 1534, when Jacques CARTIER planted at Gaspé a large cross bearing the royal arms of France. The royal arms, 3 gold fleurs-de-lis on a blue field, continued to represent the king of France in the New World. One did not have to be of nobility to bear arms, but in practice most of the armigers (bearers of arms) in New France — government officials, military officers, clergymen and merchants — were nobles. A number of men received letters of nobility and subsequently grants of arms for their services to the sovereign, eg, Charles Le Moyne de LONGUEUIL (1668), Nicolas Juchereau de Saint-Denis (posthumously, 1697) and Joseph-François HERTEL DE LA FRESNIÈRE (1716).

With the fall of New France, the officers of the British sovereign, the College of Arms in England and the Court of the Lord Lyon in Scotland became the granting authorities in Canada. Few Canadians of French origin have had recourse to British institutions to have their arms legitimized or to have new ones granted. One early exception, Gaspard-Joseph Chaussegros de Léry, recorded his arms and cross of Saint Louis at the College of Arms in June 1763. The first known grant to a Canadian after 1763 was made to James Cuthbert in 1778. The next known grant was to William MCGILLIVRAY in 1801. Early grants were not numerous, in part because Canadians were busy building a country and had little time or money for the niceties of life. A number of cities and institutions took an interest in heraldry, but few had their arms officially recorded. This gave rise to a rather naive style of heraldry, with representations of steamboats, locomotives, grain elevators, factories and forests.

Today there is a revival of heraldry, probably because people are seeking special expressions of their own identities, but also because the importance of symbolism has been recognized in art, religion, psychology and the social sciences. The HERALDRY SOCIETY OF CANADA has done much to foster a knowledge of heraldry and to induce cities, corporations, institutions and individuals to obtain grants of arms. Canadians who have become armigers include Gov Gen Georges P. VANIER, Lord Beaverbrook (*see* Max AITKEN) and Lt-Gov George F.G. STANLEY. The number of municipalities with grants has considerably

increased, and now includes Fredericton, Hamilton-Wentworth, Peace River (Alta), Esquimalt (BC) and Grand Falls (Nfld). Among the many corporate or civic bodies bearing arms are the ROYAL SOCIETY OF CANADA, the HUDSON'S BAY COMPANY, the Grey Sisters of the Immaculate Conception and numerous universities. Bishops and dioceses usually have arms, as do some counties.

A description in heraldic language is a blazon; the pictorial rendering is the emblazonment. Forms are stylized to bring out the salient points; proportions and the tonality of the colours are important. A good heraldic artist strives for individual style and avoids stereotypes. Without a Canadian heraldic authority, Canadians have been confused in heraldic matters, and designs on the whole have been poor. Canadians should be wary of anyone trying to sell them arms without solid documentary support. The arms could be the property of an entirely different family branch with the same name. In most European countries and in Canada, arms are granted to an individual and his descendants; not every family has a coat of arms.

The Public Archives of Canada responds to inquiries and, within reasonable limits, offers guidance to researchers or designers. It cooperates with museums and individuals to identify coats of arms on artifacts. With the help of heraldic artist and scholar Hans D. Birk, the arms of families from countries other than France and Britain now living in Canada are being documented and painted in colour. The main threat to heraldry today appears to be the LOGO, although heraldists warn that logos may be a passing form which, unlike heraldry, will not endure the test of time. AUGUSTE VACHON

Reading: C. Swan, *Canada: Symbols of Sovereignty* (1977).

Heraldry Society of Canada, headquartered in Ottawa, est 1966 to encourage interest in the history and practice of HERALDRY in Canada. A quarterly illustrated journal issued since 1967, *Heraldry in Canada,* is now the largest single published source relating to historical and contemporary Canadian heraldry. Society activities also include sponsorship of the annual George M. Beley Lecture on Canadian heraldry and the development of a roll of Canadian arms. In 1981 the HSC published a landmark reference text, *Canadian Heraldry,* based on a manuscript by founder Alan B. Beddoe (1893-1975). The society has promoted the establishment of a national authority to grant and regulate the use of arms, with key representations being made to the Joint Commons Senate Committee on the Constitution in 1971 and the Federal Cultural Policy Review Committee a decade later. Since 1976 those who have given outstanding service to the society have been recognized by appointment to a faculty of Fellows of the Heraldry Society of Canada (FHSC). ROBERT D. WATT

Herbarium [Lat *herba,* "herb," formerly any medicinal plant], collection of dried specimens of PLANTS, mounted on sheets of heavy paper and stored in cabinets or bound in book form, and the building that houses such a collection. The term replaced *hortus siccus* [Lat, "dried garden"], which was used until 200 years ago. Herbaria originated in Europe in the 16th century. The largest, in Paris, has over 10.5 million specimens. In 1979, the total holdings of more than 250 institutional and private herbaria in Canada were estimated at just over 5 million. The largest Canadian herbaria are as follows: Biosystematics Research Institute, Agriculture Canada, Ottawa; National Herbarium of Canada, National Museum of Natural Sciences, Ottawa; Herbier Marie-Victorin, Institut Botanique Université de Montréal; University of British Columbia, Vancouver; University of Toronto. The largest private herbarium in Canada was that of Frère MARIE-VICTORIN, which forms the basis of the herbarium which now bears his name.

Herbs, technically, are nonwoody, vascular PLANTS, ie, relatively soft plants with specialized systems of vessels for conducting water and nutrients. More commonly, the word refers to various, often aromatic, plants used especially in medicine or as seasoning. Here, "herb" is used in its less technical sense. Herbs and spices differ largely by usage. Spices are normally more aromatic than herbs, and are often of tropical origin. They may consist of seeds, bark, flower buds, fruits, etc. Herbs are usually leafy and locally grown, and their use extends far back into history. Culinary herbs are still of great importance as flavouring; before refrigeration, they were essential as preservatives and to disguise the flavour of bad meat. "Pot herbs" were almost any young, green growth that could be eaten early in spring to supply needed minerals and vitamins after the privations of winter. Various herbal teas, filling the same need, were very important to the inhabitants of the New and Old worlds.

North American Indians were very conversant with the use of herbs for health, healing and spiritual needs. In many cases, discoveries paralleled those of Europe; eg, willow (*Salix*) and poplar (*Populus*), each containing salicylic acid (as does aspirin), were used by both Europeans and Indians for relief of pain and rheumatic complaints. Rose hips (containing vitamin C) were important on both sides of the Atlantic, as were yarrow, sorrel, mint and nettles. Indians introduced European settlers to medicinal herbs which they could substitute for those left at home. Particularly noteworthy were the effective cures for scurvy, chief of which, available even in winter, were teas made of spruce (*Picea*) or cedar (*Thuja*) needles.

Many favourite herbs come from the Mediterranean area and their position in northern gardens must be planned accordingly. A sunny spot, with a light sandy soil that warms up quickly in spring, is ideal. For maximum flavour, herbs should not be given too much water or nitrogen. Luckily, many herbs are annuals or can be grown as such; therefore, they present no problem in any part of Canada. Seed should be sown outside as soon as the soil is warm, or started indoors and transplanted when all danger of frost is past. Dill (*Anethum graveolens*), summer savory (*Satureia hortensis*), sweet basil (*Ocimum basilicum*), chervil (*Anthriscus cerefolium*) and sweet marjoram (*Majorana hortensis*) are annuals that may be grown this way. Parsley (*Petroselinum crispum*) and sage (*Salvia officinalis*) are perennial only in warmer parts of the country, but may be successfully grown as annuals. Woody perennials such as rosemary (*Rosmarinus officinalis*) and lavender (*Lavandula officinalis*) will not generally overwinter outside. Thyme (*Thymus vulgaris*) is not very hardy, but creeping thyme (*T. serpyllum*) may be used as a substitute. Two popular herbs require somewhat different conditions. Chives (*Allium schoenoprasum*) are easy perennials in any good garden soil and should be divided and replanted every few years. Mint (*Mentha*) is a vigorous perennial, spreading rapidly in moist soil by means of underground stolons (horizontal branches); in dry prairie conditions, it may die out unless moved to new ground frequently.

The medicinal use of plants has a long and honourable history. The Greek Theophrastus (*c*371-286 BC) was the first botanist/physician to write about plants, their identification and uses. Medical knowledge was kept alive in the monasteries during the Middle Ages, and emerged during the 16th century, hand in hand with botany, when schools of medicine and botanic gardens were first established. Meanwhile, the local herbalist, wise woman, or shaman continued to minister to the sick, often in competition with the professional doctors. Herbal specialists were sometimes revered, sometimes burnt as witches. Because much ancient herbal lore relied on psychological as well as physical methods of curing, the use of herbal medicine fell into disrepute with the advent of "scientific" methods. Herbs, however, are the bases of modern medicines, some of which (eg, digitalis, belladonna and the many opium derivatives) are still obtainable only as plant extracts. Others, first discovered as plant ingredients, are now being manufactured synthetically. Many scientists are now looking at old remedies, and interest in herbal lore has revived as people seek alternatives or supplements to modern medicine. However, the use of herbal medicine is an exacting science in its own right, involving the correct identification and use of what may be highly toxic plants. The use even of simple home remedies and herbal teas should be attempted only by those familiar with plant identification. *See* individual species entries; PLANTS, NATIVE USES; POISONOUS PLANTS. GILLIAN FORD

Reading: Malcolm Stuart, *The Encyclopedia of Herbs and Herbalism* (1979).

Heriot, George, artist, public official (b at Haddington, Scot 1759; d at London, Eng 1839). He learned watercolour technique from Paul Sandby at the Royal Military Academy, Woolwich, Eng (*see* TOPOGRAPHIC PAINTERS), and he arrived in Québec City in 1792. The sketches he made during his extensive travels as deputy postmaster-general of BNA (1799-1816), his more formal watercolours and the aquatints that accompany his classic, picturesque *Travels through the Canadas* (1807) are marvellously evocative studies of nature as well as a valuable record of early Canadian life and landscape. Heriot's abrasive personality brought him into frequently fractious relationship with colonial administrators and he resigned in 1816.

JAMES MARSH

Heritage Canada Foundation, est 28 Mar 1973 under executive director R.A.J. Phillips and chairman Hart McDougall, with a one-time government grant of $12 million, as a private nonprofit trust for the "preservation and demonstration of the nationally significant historical, architectural, natural and scenic heritage of Canada." With existing organizations already concerned with the natural landscape, the foundation has concentrated on the built-up environment. In 1984 it had some 30 000 members and a staff of 30 in its Ottawa headquarters. Its executive has included Jacques Dalibard, Pierre Berton and J.P.S. MacKenzie. An elected board of 14 governors, chosen by regions at an annual convention, and 2 government appointees meet 3 times a year to set the foundation's goals.

The foundation's accomplishments in its first decade include establishment of heritage legislation in all provinces; demonstration projects in conservation areas in St John's; Charlottetown; St Andrew's, NB; Halifax; Annapolis Royal, NS; Saint John; Quebec City; Ottawa; Winnipeg; Edmonton; Vancouver; and Dawson, YT; establishment of an educational- and technical-services department; publication of a bimonthly magazine, *Canadian Heritage,* together with books, pamphlets and technical manuals; an awards program for excellence in heritage preservation; and a public campaign for heritage awareness, including the establishment of National Heritage Day on the third Monday in Feb.

By 1982 the foundation was concentrating on preserving main streets of small towns through demonstration projects in Windsor and Bridgetown, NS; Perth and Cambridge, Ont; Moose Jaw, Sask; Fort Macleod, Alta; and Nelson, BC. It was also engaged in a campaign to educate banks, railways and the post office in its philosophy. The foundation sees its task as "teaching the teachers," using demonstration projects to train personnel and to produce technical manu-

als for scores of communities across the nation. Its "University Without Walls," launched with private funds in 1980, is designed to train artisans, architects and builders in forgotten skills. The foundation does not give grants, nor does it purchase property except for demonstration purposes. It has also expanded the original definition of "heritage" to include the entire built environment, the great number of buildings which give our communities their special character. In 1982 executive director Jacques Dalibard defined a heritage building as one that is structurally sound and for which a viable use can be found. *See* HISTORIC SITE. PIERRE BERTON

Heritage Conservation is the understanding, appreciation and preservation of things that are important in our culture and history. Heritage can be a tangible object, such as a building (church, post office, railway station), or it can be an artifact, such as a Red River cart or a NW Coast Indian TOTEM POLE. Heritage can also be intangible, as in FOLKLORE, customs, language, dialect, songs and legends, The term "conservation" means protection from any agent (be it climate or man) that threatens to destroy heritage; it also means increasing our understanding and awareness of heritage. The practice of heritage conservation in Canada usually refers to protecting the built environment, that is the preservation of buildings, streetscapes, hamlets, neighbourhoods and rural landscapes that have been created in the development of Canada.

Concern for monuments has existed for some time. When the original PARLIAMENT BUILDINGS burned in 1916, the new buildings (completed in 1920) were built in a Gothic revival style to complement the earlier East and West Blocks that remained on the site. However, attention to everyday buildings and their protection has developed only recently. It is now common to see communities and individuals protecting, restoring, recycling and conserving shops, banks, houses and industrial buildings. Privateer's Wharf in Halifax, a grouping of early 19th-century buildings, has been restored for commercial uses; the residential neighbourhood centering on the corners of Milton and Park avenues in Montréal has been rehabilitated and is the locus of a number of housing co-operatives; and the Orpheum Theatre in Vancouver has been restored and adopted as the home of the Vancouver Symphony Orchestra. Before WWII interest in conservation had been limited to the protection of sites of national historic importance or scenic beauty. The earliest legislation in Canada to protect a site was the Rocky Mountains Parks Act of 1887. The Historic Sites and Monuments Board of Canada was formed in 1919 to advise the government on sites worthy of official recognition, and the National Parks Act was passed in 1930. Provincial historical associations, particularly in the Maritimes, Québec and Ontario, had been pressuring their governments since the early 20th century for the preservation of sites. These developments determined the nature of government intervention in heritage conservation: federal involvement is limited to the identification and protection of sites of national historic and architectural value, and to the development of programs of research in history, architecture and archaeology which relate to the national interest. Canada has signed international treaties on this subject. Under the Constitution Act, 1982, matters pertaining to property and civil rights are an exclusive concern of the provinces; thus, except for sites of clearly national significance, heritage conservation is primarily a matter of provincial policy.

In recent years, 2 events have fostered concern for retaining built heritage — the Canadian CENTENNIAL of 1967 and the ecology movement which began in the late 1960s. During the Centennial, local events commemorating the past



Heritage conservation includes the protection of historically important buildings such as those in Bonsecours Market in Old Montréal (*photo by Harold V. Green/Valan*).

drew attention to the wealth of Canada's architectural heritage and encouraged its preservation. At the national level, events such as EXPO 67 and the Voyageur Canoe Pageant drew Canadians together in a celebration of the past and future. The ecology movement gained momentum from public reaction to projects such as the ST LAWRENCE SEAWAY, which destroyed entire communities and a rich architectural heritage. Earth Day in 1970 was a celebration of the unity of the planet, and the energy crises has drawn attention since 1973 to the limits of natural resources. Thus, both the philosophy of CONSERVATION and awareness and pride in Canadian history have fostered the growth of the heritage conservation movement in Canada.

In the early 1970s the federal government, through Parks Canada, began to record and interpret architectural history in the Canadian Inventory of Historic Building, a nationwide survey of buildings constructed before 1914. The HERITAGE CANADA FOUNDATION and the Society for the Study of Architecture in Canada were established to lobby for building conservation and to research specific areas of architecture and its history. Today, every province has some form of heritage conservation legislation, which usually concerns itself with specific issues such as individual building protection, area conservation, archaeology and the establishment of a provincial body to encourage heritage conservation publicly and privately. Some provinces have also included museums and archives in their legislation.

Heritage conservation involves the protection of objects and materials of interest in the interpretation of history. This is done mostly by ART GALLERIES AND MUSEUMS and ARCHIVES which collect, identify, preserve and interpret objects taken from their everyday setting. These objects may be small and discrete, such as projectile points or farm implements, or large and interconnected, such as buildings or building groupings. The collections of local museums and heritage villages are examples of this approach.

Heritage conservation also means the commemoration of an event, person, building or site of historical importance. Thus, plaques are erected to note HISTORIC SITES. In many cases, marking a site is not enough, as demolition and destruction have occurred even on marked buildings. For example, the Atlantic Lunatic Asylum at 999 Queen Street West in Toronto (architect J.G. HOWARD) was demolished in 1976 by the provincial government, despite opposition from the Toronto Historical Board and the Ontario Heritage Foundation. Protection of a heritage building by a government can occur in 2 ways: by outright purchase or by legislation. As purchase can be costly, preference is often given to legislative means, such as heritage designation. By means of designation, a provincial or municipal government declares that a building must not be altered from the state that makes it a heritage building.

Heritage conservation may be included in land-use planning and development. In some places, heritage conservation is becoming as important in local planning as the provision of social services and community development. Several provinces have tied heritage legislation to environmental legislation and have developed procedures to ensure assessment of the impact of government expenditures or private developments on heritage. The results of a growth in heritage consciousness can be seen across Canada, as areas are protected, buildings restored, museums expanded, and long-range plans for the protection of the built environment are implemented. There are still many threats to heritage resources. Wilful neglect of important buildings, a public that is not appreciative of heritage, inappropriate conservation of sites and buildngs, tax laws that fail to encourage renovation, and zoning that does not consider heritage all threaten conservation.

The key to success is a growing appreciation by all Canadians of the contribution which this heritage can make to our quality of life, and a consensus to use economic and legal measures to capitalize on it. That consensus is still in the formative stage. GEORGE KAPELOS

Reading: M.C. Denhez, *Heritage Fights Back* (1978) and *Protecting the Built Environment* (1978).

Heritage Trail, route along which selected features of history or natural history are explained for the general public. The earliest interpreted trails, some 60 years ago, dealt only with natural history and were called nature trails. Originally, a typical nature trail was an existing path through a natural area, interpreted by means of signs or a booklet.

The first interpreted nature trails in Canada were probably those developed in BANFF NATIONAL PARK in 1959 at the Hoodoos and Bow Summit. Hundreds of trails are now found from coast to coast in Canada, installed and run by national and provincial parks, the Canadian Wildlife Service, tourist departments, conservation authorities, museums, universities, schools, BOTANICAL GARDENS and private agencies.

Visitor numbers are often counted to measure use; however, few trails are systematically evaluated, although the Wye Marsh Centre now uses microcomputers to encourage visitors to evaluate all aspects of their visits. Trails can be expected to increase and diversify, and to become more sophisticated as interpreters and audience use them more extensively. The following is a short list of selected nature trails by province or territory.

Alberta: DINOSAUR PROVINCIAL PARK — Dead Lodge Canyon Nature Trail; ELK ISLAND NATIONAL PARK — Lakeview Trail; WATERTON LAKES NATIONAL PARK — Bertha Falls Trail; WOOD BUFFALO NATIONAL PARK — Lane Lake Trail, Salt River Trail.

British Columbia: GLACIER NATIONAL PARK — Abandoned Rails Trail, Loop Trail, Trestle Trail; MOUNT REVELSTOKE NATIONAL PARK — Inspiration Woods, Giant Cedars, Mountain Meadows.

Manitoba: RIDING MOUNTAIN NATIONAL PARK — Arrowhead, Burls and Bittersweet, Brûlé, Ma-ugun, Oninimik, Loon's Island and Grey Owl trails.

New Brunswick: Various trails at Anchorage Provincial Park, FUNDY NATIONAL PARK, Grand Falls, Hartland, Les Jardins de la République Provincial Park, Mactaquac Provincial Park, North Lake Provincial Park.

Newfoundland: GROS MORNE NATIONAL PARK — Berry Head Pond, Green Gardens, Berry Hill, Lobster Cove Head, Southeast Brook Falls and Stanleyville trails.

Northwest Territories: NAHANNI NATIONAL PARK — South Nahanni River canoe trail.

Nova Scotia: KEJIMKUJIK NATIONAL PARK — Mersey Meadow Trail, Mill Falls Trail; Lake Echo — Echo Look Off Trail; Cabot Trail; Evangeline Trail.

Ontario: Bellevue House National Historic Park; Fort Wellington National Historic Park; GEORGIAN BAY ISLANDS NATIONAL PARK — Beausoleil Island, Bobbies Trail, Flowerpot Island Trail; PUKASKWA NATIONAL PARK — Coastal Hiking Trail; Queenston Heights; Rideau Canal — Merrickvale Lockstation walking tour, Ecotour; Woodside National Historic Park.

Prince Edward Island: Prince Edward Island National Park — Balsam Hollow, Bubbling Springs, and Reeds and Rushes trails.

Québec: FORILLON NATIONAL PARK — Grande-Greve; Lachine Canal; LA MAURICIE NATIONAL PARK — Cascades Trail, Falaises Trail; ST LAWRENCE SEAWAY.

Saskatchewan: Meadow Lake; Prairie Wildlife Interpretation Centre — Swift Current Trail; PRINCE ALBERT NATIONAL PARK — Boundary Bog Trail, Mud Creek Trail.

Yukon Territory: Chilkoot Pass Trail; KLUANE NATIONAL PARK — various trails. DAVID SPALDING

Heron (Ardeidae), family of BIRDS comprising 60 species worldwide, 12 in Canada (including true herons, egrets, night herons and bitterns). Most are long-legged, long-necked wading birds which look for food (tiny fish, crustaceans, insects, amphibians and reptiles) in shallow fresh or salt water. They have long, rounded, rather broad wings and relatively short tails. They are distinguished from CRANES by their position in flight, necks bent and heads supported between their shoulders. All have straight, rather long bills that distinguish them from ibises, which are similar in appearance but have long, curved bills. The sexes vary little in appearance. Plumage is generally dull, but certain species have crests and ornamental plumage during breeding season. Under flank plumage, the bird has layers of powder down, used to rid feathers of oil, grease and mud. The powder is applied by the claw of the middle toe, which has comblike teeth on its inner surface. Once the feathers are preened, the bird waterproofs them with oil from its uropygial glands.

Most herons and egrets nest in colonies, sometimes in mixed-species groups. Nests of small branches are built, sometimes high in trees, usually in wooded areas out of reach of predators. Bitterns nest closer to the ground, usually in freshwater marshes among clumps of reeds. Most species lay 3-5 (usually 4) pale blue or bluish green eggs. The great blue heron (*Ardea herodias*), the largest and most common heron in Canada, stands over 1 m tall. It frequents river banks and tidal bays, where it wades deep into the water to fish. It is found from NS to Alberta, and on the BC coast and islands. The black-crowned night heron (*Nycticorax nycticorax*) is a squat, short-toed bird of NS, the Great Lakes-St Lawrence R area, and southern Manitoba and Saskatchewan. It is usually found at river mouths and is especially active at dusk. Its vernacular name, night squawk, results from its cry in flight. The guttural cries of American bittern (*Botaurus lentiginosus*) may be heard in marshlands throughout southern Canada and up to Great Slave Lk, NWT. The bird blends perfectly with surrounding vegetation. Other breeding species include green-backed heron (*Butorides striatus*), in the Niagara region, southern Québec, part of NB and, possibly, NS; cattle egret (*Bubulcus ibis*), recently and very locally in Ontario; great egret (*Casmerodius albus*), very locally in southern Ontario and rarely in SE Saskatchewan and Manitoba; yellow-crowned night heron (*Nycticorax violaceus*), only at East Sister I, Ont; least bittern (*Ixobrychus exilis*), locally in southern Manitoba and NB, and in Niagara region. JEAN-LUC DESGRANGES

Great blue heron (*artwork by John Crosby*).



Héroux, Denis, film director, producer (b at Montréal 15 July 1940). Héroux established himself in 1968 with *Valérie,* the first porno-erotic film made in Québec. After several erotic films, Héroux tried historical melodrama in *Quelques arpents de neige* (1972) and light comedy in *J'ai mon voyage* (1973) and *Pousse mais pousse égal* (1974). In the 1970s he became one of Canada's major producers of international co-productions. He directed a few films but abandoned directing for producing. His international reputation has enabled him to work with other celebrated directors: Claude Chabrol, *Violette Nozière* (1977) and *Blood Relatives* (1978); Claude Lelouch, *A nous deux* (1979); Claude Pinoteau, *L'Homme en colère* (1979); Louis Malle, *Atlantic City* (1980); and Jean-Jacques Annaud, *Quest for Fire* (1981). Despite his dominant position in the private industry and his commercial success, Héroux's views on the Québec film industry and on national cinema have placed him at odds with his colleagues. He silenced criticism in part by producing Gilles CARLE's *Les Plouffes* (1981) and repeated this success with *La Crime d'Ovide Plouffe* (1983). Héroux is also a film critic and was a member of the 1982 Applebaum-Hébert Federal Cultural Policy Review Committee.
PIERRE VÉRONNEAU

Herridge, William Duncan, lawyer (b at Ottawa 18 Sept 1888; d at Ottawa 21 Sept 1961). Herridge was the brother-in-law of PM R.B. BENNETT, his minister to the US, 1931-35, and one of his key advisers. He served with distinction in WWI, winning both the DSO and MC. He came to political prominence during the election of 1930, when he wrote speeches for Bennett and helped formulate Conservative strategy. While in Washington he was impressed by F.D. Roosevelt's activist philosophy of government, and he played a prominent role in convincing Bennett to bring a version of the New Deal to Canada in 1935 (*see* BENNETT'S NEW DEAL). In 1939 the mercurial Herridge launched New Democracy, a short-lived political movement advocating monetary reforms and far-reaching government intervention in the economy. NORMAN HILLMER

Herring, common name for FISH of the widely distributed family Clupeidae. The true herring (*Clupea harengus*), a relatively small, bony, soft-rayed fish with an elongate, laterally compressed body, is silvery in colour, shading to bluish or bluish green on the back. Perhaps the most abundant of fishes, it is widely distributed throughout temperate and subarctic waters of the Northern Hemisphere, and is the only member of the genus found in Canadian waters. Adults move in vast schools, often many kilometres long, and migrate annually to spawning grounds in shallower waters. Herring feed on larger ZOOPLANKTON, abundant on or at the edge of the Continental Shelf. They are a major food of larger fishes (eg, COD, SALMON, TUNA, Halibut), marine mammals and sea birds.

Herring, abundant on Pacific and Atlantic coasts, also occur occasionally in Arctic waters. The Pacific subspecies (*C. h. pallasi*) differs from the Atlantic form (*C. h. harengus*) in several respects. Pacific herring spawn in spring, directly onto vegetation in intertidal and subtidal waters. They mature in their third year and seldom live more than 8 years. Their maximum standard length is about 26 cm. Atlantic herring spawn either in spring or autumn, usually over a gravel bottom. They mature in their fourth or fifth year, live 18 years or more and attain lengths of 35 cm or over. Herring have supported major commercial FISHERIES on both coasts. Both subspecies experience major population fluctuations caused by differences in brood survival. Prior to the mid-1900s, catches were limited by markets or catching capacities of fishing fleets. The development of an almost unlimited world market for herring meal and oil, plus major advances in fishing technology, led to overfishing of Pacific stocks in 1956-66, when annual catches usually exceeded 200 000 t, and of Atlantic stocks in 1968-71, when Canadian catches exceeded 400 000 t annually. Both fisheries have since been strictly regulated. Pacific fishermen, using mainly purse seines and gillnets, took about 50 000 t annually during the late 1970s; this was further reduced to an average of 34 000 t between 1981 and 1984. However, the value of the catch was much higher than before because of the prime price fetched on the Japanese market for quality Herring roe. Catches of Atlantic herring averaged about 235 000 t during the late 1970s, taken primarily by purse seine and mid-water trawl for sale to

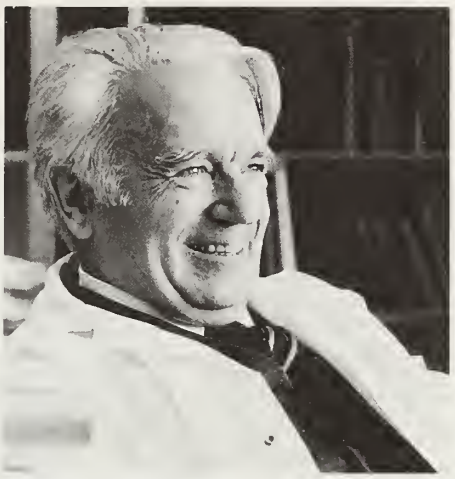
European processors. Abundance declined on the East Coast also during the early 1980s, with catches declining steadily from 260 000 t in 1980 to about 165 000 t in 1983. A traditional weir fishery for young herring, for canning as sardines, operates in NB.

Six other members of the family are found in Canadian waters. Atlantic round herring (*Etrumeus sadina*), Atlantic menhaden (*Brevoortia tyrannus*) and Pacific sardine or pilchard (*Sardinops sagax*) are ocean spawners most abundant in southern US waters. They are now rare and of no commercial importance in Canada, although Pacific sardines supported a major fishery in BC during a period of high abundance (mid-1920s to 1940s). Alewife or glut herring (*Alosa pseudoharengus*), American shad (*A. sapidissima*) and blueback herring (*A. aestivalis*) are anadromous (ie, live in the sea but spawn in fresh water) on the Atlantic coast. They are also most abundant in the south, but alewife and American shad are relatively common in Canadian coastal waters, where they are fished commercially. American shad, introduced on the Pacific coast in 1871, is now found in the Fraser R and Rivers Inlet. A landlocked form of alewife is plentiful in the Great Lakes; many of its local names include the word herring. At least 4 other freshwater fishes (2 ciscos, goldeye and mooneye) are also known by names sometimes containing the word herring. A.S. HOURSTON

Hertel de La Fresnière, Joseph-François, soldier (bap at Trois-Rivières 3 July 1642; buried at Boucherville, Qué 22 May 1722). As a youth, he was captured and adopted by the Iroquois (1661), escaped, and took part in retaliatory raids, accompanying FRONTENAC to Lk Ontario (1673). Though he was fined and briefly jailed for illegal fur-trading activities, his knowledge of Indian languages and warfare was valuable. Under Frontenac's orders, Hertel led numerous expeditions using the Indian method of rapid movement and ambush, including a devastating raid on the New England town of Salmon Falls in which the French claimed 43 Englishmen were killed. Hertel was called "the Hero," the "terror of the English." He commanded FT FRONTENAC 1709-12 and, by marriage with Marguerite de Thavenet, he inherited the Chambly seigneury. After long delays due to his humble birth, he was granted letters of nobility in 1716. JAMES MARSH

Herzberg, Gerhard, physicist, Nobel laureate (b at Hamburg, Germany 25 Dec 1904). He began an academic career at Darmstadt Technical U after earning his doctorate in engineering there. He left Nazi Germany in 1935 coming to Canada on the initiative of J.W.T. SPINKS, who had worked at his Darmstadt laboratory 1933-34. Herzberg taught at U of Sask 1935-45. He went to the Yerkes Observatory, Chicago, in 1945, seeking better opportunities for research, and returned to Canada in 1948 to join the staff of the NATIONAL RESEARCH COUNCIL. As director of physics 1949-69, Herzberg and NRC president E.W.R. STEACIE laid the foundations of the NRC's postwar reputation as a scientific "centre of excellence."

Herzberg's own research field was molecular SPECTROSCOPY, the analysis of the spectra of molecules in order to determine their structure. He specialized in free radicals, important intermediates of chemical reactions that have very short lifetimes (microseconds) under laboratory conditions. Free radicals are also found in interstellar space, where they can last for long periods, and their spectra can thus be recorded by special instruments. Herzberg and his associates developed new methods for their spectroscopic analysis. His personal career included more than 200 scientific publications and earned him



Gerhard Herzberg, winner of the Nobel Prize in 1971 for his work in molecular spectroscopy, was director of physics at the NRC 1949-69 and a vigorous participant in the debate over Canadian science policy (*courtesy National Research Council*).

many honours, such as fellowship in the Royal Soc of London (1951), the Order of Canada and the Nobel Prize for chemistry in 1971. He was also a vigorous participant in the SCIENCE POLICY debate following the Lamontagne report of 1970. The NRC created its highest grade, Distinguished Research Officer, especially to allow Herzberg to continue personal research after he reached retirement age in 1969 (in 1984 he still worked in his laboratory 5 days a week). In 1975 the NRC's astronomy and spectroscopy units were reorganized as the Herzberg Institute of Astrophysics. DONALD J.C. PHILLIPSON

Hespeler, Ont, Town, inc 1901, located in SW Ontario, 14 km S of GUELPH. It was first settled by Swiss Germans from Pennsylvania, and originally called Bergytown after an early resident, Michael Bergy. Subsequently the name became New Hope, then Hespeler (1858), after Jacob Hespeler, an operator of mills and small manufactories who moved to the community 1844. His enterprises formed the core of the local economy for most of the 19th century and he was the first reeve of the village. In 1973 Hespeler amalgamated with Preston and GALT to form the new city of CAMBRIDGE. DANIEL FRANCIS

Hessian Fly, *see* MIDGE.

Hétu, Pierre, conductor, pianist (b at Montréal 22 Apr 1936). After studying in Montréal with Germaine Malépart (piano), Jean PAPINEAU-COUTURE (acoustics), Gabriel Cusson and Conrad Letendre (harmony, counterpoint), Hétu studied in Europe and the US. In 1960 he founded the Canadian Trio in Paris and in 1961 came first in the International Competition for Young Conductors in Besançon, France. As musical director for the Kalamazoo Symphony Orchestra, Mich (1968-72), associate conductor of the Detroit Symphony Orchestra (1970-73), artistic director of the Edmonton Symphony Orchestra (1973-1979), he has helped promote the work of Canadian composers. Since 1973 he has been guest-conductor for orchstras and opera houses across Canada. HÉLÈNE PLOUFFE

Heward, Efa Prudence, painter (b at Montréal 2 July 1896; d at Los Angeles, Calif 19 Mar 1947). A figure painter of distinction when landscape painting was uppermost, Heward studied in Montréal and Paris. She was a founding member of the Canadian Group of Painters (1933), and joined the Contemporary Arts Soc (1939), differing from her women contemporaries by a strong, individualistic approach to figure painting. Brilliant acid colours, sculptural treatment and an intense brooding quality pervade her pictures, whatever the subject. In her determination that structure would win over pretty landscape, she sometimes isolated the figure against a backdrop of complex, modelled shapes. ANNE MCDOUGALL

Hewitt, Charles Gordon, administrator, economic entomologist, conservationist (b at Macclesfield, Eng 23 Feb 1885; d at Ottawa 29 Feb 1920). Hewitt received a doctorate from Manchester U where he also lectured in economic zoology. He was appointed Canada's second Dominion entomologist in 1909. He was instrumental in the passing of the Destructive Insect and Pest Act in 1910 and expanded entomological services of the federal Dept of Agriculture by creating separate units, each headed by an entomologist, to deal specifically with field-crop, garden, forest and stored-product insects. Regional laboratories were established to study insect pests and devise controls. He was also successful in furthering the Canada-US treaty for the protection of migratory birds. A book on the protection of wildlife (1919), one on the housefly, annual entomological reports (1910-16) and many circulars and bulletins are part of his legacy. P.W. RIEGERT

Reading: P.W. Riegert, *From Arsenic to DDT: A History of Entomology in Western Canada* (1980).

Hewitt, Foster, broadcaster (b at Toronto 21 Nov 1902). He worked briefly as a sportswriter for the Toronto *Daily Star* before switching to the new radio desk. On 22 Mar 1923, using an upright telephone, he made the first radio broadcast of a HOCKEY game (a Senior League match between Toronto Parkdale and Kitchener). Although this success led him to try his hand at broadcasting a wide variety of sports and public-affairs events, his name is most indelibly associated with hockey. He broadcasted the first game from Maple Leaf Gardens when it opened in 1931 and, from that time, his play-by-play descriptions became familiar to fans from coast to coast. His high-pitched voice would rise to a crescendo with his famous phrase, "He shoots! He scores!" He probably did more to popularize hockey in N America than any other person. In 1933 he participated in Canada's first experiment with TV, and when that medium came of age in the 1950s, he readily adapted to it. He was a TV commentator for 15 years. J. THOMAS WEST

Hewitt, John, cooper, labour leader, editor (*fl* 1860-90s). After extensive experience in American labour reform, Hewitt became a major Toronto labour leader. He helped found the Toronto Trades Assembly, led the NINE-HOUR MOVEMENT, and backed the labour paper, the *Ontario Workman*. He was elected first secretary of the Canadian Labor Union (1873). He resigned as secretary of the Toronto Trades Assembly to take a Tory patronage job at the Toronto Water Works, and later was an editor of the *Sentinel*, the Orange Order's weekly. Hewitt's Toryism stemmed from his belief in a coalition of labour and small producing employers. While an anomaly from today's perspective, he represents the radical Tory workingman of his day. G.S. KEALEY

Hewton, Randolph Stanley, painter (b at Maple Grove, Qué 12 June 1888; d at Belleville, Ont 17 Mar 1960). He studied under William BRYMNER in Montréal (1903) and at the Académie Julian in Paris (1908-13). In Paris he met A.Y. JACKSON (1912), whose influence on his style would be considerable. This influence and the impressionism to which he was exposed in Paris can be seen in his early Canadian landscapes. His interpretation was sympathetic to that of the GROUP OF SEVEN but was not initially well received in his native Québec (1913). Perhaps his strongest development was in figure

painting and portraiture, in which he successfully combined the traditional fundamentals with contemporary influences, as in *Sleeping Woman* (1929). He was a founding member of the Canadian Group of Painters (1933) and was elected to the Royal Canadian Academy of Arts in 1934. ERIK J. PETERS

Hibernia Case (*Newfoundland Reference Re Continental Shelf*) On 19 May 1982 the governor-in-council asked the Supreme Court of Canada whether Canada (the federal government) or Newfoundland has the right to explore and exploit the mineral and other natural resources of the seabed and subsoil of the Continental Shelf in the area offshore Newfoundland, approximately 320 kilometres E-SE of St John's, and whether Canada or Newfoundland has legislative jurisdiction to make laws in relation to such exploration and exploitation (*see* RESOURCE RIGHTS). The Court held, in March 1984, that continental shelf rights are an extraterritorial manifestation of external sovereignty, and hence these rights fall under the jurisdiction of the federal government. The Court held also that the federal government has legislative jurisdiction in relation to the right to explore and exploit in the Continental Shelf by virtue of the PEACE, ORDER AND GOOD GOVERNMENT power in its residual capacity. GÉRALD-A. BEAUDOIN

Hickman, Albert Edgar, businessman, politician (b at Grand Bank, Nfld 2 Aug 1875; d at St John's 9 Feb 1943). Newfoundland's seventeenth prime minister, he held that office for just 33 days from June 11 to May 10, 1924, the shortest administration in Newfoundland's history. He was a prominent St John's businessman when he entered politics in 1913 and became a minister in several cabinets. He succeeded William WARREN as prime minister when Warren resigned but was soon defeated in a general election by Walter MONROE. Hickman continued as leader of the Opposition until he retired from politics in 1928. ROBERT D. PITT

Hicks, Henry Davies, lawyer, politician, university president, philatelist (b at Bridgetown, NS 5 Mar 1915). Educated at Mt Allison, Dalhousie and Oxford (where he was a Rhodes scholar) and an officer of the Royal Canadian Artillery 1941-45, Hicks, a Liberal, was elected to the NS legislature in 1945. Minister of education 1949-55, he implemented a system of regional and vocational schools. In 1954 he was elected by a badly split party to succeed Prem Angus L. MACDONALD and became leader of the Opposition in 1956. Resigning from the legislature in 1960 to become dean at Dalhousie, he became president in 1963 — a position he held for 17 years. President of the Canadian Commission to UNESCO 1963-67 and member of the Canada Council 1963-67, he was appointed to the Senate in 1972. MARGARET CONRAD

Hide, Peter Nicholas, sculptor (b in Surrey, Eng 15 Dec 1944). Hide studied under British sculptor Anthony Caro at St Martins School of Art, London, 1964-67, then was instrumental in establishing studios and annual exhibitions for painters and sculptors at Stockwell Depot in S London. He accepted a teaching post at U of A, Edmonton, in 1977 and has since divided his time between Canada and England, where he works at Stockwell Depot for brief periods each summer. Like many sculptors today, Hide works in welded steel. He is one of the few to have broken away from the overpowering influence of Anthony Caro, whose art tends to sprawl and spread through space; Hide's tends to be compact and upright. As such, it looks back to the monolithic sculpture of the past, though fully abstract. Composed of rhythmic folds, pleats and projections, his sculptures are often more than 2 m high and have a unique presence. Though influential in Edmonton and London, Eng, his work has unfortunately seldom been exhibited outside those 2 centres. TERRY FENTON

High Level, Alta, Town, pop 2194 (1981c), inc 1965, is located 300 km N of the town of Peace River. It began as a stopping point on the Mackenzie Hwy and later the Great Slave Lake Ry (1963). It is a shipping centre for timber and grain and serves numerous oil rigs at Rainbow Lk to the W. The town is named for its location at the height of land separating the HAY R system from the PEACE R. The weekly newspaper is the *High Level Echo.* ERIC J. HOLMGREN



High River, Alta, Town, pop 4792 (1981c), inc 1906, is located 55 km S of Calgary, and was named for the nearby Highwood R, known to the Blackfoot as *ispitsi,* "tall trees." Traces of Indian hunting villages have been found throughout the area, which was opened to ranching in the 1880s. In 1890 the CPR arrived in High River and it became an important shipping point for cattle. Today ranching and wheat growing are the mainstays of the local economy. The ranching past and the life of the homesteaders is preserved in the Museum of the Highwood. W.O. MITCHELL set the scene of many of his stories in the area. The town is the birthplace of Rt Hon Joseph CLARK, prime minister of Canada 1979-80. ERIC J. HOLMGREN

High School, the term usually applied to the school grades following those of the elementary school. Because the elementary grades have varied from province to province over the decades, high schools have included grades 7, 8 or 9 to 12 or 13. These schools vary in type (academic, vocational, technical, composite) and may be public (free) or private (fee-charging). Originally tending to be somewhat elitist, public high schools have become open and free to all children who have completed elementary schooling. As a result, the number of courses offered has increased markedly. *See* SECONDARY SCHOOL. WILLARD BREHAUT

High Technology Technology, along with labour, capital, resources and management, is one of the essential components of industrial production. Most classes of INDUSTRY require some technological input but the amount varies widely among industrial sectors. Some sectors, eg, AEROSPACE, computers, TELECOMMUNICATIONS and PHARMACEUTICALS, are particularly dependent upon advanced TECHNOLOGY (ie, technology that rests on advanced scientific and ENGINEERING knowledge) and are referred to as "high-technology" industries.

Success in high technology depends upon the interaction of highly skilled engineers, scientists, technologists and business managers, operating in an environment which is receptive to new products, processes and services. Thus, high-technology industries flourish in countries with advanced economies, well-developed educational systems and sophisticated markets. High-technology industries form an important component in the economies of most major Western industrial countries, particularly the US, West Germany, Japan, France and Great Britain. Within these countries, the managerial and design headquarters of high-technology firms tend to concentrate in particular regions, usually regions served by strong universities with scientific and technological orientation.

There has been a long-standing debate on the importance of high-technology industry to Canada's economic development. One view is that Canada, as an advanced industrial country with a highly educated work force, should seek to become a major player in international markets for high-technology products. Proponents of this view believe that high technology offers the best growth potential, that it corresponds most closely with the aspirations of individual Canadians and that it is essential if this country is to keep open the widest choice of economic and political options. The opposing view is that the most appropriate economic strategy for Canada, a country rich in natural RESOURCES and with comparative advantages in resource-based industries, would be to build on those comparative advantages. The latter view coincides with the interest of foreign investors who seek reliable supplies of raw materials and semiprocessed goods from politically stable resources.

In practice, Canadian policy has been to encourage simultaneously both high-technology and resource-based industries. Hence, Canada has demonstrated less national commitment to high technology than have most of its industrial trading partners. The federal government has shown the greatest interest in high-technology industries; provincial governments have held policies generally more favourable to resource development. The aggregate impact of these mixed policies, combined with a high degree of FOREIGN INVESTMENT and the natural economic forces stemming from Canada's rich resource base, has produced an industrial structure that is much more resource than high-technology oriented. Since the end of WWII Canada has consistently been in a net deficit position in its trade in high-technology products. This deficit has been growing (ie, from $1.5 billion in 1968 to $7.6 billion in 1982), while Canada has enjoyed a very favourable trade position in natural resources and resource-based industries. Many Canadians see this increasingly poor performance as a major national concern, not only because of its immediate impact on economic growth and employment but also because of the constraints that it may place on Canada's future economic, social and political development.

Despite the disappointing overall performance of Canadian high-technology industries, certain individual firms have been highly successful. Northern Telecom, one of Canada's few world-scale technology-based companies, has grown over the past 10 years from essentially a domestic company, operating mostly in Ontario and Québec, to a truly multinational company with manufacturing plants in 6 countries and sales in 90 countries. Its sales rose from $608 million in 1973 to $3.3 billion in 1983. Some smaller firms, eg, Mitel Corporation, have experienced even more rapid growth. Mitel's sales grew from $0.3 million in 1975 to over $225 million in 1983, more than doubling each year. Despite these kinds of growth rates, such high technology companies can and do experience difficulties (including Mitel in 1984). Nonetheless, these firms demonstrate that Canada can be a fertile ground for high-technology industry and that overall performance could improve rapidly, given the right conditions. Recent federal and provincial government initiatives to encourage and strengthen the capacity of Canadian industry to innovate will assist in improving conditions for high-technology industry in Canada. *See* BIOTECHNOLOGY; ELECTRONICS INDUSTRY; RESEARCH, PROVINCIAL ORGANIZATIONS; ROBOTICS; SCIENCE POLICY; SCIENTIFIC RESEARCH AND DEVELOPMENT; SCIENCE AND SOCIETY. P.L. BOURGAULT

High Wines, liquor adulterated for use in the FUR TRADE. Fur traders who supplied liquor to the

Indians often diluted their brandy, rum, whisky, etc, with flavoured water. The term "high wines" is a misnomer, for the trade goods are not wines but spirits. Trade liquor, whether diluted or not, was also known as "Indian liquor" or "fire-water." JOHN ROBERT COLOMBO

Highland Games originated among the Scots' Celtic ancestors and became a customary part of their life. Events such as tossing the caber and putting the stone, and competitions in playing bagpipes and Highland dancing formed the core of the festivities, along with footraces, wrestling and tug-o'-war, and novelty events such as three-legged races or the Best-Dressed Highlander competition. Emigration from Scotland dispersed the Highland Games and brought them to N America (where they are often referred to as the Caledonian Games). Given the influence of scots in Canadian history, it is not surprising that their Highland Games have flourished.

A Highland Society was organized in Glengarry, Ont, in 1819 but lapsed after "many successful gatherings." More permanent games were established by the Caledonian Club of PEI in 1838. Similar games followed in Lancaster, Toronto, Cape Breton, Montréal and Zorra, and by Confederation in Halifax, Antigonish, Chatham, Ottawa and Vancouver. Within a few years, they were established in many Ontario townships and in Fredericton, Québec City and Victoria. In 1880, the St Andrew's Society of Winnipeg held the first of its many successful Dominion Day Games at Dufferin Park. The marquis of LORNE patronized these games and others, as did other governors general and many famous Scottish political figures, among them George BROWN and Sir John A. MACDONALD. Former PM John DIEFENBAKER carried on the tradition when he visited the 1975 Glengarry Games, appropriately dressed in a kilt.

It has become customary to hold provincial track and field championships in conjunction with the Highland Games. The festival has thus undoubtedly helped to produce some of Canada's greatest athletes — for example Duncan Bowie, George GRAY and Walter KNOX — who have won international renown. More significantly, perhaps, it has thoroughly permeated Canadian culture (for example, the novels of Ralph Connor — C.W. GORDON), and Canada is now said to have more bagpipes and Highland dancers than even Scotland itself. Canadian Highland Games remain a vivid reflection of the Scottish tradition in Canadian life.

GERALD REDMOND

Reading: Gerald Redmond, *The Sporting Scots of Nineteenth-Century Canada* (1982).

Hiking can be defined as walking over long distances (preferably in a scenic, natural setting), for pleasure or exercise. For many people, hiking means backpacking; others prefer simply to go rambling. Whatever the definition, more and more Canadians are participating in the activity. In 1976 about 1% of the population 14 years and over had participated. By 1981 this figure had grown to about 5%. About 50% of Canadians walk for pleasure, an activity that includes nature walks, which may or may not involve carrying a pack. Hiking's increase in popularity has resulted in part from a more urbanized population that is interested in the outdoors, in part from increased concern for physical fitness, and in part from easier access to wilderness or park areas. Although one can go hiking almost anywhere, the most likely site is in a park or open space setting — whether an urban park (High Park, Toronto, or Capital City Park, Edmonton) or a true wilderness setting such as the Canadian Rockies or ALGONQUIN PARK. Formerly an activity for the serious nature lover or outdoor enthusiast seeking solitude in nature, hiking today includes people from all levels of society, although most participants tend to be in the 20-35 age bracket. This sport has also become a group or family activity.

Many people pursue hiking by becoming members of a hiking club or association such as the Bruce Trail Assn, Ontario Federation of Naturalists or Waskahegan Trail Assn. Many clubs were formed to promote the development and use of a particular hiking trail. There is even a newly formed National Trail Assn of Canada promoting the development of a long-distance hiking trail across the entire country from coast to coast. These trails may represent an historic aspect of Canada's heritage or simply provide access through a scenic environment, for example the Cabot Trail and BRUCE TRAIL. Many are considered long-distance trails, extending for many kilometres and requiring the hiker to "overnight" along the route before completing the hike. Trails exist at all levels of difficulty, from the easy-to-walk rural trails (WASKAHEGAN TRAIL, Alberta) to the more stamina-testing and rugged ones such as WEST COAST TRAIL, Vancouver I. *See also* HERITAGE TRAILS. BART F. DEEG

Hill, James Jerome, pioneer transportation official, railway magnate (b at Rockwood, UC 16 Sept 1838; d at St Paul, Minn 29 May 1916). In 1856 Hill settled in St Paul. His many business ventures there included the Red River Transportation Co, which had a monopoly of the steamboat business on the Red R. With George STEPHEN and others he acquired the St Paul and Pacific Ry in 1878 (reorganized as the St Paul, Minneapolis and Manitoba Ry in 1879) and became its president a few years later. Although an original director of the CANADIAN PACIFIC RY, he resigned in 1883 to protest the decision to build the main line N of Lk Superior. He later expanded the St Paul line into the Great Northern Ry, of which he was president from 1893.

JOHN A. EAGLE

Reading: A. Martin, *James J. Hill and the Opening of the Northwest* (1976).

Hill, Philip Carteret, lawyer, politician, premier of NS (b at Halifax 13 Aug 1821; d at Tunbridge Wells, Eng 14 Sept 1894). Called to the Bar in 1844, he began his political career as mayor of Halifax 1861-64. In 1867 he was nominated provincial secretary in the first Cabinet under Confederation, but had to resign following the ministry's defeat at the polls. He was returned in 1870 as Reform (Liberal) member for Halifax County. Reappointed provincial secretary in a new Reform administration in 1874, he replaced William ANNAND as premier in 1875. Hill retained both offices until his administration was defeated 1878. He retired to England 1882 where he published several pamphlets, chiefly theological in nature. LOIS KERNAGHAN

Hill-Tout, Charles, anthropologist (b at Buckland, Eng 28 Sept 1858; d at Vancouver 30 June 1944). After studying theology, Hill-Tout immigrated to Canada and in 1891 became headmaster of a boys' school in Vancouver. He bought land in the Fraser Valley and eventually moved out to farm it and carry on field studies among the Indians. Hill-Tout became perhaps Canada's most important amateur anthropologist, largely through his friendships with the SALISH people. He became president of the anthropological section of the RSC, to which he was elected in 1913, and a fellow of the Royal Anthropological Institute of Great Britain. He published *The Native Races of British North America: The Far West* (1907), but his most important work appears in the field reports collected by Ralph Maud in the 4-vol *The Salish People* (1978). GEORGE WOODCOCK

Hill 70, *see* WORLD WAR I.

Hiller, Arthur Garfin, film director (b at Edmonton 22 Nov 1923). He has represented since the 1960s the beau ideal of the successful Canadian filmmaker in Hollywood. He began at CBC Radio in 1949, moving to CBC-TV 1953-54 and then to American network TV. His films display an admirable slickness and ease, though arguments over their ultimate artistic value remain unresolved. They include *The Wheeler Dealers* (1963), *The Americanization of Emily* (1964), *Tobruk* (1967), *Popi* (1969), *The Out-of-Towners* (1970) *Love Story* (1970, Academy Award nomination for direction), *Plaza Suite* (1971), *Man of La Mancha* (1972), *The Man in the Glass Booth* (1975), *Silver Streak* (1976) and *The In-Laws* (1979).

WILLIAM BEARD

Hilliard, Anna Marion, physician (b at Morrisburg, Ont 17 June 1902; d at Toronto 15 July 1958). She studied at U of T (BA, MB), did postgraduate work in Britain (MRCS, LRCP) and in 1928 joined the staff of Women's College Hospital, Toronto, where she headed the Dept of Obstetrics and Gynaecology 1947-57. In 1947 she helped devise a simplified Pap test, which she introduced the following year at WCH's newly formed Cancer Detection Clinic, and she was the driving force in getting WCH accepted as a U of T teaching hospital (1956). Her commonsense approach to women's problems, especially those connected with childbirth, brought her many devoted admirers and led to a series of articles which were the basis of her book, *A Woman Doctor Looks at Love and Life* (1957). She was also the author of *Women and Fatigue,* published posthumously in 1960. CARLOTTA HACKER

Reading: Marion O. Robinson, *Give My Heart: The Dr. Marion Hilliard Story* (1964).

Hime, Humphrey Lloyd, photographer, surveyor, businessman, financier (b at Moy, Ire 17 Sept 1833; d at Toronto 31 Oct 1903). Noted as a pioneer photographer on the Canadian Prairies, Hime was photographer and surveyor on the Canadian government's 1858 Assiniboine and Saskatchewan exploring expedition led by Henry Youle HIND. Hime's photographs include views and portraits taken along the route and in the Red River settlements, various HBC forts and native encampments. A portfolio of prints was published in 1860. Hime's subsequent career included mining, business and presidency of the Toronto Stock Exchange. RICHARD J. HUYDA

Reading: H.L. Hime and Richard J. Huyda, *Camera in the Interior: 1858* (1976).

Hincks, Clarence Meredith, physician, mental-health reformer (b at St Mary's, Ont 8 Apr 1885; d at Toronto 17 Dec 1964). He received his MD from U of T in 1907 and, finding general practice unsuitable, obtained a part-time post as medical inspector for Toronto schools. In this capacity he was the first to introduce the newly developed Binet-Simon tests for intelligence into Canada. In 1917 he met Clifford W. Beers, founder of the US National Committee for Mental Hygiene, an organization dedicated to improving conditions in America's insane asylums and to promoting sound mental health. With Dr C.K. CLARKE, Hincks founded the Canadian National Committee for Mental Hygiene in 1918, serving first as secretary and then as general director. In 1930 he was also appointed director of the US National Committee, a post he retained until 1939. He remained director of the renamed Canadian Mental Health Assn until his retirement in 1952. THOMAS E. BROWN

Hincks, Sir Francis, politician, colonial administrator (b at Cork, Ire 14 Dec 1807; d at Montréal 18 Aug 1885). He established the Toronto *Examiner* 1838 and the Montreal *Pilot* 1844. Convinced of the need for an English-French partnership in the United Province of Canada, Hincks and Robert BALDWIN joined with L.H. LAFONTAINE in 1841 to create a Reform Party. The 3 entered the executive of Gov Gen BAGOT in 1842 but resigned over control of patronage in 1843. Hincks became inspector gen-

eral in the Baldwin-LaFontaine ministry 1848, restoring provincial credit and promoting railway construction, and replaced Baldwin as leader in 1851. Unable to deal with growing sectional feeling and tainted by railway corruption, Hincks's ministry was defeated in 1854. He was governor of 2 Caribbean colonies 1856-69. On his return to Canada in 1869, he became federal minister of finance in Sir John A. MACDONALD's government and concentrated on banking and currency regulation. He left politics for business in 1874. His writings include his *Reminiscences* (1884). DAVID MILLS

Hind, Ella Cora, journalist, women's rights activist (b at Toronto 18 Sept 1861, d at Winnipeg 6 Oct 1942). Denied a position on the *Free Press* upon arriving in Winnipeg in 1882, Hind learned to use the recently introduced typewriter and worked as a secretary, in 1897 becoming a public stenographer even while submitting articles on agriculture. She became agricultural editor of the *Free Press* in 1901, often accurately predicting the western Canadian wheat crop yield, thus achieving renown among grain speculators. The first western female journalist, Hind became president of the Canadian Women's Press Club in 1904. In 1914 she participated in Manitoba's Mock Parliament, in which women sardonically defeated a motion to permit men the vote. Often rebuffed because of her gender, she agitated for WOMEN'S SUFFRAGE, a concern she combined with interest in WOMAN'S CHRISTIAN TEMPERANCE UNION. At 75 she travelled around the world to observe agricultural methods, writing *Seeing for Myself* (1937). She was awarded an honorary LLD by U Man. ELIANE LESLAU SILVERMAN

Hind, Henry Youle, geologist, naturalist (b at Nottingham, Eng 1 June 1823; d at Windsor, NS 8 Aug 1908). Hind was educated at the Nottingham Free Grammar School, a Leipzig commercial college, and Caius College, Cambridge, but graduated from neither of the latter. In 1846 he immigrated to Canada to become in Oct 1847 second master of science and mathematics at the Normal School at Toronto and 1851-63 professor of chemistry at Trinity College. He then supported himself as a consulting geologist in the Maritimes.

Hind was closely associated with the establishment of the Canadian Institute, a loose association of engineers and surveyors, and acted as editor of their journal, the *Canadian Journal* 1852-57. It reflected the growing nationalist spirit, as did Hind's other work. He was a prolific author of popular scientific and exploration materials, producing 4 major government reports on the North West and Labrador, and 6 books, 25 pamphlets and 22 articles ranging from railway policy to geology to spectrum analysis. The high points of his career were the 2 expeditions into the Red R, Assiniboine and Saskatchewan countries in 1857 and 1858, for which Hind was the scientific observer, naturalist and geologist. These expeditions did much to effect an awareness of the potential of the great North West in the Canadas. The most important work resulting from these explorations is the 2-vol *Narrative of the Canadian Red River Exploring Expedition of 1857 and of the Assiniboine and Saskatchewan Exploring Expeditions of 1858* (1860).

FRITS PANNEKOEK

Reading: W.L. Morton, *Henry Youle Hind* (1980).

Hind, William George Richardson, artist (b at Nottingham, Eng 12 June 1833; d at Sussex, NB 18 Nov 1889). His older brother Henry Youle HIND arrived in Toronto in 1848 and William seems to have followed 3 years later. He set up an art studio but returned to England 8 years later where he was influenced by the paintings of Millais, Hunt and Rossetti, with their attention to minute detail. He joined his brother's expedition to the Moisie R in 1861 and produced over 100 pencil, watercolour and oil studies of the wilderness, native people, as well as sentimental flights of imagination. In 1862 he set off with the OVERLANDERS, completing over 160 sketches and paintings of the journey from Ft Garry to Victoria. Among his best-known works are scenes of farm life and *Oxen With Red River Cart* (1870) from the Red River Colony and *Bar in a Mining Camp* (1865) and studies of Lillooet miners during the Cariboo Gold Rush. By 1870 Hind was living in NB and NS and working for the Intercolonial Ry. JAMES MARSH



W.G.R. Hind, *The Third Rapid on the Moisie,* from sketches made on an expedition with his geologist brother, Henry Youle Hind (*courtesy Public Archives of Canada/C-13979*).

Hinduism, the religion of about 400 million people in India, Africa, Indonesia and the West Indies. Immigration from these countries (principally India) to Canada has provided the base for a Canadian population of about 69 500 Hindus (1981c). Evidence of the existence of Hinduism dates back 4000 years. It reached a stage of high philosophical, religious and psychological development by 1500 BC and has sustained it to the present. Hinduism has maintained its supremacy in India despite numerous migrations into the country and attempts at evangelization by other religions, notably BUDDHISM, ISLAM and CHRISTIANITY. Hindu culture and religion possess a unique vitality which has enabled Hinduism to become the foundation of the religions practised by over half the world's population. People in China, Japan, Tibet, Burma and Ceylon all look to India as their ancestral spiritual home.

For the Hindu, God is the one supreme universal spirit that underlies all human, animal and material life, and towards which all religious feelings and theology strive. To Hindus each religion's and every devotee's particular picture of God represents a true aspect of God. But the uniqueness of the Hindu world view centres on 4 important concepts: *anadi* (beginninglessness), *karma* (the moral law of life), *samsara* (rebirth) and *moksha* (freedom or release). The basic Indian world view assumes a cycle of birth, death and rebirth leading the believer to the desire for release from this endless round of suffering — "suffering," because life in this world implies separation from the divine.

Hindu thought has no concept for the creation of the universe, assuming that everything — the universe, God, scripture and humanity — has existed without beginning. Within this view is the idea of cycles of creation with relative beginnings. Each cycle begins from a pre-existent seed state, grows, flowers, withers and dies. But, just as a dying flower leaves seeds for its own propagation, each cycle drops a seed which begins the next state. In Hindu belief, the universe we are now experiencing is in one such relative cycle of creation.

A consequence of this view is typified in the term "karma." Each person is responsible for his or her own destiny. If one performs good actions and thinks good thoughts, this will establish the probability of a good future even in the next cycle of creation. The doctrine of karma teaches that when a person acts or thinks, a memory trace or seed laid in the unconscious will predispose the individual to that same kind of action or thought in the future. Each person is reborn (reincarnated) again and again, according to his or her karma. Many of the thoughts and desires we find when we analyse our unconscious impulses come from thoughts and actions of previous lives. What we experience in this life is in part a consequence of all the good and bad actions and thoughts of previous lives. The doctrine of reincarnation is manifested in society by the caste system, which has 4 levels at which an individual may be reborn, according to the karmic merit accumulated: *brahman* (priest or teacher), *kshatriya* (warrior or politician), *vaishya* (merchant or professional) and *sudra* (servant or labourer). Long after these categories were established some sudras became known as untouchables, or "outcastes."

The karmic balance in the unconscious at the time of death determines the state or level at which a person will be reborn. Through countless lives one can spiral upwards, finally to reach the level of the gods. There the individual experiences the honour of sitting in the place of a deity, exercising the deity's cosmic function until the good merit is exhausted. If through evil living one is reborn as an animal he will simply follow his instincts and experience the suffering that such instincts produce. Such is the cycle of rebirth, "samsara." How to find a way out of this cycle is an important question in Hinduism and Buddhism. The Hindu answer is called "moksha."

Moksha is release from the merry-go-round of birth, death and rebirth. The 3 ways of obtaining release are the yoga of knowledge, the yoga of action and the yoga of devotion. The yoga of knowledge involves intellectual and psychological techniques developed by Hindu holy men to control their actions and analyse their unconscious. They remove the karmic obstructions of previous lives, recovering the nature of their true selves. The true self is shown to be nothing other than Brahman, or God. The goal of all knowledge, therefore, is the experience of union with the divine. The yoga of action requires that duty be done with no thought

for oneself or for the benefit or suffering that one experiences in fulfilling it. Through the performance of one's duty as a dedication to the Lord, a kind of inner purification takes place, resulting in divine union. The yoga of devotion, the most common path, requires that prayers, the chanting of scripture and meditation on the image of the Lord be undertaken with such intensity that inner karmic obstructions are burned up and the Lord is revealed within consciousness. All that is required is willingness to surrender oneself completely in devotion to God. Regardless of which path is followed, the end is the same: the discovery of the true nature within oneself of a spiritual soul (*atman*) which is at one with God.

Hinduism in Canada Immigration to Canada of people from India or of Indian origin began in 1903-04 (*see* SOUTH ASIANS). The census records of 1911 list Hindus and Sikhs together, for a total of 1758. Most of Canada's East Indian community of the first half of this century was of the SIKH faith, and extensive Hindu immigration started only in the 1960s.

In Canada, as elsewhere in the Hindu diaspora, the structure of religious life has undergone a marked change. The practice of caste generally follows that in India, with marriages usually made along caste lines; nevertheless the practice is tempered by the egalitarianism of Canadian society. The traditional roles of temple, home altar, village festival and PILGRIMAGE to sacred sites have largely given way to a development in which temples function as the local church does for Christianity. Temples have been built in major Canadian cities from Halifax to Vancouver. A regular pattern of Sunday worship services is cultivated. These services often make reference to the Hindu sacred calendar, commemorating saints and marking seasonal or religious festivals; but the celebrations are conducted on convenient Sundays, since it is often difficult to meet during the work week. Where the Indian community is large enough several temples develop along cultural or ethnic lines. One of the older temples in Toronto (fd 1976) serves a largely West Indian Hindu community, while the Indians from Africa and India attend other temples. Informal *satsangs* (devotional meetings) take place throughout the community, bringing together people of similar cultural and linguistic background or those devoted to a specific spiritual path, such as Vedanta, or a particular *guru* (teacher), such as Sai Baba or Aurobindo.

In cities other than Toronto and Vancouver where there is a single temple it is under the influence of either the Arya Samaj or the Sanatanist tradition. Both use the *Vedas*, the ancient Hindu scriptures, as the source of their rituals. Arya Samaj worship is conducted through the Agnihotra, a ritual involving a series of purifications, the chanting of *mantras* (incantations) and scriptures, along with offerings to Agni, the god-fire who bears all sacrifices to God. Although Hindu art is noted for its magnificent depictions of the gods, Arya Samaj groups do not use images of the various Hindu deities in the act of worship. Sanatanists construct worship around a similar set of purifications, chants and offerings. However, there are lengthy oblations made to various deities through the use of their images. The gods most often called upon are Ganesa, Visnu, Siva, Suryanarayan and Devi. The services are several hours in length, requiring a knowledgeable priest familiar with the complexities of the formal ritual pattern. Both Arya Samaj and Sanatanist forms of worship are structured to make allowances for the Canadian setting and for the diversity of belief among Canada's Hindus.

Most temples in Canada are run by boards along "congregational" lines and are served by one or 2 lay priests. Trained and initiated priests, called *pundits*, serve a Sanatanist temple in Toronto and a Samajes temple in Vancouver. A number of language programs are sponsored by temples across Canada. In some communities children gain a cursory knowledge of Sanskrit, the ancient language of Hindu scripture and ritual, and of languages such as Hindi, Punjabi, Gujarati and Tamil, in which myths and legends are told and devotional hymns sung. Traditional practice requires a series of 12 initiation rites (*samskaras*) or personal religious ceremonies. This cycle has been modified dramatically in the Canadian setting, although most Canadian Hindus are married and cremated according to tradition. Some of them practise rites associated with conception, birth, the first haircut and the initiation of boys into full caste membership (the *upanayana*, or "sacred thread," ceremony).

Hindu communities in the diaspora are visited regularly by various gurus and *swamis* (monks). These may be formally associated with an institution or movement in N America such as the Ramakrishna Mission, or may hail from one of the great *ashrams* (religious communities) of India. The Sri Ramakrishna Mission actively circulates swamis throughout the Vedanta societies in Canada. Although Hindu religious life in Canada is circumscribed by a shortage of priests, a lack of sacred sites and a new set of cultural norms, numerous Hindus remain in contact with gurus who guide their personal religious paths.

DAVID J. GOA AND HAROLD G. COWARD

Reading: David J. Goa, ed, *Traditions in Transition* (1982); S.K. Jain, *East Indians in Canada* (n.d.); T.J. Hopkins, *The Hindu Religious Tradition* (1971); I.M. Muthanna, *People of India in North America* (vol 1, 1975); K.V. Ujimoto and Gordon Hirabayashi, eds, *Visible Minorities and Multiculturalism* (1980).

Hinton, Alta, Town, pop 8342 (1981c), inc 1958, is located in the Alberta foothills, 285 km W of Edmonton. It began as a coal-mining town, and was named for the manager of the Grand Trunk Pacific Ry, W.D. Hinton. In 1956, North West Pulp and Power Ltd (now St Regis Ltd) opened Alberta's first pulp mill nearby, and a new town grew up 1 km N of the original settlement. The old town survives as a centre for motels and service stations on Hwy 16 to Jasper. Coal mines have recently been reopened to the S.

ERIC J. HOLMGREN

Hippies, a term (possibly a variation of "hipster") coined in the mid-1960s to describe the adherents of a subculture (or counterculture) associated with the political and social protest movements of that decade. Although the hippy culture originated in Greenwich Village, New York, and in San Francisco, California, it spread throughout N America. In Canada hippies congregated primarily in the Kitsilano district of Vancouver and around Yorkville Ave in Toronto. They were characterized by long hair, beards and unconventional clothing, by their celebration of drugs (in particular LSD and marijuana) and rock 'n roll, by their affinity to non-Occidental religions (*see* NEW RELIGIOUS MOVEMENTS) and the cultivation of "self-awareness," by sexual experimentation, by their language ("trips," "acid," "flower power"), by economic marginalism and by their youthfulness and middle-class origins. Although they were widely disparaged and ridiculed, their ideals corresponded to the effort of the New Left in general to propose political and cultural alternatives to the institutions of capitalist society; they upheld PACIFISM, communal life, egalitarianism, self-help and the inviolability of the person, and were hostile to private property, bureaucracies and technology. Many of their ideas were inspired by Marshall MCLUHAN and his notions of the postliterate tribal society. In Vancouver, hippie culture was associated with the Easter "be-ins" at Stanley Park, with the underground newspaper *Georgia Straight* and, briefly, in a cross-fertilization with political activism, with the Vancouver Liberation Front. In Toronto hippies gathered at "love-ins" in Queen's Park, Digger House, Rochdale College (an experiment in "free education") and a mass sit-in on Yorkville Ave. As a mass phenomenon the hippies were short-lived. The Festival Express, a coast-to-coast rock 'n roll festival on board a train in 1970, was probably the last major hippie event. In the end hippies were unable to devise a strategy that linked the forms of cultural protest to those of mass political action, and they faded into solipsism, anti-intellectualism and varieties of personal therapy. Some of their ideas were subsequently taken up by the ecology movement and community-based urban-action groups of the 1970s.

MYRNA KOSTASH

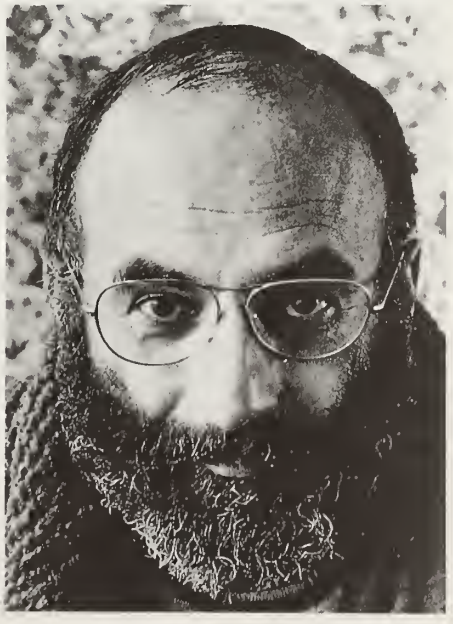
Reading: Myrna Kostash, *Long Way from Home: The Story of the Sixties Generation in Canada* (1980).

Hiram Walker Resources Ltd, with head offices in Toronto, is a Canadian holding company with diverse interests. The company was incorporated as the Consumers' Gas Company in 1848 in the PROVINCE OF CANADA. In 1979 shareholders of Cygnus Corporation Ltd and Home Oil Co Ltd approved their own joint merger, and subsequently one with Consumers' Gas. A year later, stockholders approved the merger of distiller Hiram Walker-Gooderham & Worts Limited with the company and its wholly owned subsidiary, Home Oil Company Limited. The name change to Hiram Walker Resources Ltd followed. Today the company has subsidiaries operating internationally in distilled spirits, natural resources and a gas distribution utility. As of Sept 1983 it had annual sales or operating revenue of $3.4 billion (ranking 24th in Canada), assets of $4.8 billion (ranking 18th) and 10 200 employees.

DEBORAH C. SAWYER

Hirsch, John Stephen, theatre director, administrator (b at Siófok, Hungary 1 May 1930). He emigrated to Winnipeg in 1947 and after graduating from U of Man established the Muddiwater Puppets and a troupe for children. In 1957 he and Tom HENDRY cofounded Theatre 77, which they combined with the Winnipeg Little Theatre in 1958 to form the MANITOBA THEATRE CENTRE (with Hirsch as artistic director); it was destined to be the model for a chain of regional

John Hirsch, founder of the Manitoba Theatre Centre, was co-director of the Stratford Festival 1967-69 and sole artistic director 1980-85 (*courtesy Canapress*).



stock companies across Canada. From 1967 to 1969 he was codirector of the STRATFORD FESTIVAL and from 1976 to 1979 head of television drama for the CBC. In 1980 he became sole artistic director at Stratford. Between appointments he has guided productions for Ottawa's National Arts Centre, Toronto Arts Productions, Young People's Theatre and the SHAW FESTIVAL, as well as elsewhere in Canada and abroad. Several of his American productions have been honoured. He won the Outer Circle Critics' Award for *Saint Joan* at the Lincoln Center, New York, an Obie Award for *AC-DC* at the Chelsea Theater, Off-Broadway, and the Drama Critics' Award for *The Dybbuk* at the Mark Taper Forum, Los Angeles (1975), a play he translated and adapted. His work has been seen, as well, at the Tyrone Guthrie Theater in Minneapolis, the Seattle Repertory Theater and the Habimah Theatre in Tel Aviv.

DAVID GARDNER

Hirshhorn, Joseph Herman, mining promoter, art collector (b at Mitau, Latvia 11 Aug 1900; d at Washington, DC 31 Aug 1981). Hirshhorn immigrated at an early age to the US, rising from office boy to stockbroker to entrepreneur. In 1933 he opened an office in Toronto. In the early 1950s Hirshhorn formed a partnership with Franc Joubin, a geologist; together they made the greatest URANIUM strike in Canadian history near Blind River, Ont. Hirshhorn subsequently sold his uranium interests to Rio Tinto. His great collection of contemporary art is held in the Hirshhorn Gallery in Washington.

ROBERT BOTHWELL

Histoire des Canadiens-français 1608-1880 by Benjamin Sulte (8 vols, 1882-84), proclaims in its own subtitle its significance as a comprehensive study of the French Canadian people (complete with statistics): it examines their "origins; history; religion; wars; discoveries; colonization; customs; domestic, social and political life; development and future." An eccentric "liberal" history, it met with the church's approval — despite its denunciation of the JESUIT RELATIONS — because of its outspoken critique of colonialism and MERCANTILISM and its nationalist concept of the French Canadians as a race. Unlike François-Xavier Garneau's HISTOIRE DU CANADA, which was out of favour in the ULTRAMONTANE climate of the 1880s, Sulte's history defends the habitant as the forgotten hero of his tale and views the old SEIGNEURIAL SYSTEM with nostalgia. Sulte greeted Confederation with qualified approval, stressing the need for provincial autonomy within a structure that ensures a voice for French Canadians. Sulte's *Histoire,* very popular in his day, has not been translated or reprinted.

MICHÈLE LACOMBE

Histoire du Canada depuis sa découverte jusqu'à nos jours, a Canadian classic by François-Xavier GARNEAU, appeared in 4 volumes, 1845-52, tracing French Canada's development from Champlain's voyages of discovery to 1840. A vindication of the French Canadian nation in the face of Lord DURHAM 's assimilationist policies, it was read as a national epic and a monument to "la survivance." Garneau was first among French Canadians to treat history as a science. He was strongly influenced by French historians, taking up their liberal ideals and romantic style, and adopting Augustin Thierry's theory that interracial antagonism is the prime mover of all history. Garneau's evident patriotism and his status as a national hero tempered criticism of his liberal ideas, which included suggestions of clerical mismanagement in the colony's early history. Garneau revised his text for the second and third editions of 1852 and 1859; Andrew Bell's translation (1860) somewhat misrepresents the text. The standard, indexed edition was the eighth, published in 9 volumes, 1944-46.

MICHÈLE LACOMBE

Historic Site, a place designated as having some tangible link with the past through an event, person or building. It is sometimes identified by an associated building or archaeological remains, although often merely by the presence of a statue, cairn or plaque put up more recently. A confusing term associated with historic sites is "monument," which can refer to either a historic building or a commemorative structure.

To be designated a historic site, a place must have more than intrinsic significance from the past; it must be recognized later as having meaning within a larger historical context. This qualification poses a problem of definition because it is sometimes difficult to distinguish between the historical time from which the site derives its significance and its later period of commemoration. War memorials, for instance, are not usually thought of as having intrinsic historical significance, yet with the passage of time some of these have assumed the characteristics of historic sites, eg, the Nelson column erected in Montréal in 1809, the 1854 BROCK memorial at Queenston Heights, and the monument erected in honour of MONTCALM and WOLFE in Québec City in 1827, in possibly the earliest commemoration in Canada of an historic event. Another problem that makes defining historic sites difficult is the changing of criteria for their selection. In the late 19th and early 20th centuries, sites were often chosen to commemorate important battles, great men and political events, eg, BATOCHE; CRYSLER'S FARM. Today, greater concern is shown for the history of the common person, ethnic groups and industrial developments, eg, old FORT WILLIAM; CANNINGTON MANOR; FORGES SAINT-MAURICE; MOTHERWELL HOMESTEAD.

Interest in creating historic sites became fairly widespread in eastern Canada with the rise of ñationalist sentiment at the end of the 19th century. Local patriotic and historical associations endeavoured to preserve and mark places important to the historic identity of their particular regions and some argued that their sites were important also to Canada's history. It was realized, too, that historic sites could be popular tourist attractions, especially if occupied by picturesque ruins, although efforts at development were usually limited unless supported by government funding. Following initiatives by Québec organizations in 1907, the federal government created the Québec (later National) Battlefields Commission to develop and preserve the site of the 1759 BATTLE OF THE PLAINS OF ABRAHAM. With no structures of the period to work with, the commission planned a landscape park with commemorative monuments. In 1919 the federal government created the Historic Sites and Monuments Board of Canada to advise it on implementing a national program of commemoration and preservation of historic sites, and subsequently most provincial governments appointed similar bodies to advise on the creation of provincial historic sites.

Until the 1930s efforts at developing historic sites were largely confined to interpretive plaques. If historic ruins were present they were usually left unimproved, with minimal effort made to prevent further deterioration. The prevailing preservation philosophy in the early 20th century held that reconstruction or major restoration harmed the historical integrity of a site, and the scarcity of funds for expensive restoration projects no doubt encouraged this approach. Nevertheless, some efforts were made to preserve historic buildings. A number of old forts formerly controlled by the British army were transferred to the National Parks Branch of the Dept of the Interior. Ft Anne, Annapolis Royal, NS, was made a national historic park in 1917. Other military properties — FORT BEAUSÉJOUR, NB, FORT CHAMBLY, Qué, Ft Wellington, Ont — were preserved as national historic sites until 1940, when they were designated national historic parks. In Québec and Ontario local groups successfully preserved some important historical buildings. The Montréal Antiquarian and Numismatic Society acquired the Château de Ramezay for a museum building in 1895 and Toronto historical groups fought successfully to save old Ft York from destruction. On the whole, however, preservation projects were rare.

The success of large restoration projects in the US, particularly the reconstruction of Colonial Williamsburg in the 1920s, was largely responsible for changing this attitude. Increased spending on public works during the Depression provided further stimulation. In the 1930s the Niagara Parks Commission, an agency of the Ontario government, undertook 4 significant historic projects, 2 of which — Ft George at Niagara-on-the-Lake and Ft Erie (*see* NIAGARA HISTORIC FRONTIER) — involved reconstructing nonexistent FORTIFICATIONS. Subsequently the provincial and federal governments undertook the restoration of FORT HENRY at Kingston. Although in this latter case much of the original fort remained intact, the restoration went beyond structural repairs: interiors were refurbished and furnished with period reproductions and historic artifacts. The largest reconstruction project undertaken is Fortress of LOUISBOURG National Historic Park in Nova Scotia. In 1961 Parks Canada began to rebuild part of the former French fortress demolished by the British in 1758. This involved reconstructing part of the old town as well as the fortifications; interiors have been replicated and the site is interpreted by costumed guides who explain aspects of 18th-century life at Louisbourg.

Related to the reconstruction of buildings is the artificial creation of a historic community using historic buildings moved to the site. Although in a sense not historic sites because the properties lack inherent significance, artificial pioneer communities such as KINGS LANDING, NB, and UPPER CANADA VILLAGE, Ont, are an important aspect of historic preservation in Canada.

More recently, efforts have been directed at preserving historic buildings in their natural settings, retaining the original, or at least some practical, function. Examples of commercial or domestic architecture preserved as historic sites can be found across Canada. They pose special problems for preservation because they usually remain under private control and are vulnerable to destruction or improper renovation. Buildings designated National Historic Sites, for instance, although marked by distinctive plaques, are not usually protected by federal legislation. Gradually provincial governments are enacting heritage legislation to protect designated buildings. In some provinces, municipalities have been empowered to designate historic resources, which then fall under the protection of the provincial heritage Act. Agencies such as HERITAGE CANADA, along with provincial and local heritage groups, have endeavoured to raise funds for the preservation and proper restoration of privately owned historic buildings. *See* PARKS; HERITAGE CONSERVATION.

C.J. TAYLOR

Historical Geography includes the study both of the geographies of the past and of changes in geographical patterns through time; historical geographers study some aspect or aspects of the GEOGRAPHY of a region, such as population or land use, at a selected period in the past (the cross-section or horizontal approach), or some element or aspect of the evolution of a region (the vertical approach). The horizontal approach reveals the interrelationship of numerous elements of a place at a particular period and also studies the life of an area at a particular time. The vertical approach emphasizes processes and the human thought and activities underlying changes in geographical patterns.

Historical geography was not recognized as a distinct field of university teaching and research in Canada until the 1950s. However, the term geographical history was used in 1749 in a British pamphlet describing NS, although the first major historical geographical study of Canada was by J.D. Rogers, *A Historical Geography of the British Colonies - Canada - Part III Geographical* (1911) — a description and analysis of the settling of Canada, published in England. In 1936 Carl Schott, a German geographer, analysed agricultural settlement in southern Ontario. In the 1950s and 1960s geography departments in Canadian universities expanded as young historical geographers established courses and published research. A distinct area of specialization developed, stimulated by the work of Canadian historians and economic historians, eg, H.A. INNIS. However, the emphasis that geographers place on the spatial patterns of the Earth and how they evolve distinguishes their work from that of historians. A considerable number of historical geographers received graduate training in the US. Andrew H. CLARK (born in Canada and influenced by Innis) of University of Wisconsin was particularly important. Others trained in British universities.

Canadian historical geographers concentrate on their country but a few specialize on other parts of the world and have published research on China, Europe, Latin America, the USSR, South Africa and the US. Within Canada a few scholars have adopted the cross-section approach and have reconstructed the geography of a region at a particular time, but most research is concerned with geographical change through time. Topics include the cultural historical geography of native peoples and their relationship to the FUR-TRADE economy; spatial patterns of IMMIGRATION and the transfer of culture from the Old World to the New; rural settlement; land-use and settlement patterns as they relate to primary-resource development; the founding of urban settlements and their functional development and evolution in relationship to staples and corridors of movement; and the origins and evolution of distinctive rural and urban landscapes, including buildings. Although culture is increasingly recognized as an important factor in determining geographical development, research has just begun on attitudes to and influences on the environment, and the historical geography of manufacturing is barely developed. The history of the mapping of Canada is studied, and facsimile atlases have been prepared showing how maps can be used to interpret the evolving geography of an area. In the late 1970s and early 1980s historical geographers, cartographers and others were preparing a massive 3-vol historical atlas of Canada from the Ice Age to the mid-20th century scheduled for publication in 1986.

Specialists are not responsible for all research in historical geography. Geographers who normally work on contemporary geographical problems may adopt an historical geographical approach for a particular research topic. Historical geographers in their turn may occasionally work on contemporary problems, but they usually concentrate on the past and are thoroughly familiar with the archival and field sources and the scholarly literature related to a particular area and period. J. WARKENTIN

Reading: R.C. Harris and J. Warkentin, *Canada Before Confederation* (1974).

Historical Societies in Canada have as their primary purpose the study and promotion of the Canadian historical experience. Through publication of scholarly and amateur works, public education programs, assistance to and cooperation with archives, museums, heritage groups and other similar organizations, hundreds of historical associations provide a valuable service to Canadian life. The first such association, the LITERARY AND HISTORICAL SOCIETY OF QUEBEC, was established in 1824. The Nova Scotia Historical Society began in 1878 and its publication, *Report and Collections of the Nova Scotia Historical Society*, started the following year. The Ontario Historical Society traces its roots back to 1888 with its journal, *Ontario History*, beginning in 1899. Historians in most other provinces have since established similar organizations.

On the national level the CANADIAN HISTORICAL ASSOCIATION, fd 1922, was an outgrowth of the Historic Landmarks Assn of Canada. The latter, established in 1907, had as its main objectives the planning for the 1908 Québec tercentenary and the appropriate recognition of Canada's HISTORIC SITES. The CHA now boasts over 2500 members and serves the interests of both professional and amateur historians through an active publications program and an annual conference.

Recent years, particularly since Canada's centennial celebrations in 1967, have witnessed a tremendous growth in regional and local historical associations. Societies large and small operate almost exclusively on volunteer assistance. Their activities have increased the awareness among Canadians of the richness of their own history and have encouraged many others to examine their past through local history studies, GENEALOGICAL research and other research projects. CARMAN V. CARROLL

Historiography, the published product of the historian's declared interest in the past; the writing of history. It is not by itself "history," but is by necessity part of the historical record. The serious study of history therefore also requires an awareness of the historical conditions and social assumptions that give rise to different forms of historiographical interpretation. The Canadian historiographic corpus has developed separately in English Canada and French Canada, but similarities exist. History, once the amateur's preserve, has come to be written principally by professional scholars, both anglophone and francophone. The establishment of such national agencies as the PUBLIC ARCHIVES OF CANADA (PAC) and such bodies as the ROYAL SOCIETY OF CANADA was of benefit to both. Approaches to the recording of history still differ, as do preoccupations in the choice of subject matter; but conferences and journals now provide forums for the sharing of historiographic materials, knowledge and methodology.

Historiography in French

Various descriptive works and narratives dealing with Canada and published in France during the 17th and 18th centuries were entitled "histoires." Although written by Frenchmen who in many cases had only visited NEW FRANCE, these publications profoundly influenced French Canadian historiography. They provided later historians with otherwise unattainable information about events witnessed by their authors, as well as valuable descriptions of the daily lives of colonists and Indians. One historiographic work of this period stands out from the rest: *Histoire et description générale de la Nouvelle France*, by the Jesuit P.F.X. CHARLEVOIX (Paris, 1744). Already a published historian, the author stayed in New France 1705-09 and returned 1720-22, when he travelled from Québec down the Mississippi Valley to New Orleans. His abundantly documented *Histoire* gives a faithful account of political, military and religious events from the early 16th century to 1736. For a century it remained the best history of the French colony.

The Canadiens paid little attention to the historical genre until the early 19th century, when a feeling of FRENCH CANADIAN NATIONALISM developed. The versatile Montréal writer Michel Bibaud brought out *Histoire du Canada* (3 vols, 1837-78) which had some documentary and literary merit. This conservative author criticized French Canadian nationalists, Papineau in particular.

The first volume of François-Xavier GARNEAU's *Histoire du Canada*, the most important historiographical work ever published in French in Canada, appeared in Québec City in 1845. Two more volumes followed in 1846 and 1848, and the work went through 8 printings in a century. Garneau voiced the ideals that guided French Canadian nationalists until the mid-20th century. He painted vivid accounts of the saga of New France, including the exploits of the explorers and COUREURS DE BOIS and the work of French missionaries. He celebrated the military deeds of Frenchmen and Canadiens who defended their land against the British and, later, the Americans. For the Canadiens, the CONQUEST was not the end of the conflict: after 1791 it simply moved indoors to the Parliament. Garneau's vision of a perpetual struggle for survival as the central element of Canadian history has marked all French Canadian historiography until the present day. Garneau disapproved of the REBELLIONS OF 1837 but strongly criticized British policies toward Canadiens. He vigorously denounced the ACT OF UNION as an attempt to destroy the French Canadian nation. A self-taught historian, Garneau made judicious use of official sources and existing publications, and modelled his *Histoire* on the works of his favourite author, French historian Augustin Thierry, who held that racial antagonism was the driving force of history.

Garneau showed French Canadians the power of history as an element of national identity. Those who came after him, proponents of the conservative ideology that dominated Québec from the mid-19th century to the 1960s, produced a host of historical works exalting the national and religious past of the people. In their syntheses and monographs, priest-historians Jean-Baptiste-Antoine Ferland, Étienne-Michel Faillon and Henri-Raymond CASGRAIN stressed the role of the great religious figures of New France. Such accounts complemented Garneau's works which, in the opinion of the clergy, had been unduly secular. Several works stand out in the abundant historical literature of the last half of the 19th century, among them Joseph-Edmond Roy's *Histoire de la seigneurie de Lauzon* (5 vols, 1897-1904), which is still pleasant and instructive reading.

Two historians dominated the first half of the 20th century: Thomas Chapais and Abbé Lionel GROULX. Chapais established himself with biographies of key figures in New France — Intendant TALON and Gen MONTCALM. But his greatest work was *Cours d'histoire du Canada* (8 vols, 1919-34). The *Cours*, originally given as a series of public lectures at Université Laval, covered the period from the Conquest to Confederation. Chapais took up Garneau's *Histoire* in more rigorous fashion, and had the advantage of fuller documentation. He and his contemporaries benefited from the creation of the Public Archives in Ottawa. Chapais's *Cours* is still a mandatory reference work for any student of political and parliamentary history of that era. Other writers, the most famous being Groulx, opposed his criticism of the PATRIOTES and his sympathy for British policies.

In 1915 Groulx inaugurated the chair in Canadian history at the Montréal campus of Université Laval (later U de Montréal). In a few years he became the leading historian of French Canada, the only one whose name could rival Garneau's. Each of his books sparked passionate discussion in French Canadian intellectual circles. His synthesis of Garneau's nationalist ideal with traditional Catholic ideology has never been bettered. *Histoire du Canada français depuis la découverte* (4 vols, 1950-52) is an excellent summary of Groulx's work.

Gustave Lanctôt, a career archivist with the PAC, was a less outstanding writer than Groulx, but still admirable for his time. His most important work was a 3-volume study of the French regime, *Histoire du Canada* (1959-64). The most prolific French Canadian historian was Robert Rumilly, primarily known for his monumental 41-volume account of the years between 1867 and 1945, *Histoire de la Province du Québec* (1940-69). Anecdotal, written in popular style and drawn largely from printed primary sources such as newspapers, Rumilly's *Histoire* is still the starting point for any study of the period. Rumilly was also interested in the history of the ACADIANS and the FRANCO-AMERICANS.

French Canadian historiography took a new direction after WWII. In 1947 departments of history were created at the universities of Laval and Montréal, modelled on history departments in European and American universities and staffed by professors trained in the methods of professional historiography: Guy Frégault and Michel Brunet in Montréal, and Marcel Trudel in Québec City. Large numbers of students entered history departments in the 1960s, a movement that resulted in more professors, more graduate theses and more publications. The 1970s saw the creation or further expansion of departments of history at U of Ottawa, U of Sherbrooke, and U du Québec in Chicoutimi, Trois-Rivières, Rimouski and Montréal. History, which had been the preserve of amateurs and a very few university trained scholars before 1945, had in a quarter-century become a major discipline in universities and research institutes. The vitality of the profession in Québec is reflected in the conferences of the Institut d'histoire de l'Amérique française (fd 1948), a gathering of historians whose specialty is the history either of Québec or of Francophones originating there. These annual conferences constitute the province's best forum for Québec historiography, and their methodological and ideological horizons are constantly being enlarged. The Institut publishes the *Revue d'histoire de l'Amérique française*, which has become the most notable journal for scholarly publications on the history of Québec and French Canada. Other periodicals, such as *Histoire sociale/Social History* (fd 1968 in Ottawa), also publish articles by historians who are studying Québec with new methodologies developed in France, Britain or the US.

Several works stand out from the mass of material that has been published since 1945. Groulx's disciples, unconcerned with religious ideology, developed strong political positions in their historial works: the writings and teachings of Maurice Séguin and Michel Brunet, for example, largely shaped the thinking of the sovereignty movement of the 1960s. The appearance of history as a university discipline led to greater critical rigour in historical works; the abundant and methodical writings and teachings of Marcel Trudel illustrate this development. But the impact of the SOCIAL SCIENCES on historiography since the 1960s has been especially fruitful. Fernand Ouellet's *Histoire économique et sociale du Québec, 1760-1850* (1966) was a major event in Québec intellectual life. Ouellet integrated economic and social factors much more firmly than did anyone before him, and drew perceptive conclusions which played down the Conquest as an explanation for French Canadian economic inferiority. He subsequently refined his model, provoking fruitful debates with fellow historians such as Jean-Pierre Wallot. Louise Dechêne's *Habitants et marchands de Montréal au XVII siècle* (1974) is another example of historical work based on today's best historiographical methods.

After 1970 historians began concentrating on various specialized areas. Some of the most active are the labour historians (*see* WORKING-CLASS HISTORY), whose writings appear or are analysed in the periodical *Labour/Le Travailleur*, (fd 1976). There are also urban historians (*see* URBAN STUDIES), whose writings are documented in *Urban History Review/Revue d'histoire urbaine*. Women's history attracts increasing numbers of active researchers. Greater attention is being paid to historiography itself, and more ties are being formed between the 2 historiographies of Canada. English Canadians continue to include French Canada in their analyses of Canada and endeavour to follow Québec's rapid evolution since the 1960s (*see* QUIET REVOLUTION). Perceptive analyses of French Canada in the 19th and 20th centuries, such as the works of Ramsay Cook, have been translated into French and are appreciated by Anglophones and Francophones alike. Many Franco-Québecois historians, although generally interested in Canadian history only to the extent that it helps them understand Québec, carefully follow English Canadian historiographic production and profit from its methodologies. When Franco-Québecois historians look outward, they tend to disregard the US and turn to the historiography of France, which has enjoyed great prestige since the 1960s. Québec historiography, flourishing in the 1980s, has been at the heart of the great debates waged about the society and "nation" of Québec. More importantly, however, the discipline — having benefited significantly from the historiographical renewal experienced throughout the Western world in recent decades — retained the prestige and influence in the culture of French Canada it has enjoyed for more than a century.

PIERRE SAVARD

Historiography in English

Canadian historiography in the English language began virtually with British settlement in America. By necessity, it developed regionally, and it was practised by enthusiastic amateurs. Its *raison d'être* was less to examine the past for its own sake (for in the prevailing Eurocentric view Canada had little "real" history) than to depict the physical features of the land, compile social and economic statistics, and chronicle political advances in a way that encouraged further settlement and investment. It is best regarded as a literary genre aimed at promotion, descriptive rather than analytic. The first example appeared in 1749, with the anonymous publication in London of *A Geographical History of Nova Scotia*. Other such accounts followed, culminating with Thomas Chandler HALIBURTON's *An Historical and Statistical Account of Nova Scotia* (1829), a tract intended to encourage a continued imperial connection.

Other British North American colonies and regions also contributed to this promotional literature during their formative stages. With the opening of the PRAIRIE WEST to European settlement in the 1870s, there appeared such works as Joseph James Hargrave's *Red River* (1871) and George Bryce's *Manitoba* (1882), tracts equally promotional but also reflecting an embryonic regional consciousness. In part this insistence on a distinctive western past was a reaction to the growing historiography produced by Ontarians in the 19th century. In what is now Ontario, the first counterpoint to François-Xavier Garneau's *Histoire du Canada* was John Mercier McMullen's *The History of Canada from Its First Discovery to the Present Time* (1855). Unlike Garneau, McMullen stressed the "positive" implications of the DURHAM REPORT of 1839: the necessity and goodness of material progress, commercial expansion, British parliamentary institutions and colonial self-government. In this view Canada West (Ontario) was seen as both harbinger and guardian of such virtues; other regions were shunted to the periphery, regarded (as with Québec) either as impedimenta or (as with the West) as soil for possible Ontario-based expansion. The Maritime colonies were largely ignored.

The progress of Ontario in the latter 19th century lent an aura of legitimacy to this central-Canadian view. CONFEDERATION in 1867 helped forge an equation of Ontario's past with the nation's past. Historical writing in Ontario, obsessed with material progress, preservation of the British connection and the achievement of RESPONSIBLE GOVERNMENT, remained promotional, but now was cast in the language of national destiny. By the mid-1880s journalist John Charles DENT had produced 2 major paeans to progress through political moderation: *The Last Forty Years* (1881) and *The Story of the Upper Canadian Rebellion* (1885). In the next decade another dedicated amateur, engineer William Kingsford, produced the massive 10-volume *History of Canada* (1887-98), stressing the growth of local self-government out of the structures of imperial authority. At the end of the century the writing of Canadian history still remained largely the preserve of literary enthusiasts such as William KIRBY (*The Golden Dog*, 1877), Charles MAIR (*Tecumseh, A Drama*, 1886) and Charles G.D. ROBERTS (*History of Canada*, 1897).

Overlapping with this romantic approach to historical writing, however, was the growth of institutions that provided for gradual professionalization. This resulted ultimately in a profound shift from an emphasis on literary skill to an emphasis on professional discipline. In 1882 the formation of the Royal Society of Canada gave members their first national outlet for reading and publishing scholarly papers for an audience of peers. A second source of professionalization was the rapid expansion of English Canadian university curricula between 1880 and 1920. In 1880 McGill University Principal J.W. DAWSON could write that an educated man could gain a general knowledge of history "in an easy and delightful manner by his own reading." A specialized approach, it was thought, could be made simply by gaining a more thorough acquaintance with language and literature, not necessarily with historical documents. But by 1900 the study of history had achieved independence from classics, English literature and political economy, with which it had earlier been associated. By the 1890s chairs of Canadian history existed at U of Toronto and Queen's U, and the subject was also taught by professors of history elsewhere, including U of Manitoba and Dalhousie U. By then, too, the historical romances of American historian Francis Parkman (eg, *Montcalm and Wolfe*, 2 vols, 1884) and the historical criticism of Goldwin SMITH (*Canada and the Canadian Question*, 1891) had shown that Canada's history was not necessarily parochial or lacking in significance. At U of T, George Wrong combined moralistic narrative with a serious attempt to examine original sources, especially in *A Canadian Manor and its Seigneurs* (1908). George Bryce at Manitoba did likewise in his *Remarkable History of the Hudson's Bay Company* (1900).

Perhaps as important were the continuous efforts made by Wrong and Bryce to divorce the writing of history from mere antiquarianism. Bryce was active in the Historical and Scientific Society of Manitoba (fd 1879), and by 1897 Wrong had founded the *Review of Historical Publications Relating to Canada* at U of T. The energies of both men were directed at introducing principles of historical criticism into Canadian historiography. Kingsford's approach was now deemed fundamentally inadequate because of its weak citation of archival sources and its insubstantial interpretive perspective. With the creation in 1872 of the Public Archives of Canada under Douglas Brymner, there was increasingly little excuse for failing to consult basic manuscript and public records. The new preoccupation with empirical verification was also expressed in the writings of Adam Shortt, who

taught Canadian history at Queen's from the early 1890s to 1907. First in a series of studies of Canadian economic and financial institutions, and later in CANADA AND ITS PROVINCES (23 vols, 1913-17) which he conceived and edited with Arthur DOUGHTY, Brymner's successor as Dominion Archivist, Shortt refused to engage in the nationalistic moralizing which was characteristic of Bryce and Wrong. Moreover, *Canada and Its Provinces*, focusing on the growth of Canada as a nation-state, nevertheless remained sensitive to regional distinctiveness and "provincial history." Like the idealist philosophers under whom he had studied while a student at Queen's, Shortt sought to reconcile multiplicity and unity while undermining the significance of neither.

The new academic historians' commitment to empirical verification and "objective" judgment in the first 2 decades of the 20th century did not, however, mean the death of the earlier literary and romantic approach. Instead, "men of letters" turned to BIOGRAPHY, greatly aided by the decision of Toronto publisher George Morang to create a multi-volume biographical series to chronicle the lives of the "Makers of Canada." The 20 volumes published 1904-09, written by academics and laymen, marked the apogee of Carlylean hero worship and whiggish progressivism. All subjects were, in some manner, Canada's "Founding Fathers," usually in politics. They were portrayed as "makers" of Canada's national and independent future, not as contributors to its colonial past. Egerton RYERSON was therefore suitable for inclusion; Bishop John STRACHAN was not. Nor was serious criticism of these "makers" to be brooked. When William Dawson LESUEUR, an editor of the series, submitted a manuscript on William Lyon MACKENZIE that was critical of the rebel, his volume was unceremoniously rejected. It was 71 years before this first "modern" Canadian historical biography was published as *William Lyon Mackenzie: A Reinterpretation* (1979).

In spite of the broad emotional appeal of the Makers of Canada series, by 1920 biographical history as represented by the series no longer represented the work being done by the historical profession, increasingly trained at British and American graduate schools. In 1922 the CANADIAN HISTORICAL ASSOCIATION was founded, its publishing vehicle the *Canadian Historical Review* (which supplanted Wrong's *Review of Historical Publications*). English Canadians had emerged from WWI with a new sense of psychological distance from the British Empire. An emotional attachment still existed, but there was a sense that soon Canada must declare full independence, except in allegiance to the British monarch. The relationship between empire and nation was to preoccupy the next generation and more of English Canadian professional historians. As a consequence, the interwar years witnessed the publication of several major attempts at understanding Canada's complex international status. Most notable among these were W.P.M. Kennedy's *The Constitution of Canada* (1922) and Chester Martin's *Empire and Commonwealth* (1929).

One legacy of the Great War had been an increase in autonomist forms of nationalism and an acceptance of the US as a genuine world power. Accordingly, some historians began to study Canadian-American relations. Young Canadian historians such as Arthur Lower and F.H. UNDERHILL, influenced by American progressive historians such as Frederick Jackson Turner and Charles A. Beard, began to stress common geographical, political and economic attributes of 2 nations sharing a continent. This view gained further legitimacy from the growing interdependence of the Canadian and US economies and cultures. Books internationalist in scope and comparative in structure began to appear, most notably by John Bartlet BREBNER: *New England's Outpost* (1927), *The Explorers of North America, 1492-1806* (1933) and *The Neutral Yankees of Nova Scotia* (1937). The search for continental links found popular expression in journalist J.W. DAFOE's series of essays, *Canada: An American Nation* (1935). Increasingly, the categories of American historical analysis were used to give new meaning to Canada's past. This tendency increased as American scholars turned to the study of American-Canadian relations. One massive expression of this CONTINENTALISM was the Carnegie series on Canadian-American relations, 25 volumes by scholars from both countries under the editorship of James T. Shotwell and published 1936-45. In 1945 appeared Brebner's summary volume for the series: *North Atlantic Triangle*.

English Canadian historical scholarship between the wars was dominated by a concern for establishing the environmental determinants of Canadian history. Underhill, for example, stressed north-south political and economic continental links much as had his intellectual mentor, Goldwin Smith. A different form of environmental determinism was set forth by U of T political economist Harold INNIS. In a series of comprehensive studies of Canadian economic history (especially *The Fur Trade in Canada*, 1930) Innis gradually articulated what came to be known as the STAPLE THESIS. This complex argument, made with great attention to historical detail, stressed that the fundamental material and economic determinants of Canadian history were ones that linked the hinterland economy of Canada to the metropolitan centres of Europe, particularly Britain (*see* METROPOLITAN HINTERLAND THESIS). The reciprocal relationship between the exploitation of Canadian products and the demands of Europe forged a transatlantic east-west economic axis that transcended north-south continental imperatives. Other aspects of historical development, such as cultural, political and urban growth, were in his view of secondary importance.

Innis's interpretation provided an important means for Canadian historians dissatisfied with continentalist views to remain environmentalists while stressing European, especially British, economic and cultural ties. This was particularly true of Donald CREIGHTON, whose *The* COMMERCIAL EMPIRE OF THE ST. LAWRENCE appeared in 1937. This seminal book owed much to Innis's focus on the transatlantic nature of staple development, but concentrated on the centrality of the ST LAWRENCE RIVER system and the colonial merchants who, after the Conquest, shaped a transcontinental economy. Thus was born the LAURENTIAN THESIS, the dominant interpretation of Canadian history until the 1960s. Creighton himself expanded upon it, most notably in his magisterial biography, *John A. Macdonald* (2 vols, 1952-55), in which Macdonald became the personification of national will, and his great achievement, the construction of the CANADIAN PACIFIC RAILWAY, marked the transcontinental extension of the empire of the St Lawrence to the Pacific in the age of industry. Much of Creighton's great appeal in the 1940s and 50s was due to the fusion in his works of previously differentiated characteristics in Canadian historiography, especially heroic initiative and will with social and economic factors, "character" with "circumstance."

The effect of Creighton on his generation was profound. His *Dominion of the North* (1944), *Canada's First Century* (1970) and other works kept the Laurentian thesis at the forefront of interpretations of nation-building in Canada, and his biography of Macdonald helped rehabilitate biography as a genre of history. Other scholars produced major studies of neglected figures, most notably J.M.S. Careless (*Brown of the Globe*, 2 vols, 1959-63) and Roger Graham (*Arthur Meighen*, 3 vols, 1960-64). By 1960, in fact, political biography had become the dominant form of historical writing in English Canada, in part because of the extraordinary literary power of Creighton's *Macdonald* and in part because of the post-1945 generation's reaction to the rigidities and restrictiveness of economic determinism in the social sciences. At mid-century, the practice of Canadian history was still very much part of the humanist's domain.

The "Laurentian school" was not without its critics, most notably W.L. MORTON, whose 1946 essay "Clio in Canada: the Interpretation of Canadian History" had been a major indictment of the hegemonic and exploitative implications of Laurentianism for regions other than central Canada. In his own writings, including *The Progressive Party in Canada* (1950) and *Manitoba* (1957), Morton had made major contributions to the history of a region neglected (except in its role as hinterland) by Laurentian historians, just as G.F.G. STANLEY had done earlier in *The Birth of Western Canada* (1936). But in the 1960s the assumptions of the Laurentian school began to be codified for a new generation in the Canadian Centenary Series, a projected 18-volume comprehensive history of Canada edited by Morton and Creighton. By 1984 most volumes in the series (now expanded to 20) had been published.

The exponential growth of Canadian universities, especially graduate schools, in the 1960s and early 1970s fundamentally altered the direction of Canadian historiography. More scholars produced many more books and articles reflecting increasingly divergent areas of specialization and methodologies. The financial support of the CANADA COUNCIL (and later the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL) greatly facilitated scholarly research, writing and publication. Graduates from "regional" universities were less enamoured with the Ontario-centered "Laurentian" approach than the earlier generation had been, and, reflecting a growing division of labour within the profession, they turned increasingly to studies of urban, ethnic, working-class and feminist historiography, often within regional settings. International scholarship, especially the New Social History of the 1960s, markedly influenced such scholars, and major works were often set within a framework critical of capitalist social and economic relations. Specialized journals, such as *Acadiensis*, *B.C. Studies*, *Labour/Le Travailleur* and *Urban History Review/Revue d'histoire urbaine*, met with an enthusiastic response from the scholarly community, challenging the profession to extend the conventional boundaries of historical investigation. By the late 1970s the earlier attempts at a "national synthesis" had become the subject of much criticism for their failures to account for forms of regional distinctiveness and their singular emphasis upon members of the English and French middle class and their political representatives. Carl Berger's study of the national historians, *The Writing of Canadian History* (1976), was an eloquent capstone to this earlier historiography. Most of the energies of the generation of historians writing in the 1970s and 1980s went in completely new directions. *See* INTELLECTUAL HISTORY.

A.B. MCKILLOP

History Since Confederation The years from 1867 to 1919 were the formative period for the transcontinental nation-state and its maturing economy. A dependent colonial existence gave way to a semiautonomous nationhood rooted in dynamic growth at home and then manifested in impressive wartime achievements. Yet the rapid growth also brought urban slums, rising labour discontent and social disharmony, as well as an acceleration of linguistic, ethnic and religious divisions. And the military glory of WWI came at a heavy price in blood and national division.

The new state of 1867 — 4 provinces on the Atlantic and along the Laurentian Basin — expanded extraordinarily in less than a decade to stretch from sea to sea. RUPERT'S LAND, from Ontario to the Rockies and N to the Arctic, was purchased from the HUDSON'S BAY COMPANY in 1869-70. From it were carved Manitoba and the North-West Territories in 1870. A year later, British Columbia on the Pacific entered CONFEDERATION on the promise of a transcontinental railway. Prince Edward Island was added in 1873. In 1905, after mass immigration at the turn of the century began to fill the vast PRAIRIE WEST, Alberta and Saskatchewan won provincial status (*see* TERRITORIAL EVOLUTION).

Under the leadership of the first federal prime minister, Sir John A. MACDONALD, and his chief Québec colleague, Sir George-Étienne CARTIER, the CONSERVATIVE PARTY — almost permanently in office until 1896 — committed itself to the expansionist NATIONAL POLICY. It showered the Canadian Pacific Railway with cash and land grants, achieving the CPR's completion in 1885. The government erected a high, protective customs-tariff wall to shield developing Canadian industrialism from foreign, especially American, competition. The third objective, mass settlement of the West, largely eluded them, but success came under their LIBERAL successors after 1896. Throughout this period there were detractors who resented the CPR's monopoly or felt, as did many westerners, that the high tariff principally benefited central Canada. On the other hand, the tariff had strong support in some parts of the Maritimes.

The earliest post-Confederation years saw the flowering of 2 significant movements of intense emotional NATIONALISM. In English Canada the very majesty of the great land, the ambitions and idealism of the educated young and an understanding that absorption by the US threatened a too-timid Canada, spurred the growth of the Anglo-Protestant CANADA FIRST movement in literature and politics. Existing political parties, however, were quick to strangle potential competition, and the materialistic ethos of the age largely overrode idealistic reformism. There was also an incompleteness about the Canada Firsters' confusing, nationalist-imperialist vision of grandeur for their country: their vision did not admit of the distinctiveness of the French, Roman Catholic culture that was a part of the nation's makeup (*see* IMPERIALISM).

Their counterparts in Québec, the ULTRAMONTANES, believed in papal supremacy, in the Roman Catholic Church and in the clerical domination of society. Their movement had its roots in the European counterrevolution of the mid-19th century, and it found fertile soil in a French Canada resentful at reconquest by the British after the abortive REBELLIONS OF 1837-38 and distrustful of N American secular democracy. The coming of RESPONSIBLE GOVERNMENT in the PROVINCE OF CANADA by 1850 and of federalism in the new Confederation encouraged these clericalist zealots to try to "purify" Québec politics and society on conservative Catholic lines. The bulwark of Catholicism and of Canadien distinctiveness was to be the French language. Confederation was a necessary evil, the least objectionable non-Catholic association for their cultural nation. Separatism was dismissed as unthinkable and impractical, in the face of the threats posed by American secularism and materialism. But a pan-Canadian national vision was no part of their view of the future.

These 2 extreme, antithetical views of Canada could coexist so long as the English-speaking and French-speaking populations remained separate and little social or economic interchange was required. But as the peopling of border and frontier areas in Ontario and the West continued, and as the industrialization of Québec accelerated, conflicts multiplied. The harsh



Federal government poster promoting western Canada, "The New Eldorado" (*courtesy Public Archives of Canada/ C-85854*).

ultramontane attacks on rouge radicalism, liberal Catholicism and freedom of thought in Québec alarmed Protestant opinion in English Canada, while the lack of toleration of Catholic minority school rights and of the French language outside Québec infuriated the Québecois (*see* MANITOBA SCHOOLS QUESTION). Increasing social and economic domination of Québec by anglophone Canadians exacerbated the feeling.

Economic growth was slow at first and varied widely from region to region. Industrial development steadily benefited southern Ontario, the upper St Lawrence Valley and parts of the Maritimes. But rural Ontario W of Toronto and most of backcountry Québec steadily lost population as modern farming techniques, soil depletion and steep increases in American agricultural tariffs permitted fewer farmers to make their living on the land. Emigration from the Maritimes was prompted by a decline of the traditional FOREST and SHIPBUILDING industries, among other factors. Nationwide, from the 1870s through the 1890s, 1.5 million Canadians left the country, mostly for the US (*see* POPULATION).

Fortunately, prosperous times came at last, with a rising tide of IMMIGRATION — from just over 50 000 in 1901 to 8 times that figure 12 years later. A country of 4.8 million in 1891 swelled to 7.2 million in 1911. The prairie "wheat boom" was a major component of the national success. Wheat production shot up from 8 million bushels in 1896 to 231 million bushels in 1911. Prairie population rose as dramatically, necessitating the creation of the provinces of Alberta and Saskatchewan in 1905 and the completion of 2 new cross-Canada railways — the GRAND TRUNK PACIFIC and the CANADIAN NORTHERN. Western cities, especially Winnipeg and Vancouver, experienced breakaway expansion as entrepôts. Nearly 30% of the new immigration went to Ontario, with Toronto taking the lion's share for its factories, stockyards, stores and construction gangs. Both Toronto and Montréal more than doubled their population in the 20 years before 1914.

As Canada increasingly became an urban and industrial mass society, the self-help and family-related social-assistance practices of earlier times were outmoded. The vigorous SOCIAL GOSPEL movement among Protestants and the multiplication of social-assistance activities by Roman Catholic orders and agencies constituted impressive responses, however inadequate. Governments, especially at the provincial level, expanded their roles in education, labour and welfare. An increasingly significant presence in social reform work was that of women, who also began to exert pressure for the vote.

Through the new immigration, Canada was becoming a multicultural society, at least in the West and in the major, growing industrial cities. Roughly one-third of the immigrants came from non-English-speaking Europe. Ukrainians, Poles, Russian Jews, Germans, Italians, Dutch and Scandinavians were the principal groups. In BC there were small but increasing populations of Chinese, Japanese and East Indians. There were growing signs of uneasiness among both English and French Canadians about the presence of so many "strangers," but the old social makeup of Canada had been altered forever.

There was a reduction in the extent of territories controlled by NATIVE PEOPLES and in their degree of self-determination. In the Arctic the Inuit remained largely undisturbed, but most western Indians and Métis lost their way of life as white settlement encroached on much of their hunting lands. In 1869-70 in the Red River region and in 1885 at Batoche in the Saskatchewan country there were unsuccessful armed Métis rebellions led by Louis RIEL (*see* RED RIVER REBELLION; NORTH-WEST REBELLION). During the second rising some Indians were directly involved. Otherwise the "pacification" of the West was generally peaceful, by purchase in exchange for treaty and reservation rights for the Indians, and through land grants to the Métis. Order was kept by the NORTH-WEST MOUNTED POLICE.

In 1896 the prime ministership of Canada passed to the Québecois Liberal Roman Catholic Sir Wilfrid LAURIER. He presided over the greatest prosperity Canadians had yet seen, but his 15 years of power were bedeviled and then ended by difficult problems in Canada's relationships with Britain and the US. During Laurier's tenure as prime minister, Britain's interest in a united and powerful empire intensified. Many English Canadians joined pan-Britannic emotion to Canadian nationalist ambition to call for an enlarged imperial role for Canada. They forced the Laurier government to send troops to aid Britain in the SOUTH AFRICAN WAR, 1899-1902, and to begin a Canadian navy in 1910. In the same spirit came a massive Canadian contribution of men and money to the British cause in WWI.

By then the Laurier administration had been defeated, in part because too many English Canadian imperialists thought it was "not British enough," and because the growing *nationaliste* movement in Québec, led by Henri BOURASSA, was sure that it was "too British" and would involve young Québec boys in foreign wars of no particular concern to Canada. But the chief cause of Laurier's defeat in the general election of 1911 was his proposed RECIPROCITY trade agreement with the US, which would have led to the reciprocal removal or lowering of duties on the so-called "natural" products of farms, forests and fisheries. The captains of Canadian finance, manufacturing and transport excited the naturally strong Canadian suspicions of American economic intentions and, with their support, the Conservative opposition under Robert BORDEN convinced the electorate that Canada's separate national economy and imperial trading possibilities were about to be thrown away for economic, and possibly political, absorption by the US.

The new Borden government faced the terrible decisions and divisions of WORLD WAR I. There was extraordinary voluntary participation on land, at sea and in the air by Canadians (*see* WARTIME HOME FRONT). But in 1917 the country was split severely over the question of CONSCRIPTION, or compulsory military service. The

question arose as a result of a severe shortage of Allied manpower on the Western Front in Europe. The subsequent election of a pro-conscription UNION GOVERNMENT of English Canadian Liberals and Conservatives under Borden, over Laurier's Liberal anticonscriptionist rump with its support drawn largely from French Canadians, non-British immigrants and radical labour elements, dramatized the national split.

Yet the war also had a positive impact on Canada. Industrial productivity and efficiency had been stimulated. A new international status — as a separate signatory to the TREATY OF VERSAILLES and as a charter member of the new LEAGUE OF NATIONS — had been won. And the place of women in Canadian life had been upgraded dramatically. They had received the vote federally, primarily for partisan political reasons. But their stellar war service, often in difficult and dirty jobs hitherto thought unfeminine, had won them a measure of respect; they had also gained a taste for fuller participation in the work world. Canadian men and women, on a much broadened social scale, had been drawn into the mainstream of a Western consumer civilization.

Yet the attempted shift to a peacetime economy was soon clouded by high INFLATION and UNEMPLOYMENT, as well as disastrously low world grain prices. Labour unrest increased radically, farmer protests toppled governments in the West and Ontario, and the economy of the Maritimes collapsed. Resentment over conscription remained intense in Québec. The early national period of Canadian innocence was over.

RICHARD T. CLIPPINGDALE

The Interwar Years

Canada's population between the world wars rose from 8 to 11 million; the urban population increased at a more rapid rate from 4 to 6 million. WWI created expectations for a brave new Canada, but peace brought disillusionment and social unrest. Enlistment in the ARMED FORCES and the expansion of the munitions industry had created a manpower shortage during the war, which in turn had facilitated collective bargaining by industrial workers. There had been no dearth of grievances about wages or working conditions, but the demands of patriotism had usually restrained the militant. Trade-union membership grew from a low of 143 000 in 1915 to a high of 379 000 in 1919, and with the end of the war the demands for social justice were no longer held in check. Even unorganized workers expected peace to bring them substantial economic benefits.

Employers had a different perspective. Munitions contracts were abruptly cancelled and factories had to retool for domestic production. The returning veterans added to the disruption by flooding the LABOUR MARKET. Some entrepreneurs and some political leaders were also disturbed by the implications of the 1917 Russian Revolution and were quick to interpret labour demands, especially when couched in militant terms, as a threat to the established order. The result was the bitterest industrial strife in Canadian history. In 1919, with a labour force of some 3 million, almost 4 million working days were lost because of STRIKES AND LOCKOUTS. The best-known of that year, the WINNIPEG GENERAL STRIKE, has a symbolic significance: it began as a strike by construction unions for union recognition and higher wages, but quickly broadened to a sympathy strike by organized and unorganized workers in the city. Businessmen and politicians at all levels of government feared a revolution. Ten strike leaders were arrested and a demonstration was broken up by mounted policemen. After 5 weeks the strikers accepted a token settlement, but the strike was effectively broken.

Industrial strife continued, with average annual losses of a million working days until the mid-1920s. By then the postwar recession had been reversed and wages and employment levels were at record highs for the rest of the decade. Some labour militants turned from the economic to the political sphere; some labour candidates were successful early in the decade in provincial elections in Nova Scotia, Ontario and the 4 western provinces, and J.S. WOODSWORTH was elected in N Winnipeg in the 1921 federal election.

The war also left a heritage of grievances in RURAL SOCIETY. Rural depopulation had accelerated during the war, but the farmers' frustration was directed against the UNION GOVERNMENT of Sir Robert Borden, which had first promised exemptions and then conscripted farm workers. A sudden drop in prices for farm produce increased their bitterness. In postwar provincial elections, farmers' parties formed governments in Ontario, Manitoba and Alberta, and in the federal election of 1921, won by W.L.M. KING's Liberals, the PROGRESSIVE PARTY won an astonishing 65 seats on a platform of lower tariffs, lower freight rates and government marketing of farm products.

These social protests declined by the end of the decade. Industrial expansion, financed largely by American investment, provided work in the AUTOMOTIVE INDUSTRY, in PULP AND PAPER and in MINING. Farm incomes rose after the postwar recession, reaching a high of over $1 billion in 1927. The political system also offered some accommodation. Most provincial governments introduced MINIMUM WAGES shortly after the war, and the federal government reduced tariffs and freight rates and introduced OLD-AGE PENSIONS. By the end of the decade the impetus for social change had dissipated. Even wartime PROHIBITION experiments had given way to the lucrative selling of liquor by provincial boards.

The GREAT DEPRESSION of the 1930s followed. For wheat farmers it began in 1930 when the price of wheat dropped below $1 a bushel. Three years later it was down to about 40 cents and the price of other farm products had dropped as precipitously. Prairie farmers were the hardest hit because they relied on cash crops, and because the depressed prices happened to coincide with a cyclical period of drought, which meant crop failures and a lack of feed for livestock. Cash income for prairie farmers dropped from a high of $620 million in 1928 to a low of $177 million in 1931 and did not reach $300 million until 1939. Disaster also struck those industrial workers who lost their jobs. UNEMPLOYMENT statistics are not reliable partly because there was no unemployment insurance and so no bookkeeping records, but it is estimated that unemployment rose from 3% of the labour force in 1929 to 20% in 1933. It was still 11% by the end of the decade. Even these figures are misleading: the labour force included only those who were employed or looking for work, excluding most women. Those who were identified as unemployed were often the only breadwinners in the family.

Voters turned to governments for an economic security that the economic system could not provide. Most governments were slow or unable to respond and were replaced by others at the first opportunity. King's Liberals, elected in 1926 after a brief period of Conservative rule, were again rejected in 1930, this time in favour of a Conservative government under R.B. BENNETT. New political parties contested the 1935 federal election — the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), SOCIAL CREDIT and the short-lived RECONSTRUCTION PARTY — with promises to regulate credit and business. Even Conservative leader Bennett promised improvements (*see* BENNETT'S NEW DEAL), and Mackenzie King and the Liberals, who won the election, spoke vaguely of reform. At the provincial level, the UNION NATIONALE was elected in Québec under Maurice DUPLESSIS and Social Credit in Alberta under William ABERHART, with the older parties in other provinces often turning to new and more dynamic leaders who promised active intervention on behalf of the less privileged.

Governments tried to provide emergency relief, but they too soon needed help. Prairie farmers needed relief in the form of food, fuel and clothing, but they also needed money for seed grain, livestock forage and machinery repairs. Neither municipal nor provincial governments could meet these demands for assistance; in the drought year of 1937 almost two-thirds of Saskatchewan's population required some relief. Other provinces had declining revenues but were not as close to bankruptcy, with the possible exception of Alberta. Inevitably, as the Depression continued, the federal government had to contribute to relief costs.

The role of governments changed, but not dramatically. Most governments would have preferred to provide jobs by undertaking major public-works projects, but with declining revenues and limited credit the cost of materials and equipment was prohibitive. Direct relief was cheaper in the short run. Governments did become more involved in the regulation of business: mortgages and interest payments were scaled down by legislation, and new regulatory institutions such as the BANK OF CANADA and the CANADIAN WHEAT BOARD were established. The major expansion of the bureaucracy, however, would come only after the outbreak of WORLD WAR II in 1939. Trade-union activity revived with the beginning of industrial recovery: by 1937 trade-union membership was back to the 1919 level. Canadian auto workers and miners followed the American lead and formed INDUSTRIAL UNIONS. Their effectiveness was limited by the opposition of Mitchell HEPBURN in Ontario and Duplessis in Québec, and the significant gains, once again, would come only during the war.

In the years between the wars, 2 machines may have done more than the BUSINESS CYCLE to alter the Canadian way of life: the automobile and the radio. The 1920s were the decade of the automobile; in 1919 there was one car in Canada for every 40 Canadians and 10 years later it was one car for every 10. The car created Canadian suburbs and altered the social patterns of the young. In the 1930s it was the radio: there were half a million receiving sets in 1930 and over a million by 1939, bringing news and entertainment into most Canadian homes. The changes brought about by mass production and popular entertainment posed problems for Canadian identity. The tariff (*see* PROTECTIONISM) provided Canadian jobs by ensuring that cars and radios would be assembled in Canada. There was little concern at the time for this expansion of a branch-plant pattern, but there was concern for the BROADCASTING of American programs by Canadian radio stations. The result was the CANADIAN BROADCASTING CORPORATION, with French and English networks broadcasting a combination of Canadian and popular American programs. In one way or another, by 1939 Canadians looked to governments to provide cautious assistance to maintain a Canadian way of life.

H. BLAIR NEATBY

History Since 1945

Canada's political landscape had been fundamentally changed by WWI. During WWII many Canadians predicted another transformation. In 1943 the CCF, a product of 1930s political discontent, stood highest in new public opinion polls. It became the official opposition in Ontario in 1943 and in 1944 won decisively in Saskatchewan. In Québec, Maurice Duplessis's Union Nationale recaptured power. Federally, Québec's BLOC POPULAIRE retaliated against conscription in 1944. Once again it seemed that

the Canadian party system would become a casualty of a European war.

In the federal election of 11 June 1945, held while thousands of veterans were just beginning to come home, Canadians returned the LIBERAL PARTY to office. Mackenzie King's majority was very small, but his survival is nevertheless remarkable: among Allied wartime leaders, only Stalin and he led through both the war and the peacemaking. In 1945 the Liberals added a new commitment to social welfare and Keynesian management of the economy (*see* KEYNESIAN ECONOMICS). Liberal welfare policies — not least among them the FAMILY ALLOWANCE, begun in 1945, and UNEMPLOYMENT INSURANCE, begun in 1940 — attracted many workers and farmers, and rebuffed the challenges from the CCF on the left and the Conservatives on the right. Although the national Liberals continued to enjoy some support in all regions and from all economic groups, CCF and Social Credit held, respectively, Saskatchewan and Alberta throughout the 1950s and into the 1960s, and Social Credit governed BC from 1952 to 1972. Historians have attributed Liberal success to the period's unparalleled prosperity, to consensus on foreign policy arising from COLD WAR fears (few had objected when Canada joined the UNITED NATIONS in 1945 or, 4 years later, signed the North Atlantic Treaty and then sent troops to Europe in 1951), to the nation's need for stability after depression and war, and to a highly competent Cabinet and bureaucracy.

After 1954 these advantages began to disappear. There was a sharp economic slump in 1954, followed by worries that Canada's postwar boom was too dependent upon (mainly American) FOREIGN INVESTMENT. The Cabinet's competency obviously weakened in 1954 when 3 prominent ministers, Douglas Abbott, Lionel CHEVRIER and Brooke CLAXTON, resigned. In 1956 the PIPELINE DEBATE revealed apparent Liberal arrogance and political clumsiness. Western allies divided during the SUEZ CRISIS when France, Britain and Israel attacked Egypt, and the US and Canada did not support them.

On 10 June 1957 the Conservative Party was elected. Probably most significant in explaining the victory is the Conservatives' choice of John DIEFENBAKER as leader. He brought a flamboyance and a populist appeal that his predecessor, George DREW, completely lacked. He was also a western Canadian who understood and shared the area's grievances against Ottawa. Diefenbaker's brief first term saw taxes cut and pensions raised. The new government also took Canada into the NORAD agreement with the US, and 2 years later scrapped the AVRO ARROW interceptor and purchased BOMARC MISSILES, effective only with nuclear warheads. Seeking escape from the confines of a minority government, Diefenbaker called an election for 31 Mar 1958. Although the Liberals had Lester PEARSON as leader, Diefenbaker won 208 of 265 seats on the strength of his charisma, his "vision" of a new Canada and his policy of northern development. His support was well distributed, except in Newfoundland.

No one had predicted the extent of the Conservative triumph, but that did not prevent many commentators at the time forecasting a Conservative dynasty and a return to the 2-party system. Historians and political scientists tend to consider the 1958 election as an aberration that neither reflected nor affected the fundamental character of Canadian politics. Yet closer scrutiny reveals a lasting imprint. Since 1958 Conservatives have commanded western Canadian federal politics, and Liberals have found western seats increasingly difficult to obtain. On the other hand, Conservatives, who won 50 seats in Québec in 1958, by the early 1980s had not yet recovered from Diefenbaker's failure to build upon his victory there.

The CCF and the Liberals began rebuilding almost immediately, the Liberals by appealing to urban Canadians and Francophones, and the CCF by strengthening its links with organized labour. Provincial bases were important in this reconstruction. Social Credit governments in Alberta and, to a much lesser extent, BC assisted the Liberals. Within 5 days in June 1960 the party was elected in Québec and NB. In Québec Jean LESAGE modernized Québec Liberal traditions and introduced the QUIET REVOLUTION. In Saskatchewan the CCF sacrificed most for its federal counterpart. Longtime Saskatchewan Prem Tommy DOUGLAS went to Ottawa to lead the CCF's heir, the NEW DEMOCRATIC PARTY, whose formation was an explicit attempt to create a closer link with the labour movement. Without Douglas, the NDP in Saskatchewan bravely introduced medicare in 1962 and, under the lash of a scare campaign, lost the next election to the Liberals. Medicare, however, proved immensely successful and soon became a popular national program.

By 1962 Diefenbaker's 1958 "vision" of Canada had become a nightmare to some and a joke to others. There had been postwar peaks in unemployment, record budget deficits and, in May 1962, a devaluation of the dollar. But neither Pearson nor Douglas made much impact as leaders before the election of 18 June 1962; the Conservatives stayed in power as a MINORITY GOVERNMENT. By early 1963 the Cabinet began to bicker, members resigned ostensibly on the issue of Canadian defence policy, and finally the government collapsed. In a bitter 1963 election campaign Diefenbaker charged that the US, which had openly criticized his refusal to accept nuclear weapons, was colluding with the Liberals to defeat him. The Liberals brushed off the attack and excoriated Diefenbaker for alleged incompetence. The NDP declared a pox upon all who stayed outside its camp. On 8 Apr 1963 the Liberals won a minority government.

The campaign left its mark on subsequent parliaments. The Pearson government sought to be innovative, and in many ways it was — the armed forces were unified and social welfare was extended; but the foul atmosphere obscured its merits. The party became ever more identified with the "politics of national unity," dedicated to containing Québec's aspirations through "co-operative federalism." The NDP argued that this focus distorted the voters' view of their economic circumstances. The Conservatives held that the Liberal approach to national unity was concerned too much with Québec and too little with problems elsewhere. In reality all parties shared a commitment to reform and to the need to deal with Québec's demands for changes in Canada's federal system. Hence, these years were marked by personality quarrels and numerous political scandals, especially the MUNSINGER AFFAIR. They were also notable for the establishment of the CANADA PENSION PLAN and the signing of the CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT, a treaty intended to give Canada a larger share of the continental auto market. Desperate to escape from the minority straitjacket, Pearson called an election for 8 Nov 1965. He won only 2 more seats, remaining 2 short of a majority. Diefenbaker ran a stirring campaign, picking up strength in Atlantic Canada, and took 46 of the 72 western seats. Regional voting patterns persisted as the Liberals took 56 seats in Québec.

In 1967 the Conservatives replaced Diefenbaker with Nova Scotia Prem Robert STANFIELD. Pearson resigned at the end of 1967, to be succeeded by Pierre TRUDEAU, who largely restored party unity. The choice of Trudeau emphasized the Liberals' commitment to finding a solution to the "Québec problem." Trudeau's vigorous opposition to Québec nationalism (*see* FRENCH CANADIAN NATIONALISM) and to "special status" won support in English Canada, while his promise to make the French fact important in Ottawa appealed to his fellow Francophones. Conservatives and the NDP found difficulty in developing a similarly appealing platform, not least because both lacked support in Québec. In 1968, Québec's place in Confederation and Trudeau's personality dominated federal political debate. This dominance endured almost uninterrupted into the 1980s.

In 1968 Trudeau won a majority, appealing across class lines and even across regional barriers. The Liberals won more seats W of Ontario than since 1953. Trudeau's harsh response to terrorism in Québec during the 1970 OCTOBER CRISIS, the growth of leftist sentiment in the NDP and Conservative leadership bickering strengthened Trudeau's position. However, when he called an election for 30 Oct 1972, the Liberals' position was considerably weaker. Their emphasis on BICULTURALISM angered many English Canadians who feared fundamental changes in their lives and their nation; many were also unhappy with the government's cuts in defence and particularly in the forces dedicated to NATO. The Liberals won only 109 seats, Conservatives 107. The NDP held the balance of power with 31, their highest number to that point. Believing that a Liberal defeat in Parliament would bring a Conservative election victory, NDP leader David LEWIS backed the Liberals. Trudeau took his government towards the left to guarantee NDP support. The Liberals benefited from this political minuet, where the partners pirouetted but never embraced.

In the 1974 election Trudeau's reformist legislation and his opposition to the Conservative policy of WAGE AND PRICE CONTROLS brought many working-class voters to his side, especially in BC and Ontario. The Liberals won 141 seats, the Conservatives 95 and the NDP 16. Political scientists have identified how the 1974 election reflected continuing trends. The regional pattern of support persisted even when economic rather than bicultural issues dominated the campaign. Liberals depend upon Québec to win elections and upon urban Ontario for majorities. Similarly, Conservatives are strongly western oriented in opposition, and they too depend upon Ontario for majorities. New Democrat strength has grown among unskilled workers but dropped among skilled. Their strength lies mainly in the West, but the NDP vote is often only a protest vote in an area where Liberalism is anathema. Nevertheless the NDP percentage of the popular vote has grown, albeit intermittently, since the 1950s. Research indicates that fewer voters remain committed to a single party than was true earlier. Bloc voting is still a characteristic of several ethnic groups and leadership has become much more significant than before. Trudeau's political success is perhaps best explained by the voters' perception that Conservative leaders Robert Stanfield and Joe CLARK were ineffective.

After 1974 Trudeau gave indecisive leadership. Personal problems, weakness in the Cabinet and intractable economic difficulties plagued his government between 1974 and 1979. He surged forward in 1976-77 when René Lévesque's PARTI QUÉBÉCOIS gained power in Québec; the Liberals clearly benefit most when Canadians focus upon their bicultural nature. When Canada did not collapse within 2 years of Lévesque's win, voters began to worry most about slow and unequal economic growth. In May 1979 Clark defeated Trudeau, sweeping English Canada. Although Liberals gained in Québec, Clark was only 4 seats short of a majority.

The Liberal situation seemed more desperate than in 1958. Provincially, especially in the West, they were pathetically weak. Their Québec base might be threatened if an Anglophone re-

placed Trudeau. Moreover, leadership material was thin, and the successor might face internal party acrimony. But Clark remained personally unpopular, and his party, which depended upon support from the resource-rich western provinces, could not develop an economic or energy strategy that satisfied central Canada, where rapidly rising oil prices were unpopular.

In Dec 1979 the government presented a tough budget and lost a subsequent nonconfidence motion, and an election was called for Feb 1980. Cleverly manipulating the Conservatives' internal differences, the Liberals under Trudeau (who had resigned and then returned) regained their majority in an election in which Ontario swung strongly behind the Liberals, whose policies on resource pricing they favoured and the West abhorred. The Liberals won no seat W of Manitoba and only 2 there. Deep regional divisions in Canadian politics resulted from economic strategies marking a fragmented party system, which mirrored a fragmented nation.

After 1980 Trudeau's government followed a nationalist course for a time. The National Energy Program (soon to be modified) offered great incentives to encourage domestic ownership in the PETROLEUM INDUSTRY. There was a more independent direction taken with respect to the US. After Trudeau had been instrumental in crushing Québec SEPARATISM in a 1980 Québec referendum, the Canadian CONSTITUTION, in which was entrenched the CANADIAN CHARTER OF RIGHTS AND FREEDOMS, was "patriated" to Canada. But the prime minister became ever more unpopular as inflation, interest rates and unemployment rose. In 1984 the Liberals paid the price for alienating the electorate. The Conservatives had replaced Clark with a bilingual Quebecker, Brian MULRONEY, in 1983. The Liberals chose John TURNER as Trudeau's successor a year later. Turner quickly called an election. The result was an overwhelming Conservative victory, as the Tory strength in the West endured while the Liberal fortress of Québec crumbled. Mulroney won 211 seats, 58 of them in Québec; the Liberals retained only 40. The fragmentation of the Canadian party system seemed to have ended with the stunning Conservative triumph. Nevertheless, it is not yet clear how enduring this new brand of political cement will be.

See POLITICAL HISTORY; CONSTITUTIONAL HISTORY; ECONOMIC HISTORY; SOCIAL HISTORY; INTELLECTUAL HISTORY; BUSINESS HISTORY; WORKING-CLASS HISTORY; AGRICULTURE HISTORY; EXTERNAL RELATIONS; HISTORIOGRAPHY and various regional articles, such as PRAIRIE WEST and MARITIME PROVINCES. For the pre-Confederation period *see* EXPLORATION; NEW FRANCE; ACADIA; PROVINCE OF QUÉBEC; LOWER CANADA; UPPER CANADA; PROVINCE OF CANADA.

JOHN ENGLISH

Reading: I. Abella, *Nationalism, Communism and Canadian Labour* (1973); D.J. Bercuson, *Fools and Wise Men* (1978); Robert Bothwell et al, *Canada Since 1945* (1981); R.C. Brown and Ramsay Cook, *Canada 1896-1921* (1974); J.M.S. Careless and R.C. Brown, eds, *The Canadians 1867-1967* (1967); Donald Creighton, *Canada's First Century* (1970); R.M. Dawson and H. Blair Neatby, *William Lyon Mackenzie King* (3 vols, 1958-76); M. Horn, ed, *The Dirty Thirties* (1972); W.L. Marr and D.G. Paterson, *Canada: An Economic History* (1980); A.E. Safarian, *The Canadian Economy in the Great Depression* (1959); P.B. Waite, *Canada 1874-1896* (1971).

Hnatyshyn, Ramon John, politician (b at Saskatoon 16 Mar 1934). The son of a senator, Hnatyshyn was educated at U of Sask and worked for the government leader in the Senate, 1958-60. He was called to the Saskatchewan Bar in 1957 and practised law in Saskatoon 1956-58 and 1960-74. Elected a Conservative MP for Saskatoon in the 1974 general election, he was minister of energy in the CLARK government 1979-80. The moderate, well-liked Hnatyshyn was named House leader in 1984 and after the election that year he became government leader in the Commons. NORMAN HILLMER

Hobson, Joseph, civil engineer (b near Guelph, UC 4 Mar 1834; d at Hamilton 19 Dec 1914). Trained in land surveying and engineering, Hobson served as engineer to Waterloo County and then worked on the building of the Grand Trunk Ry. In 1875 he became chief engineer of the GREAT WESTERN RY and then of the GRAND TRUNK RY. His outstanding works included the tunnel under the St Clair R at Sarnia (the first underwater railway tunnel in N America) and the replacement of the superstructure of the Victoria Bridge over the St Lawrence at Montréal, without interrupting traffic. A brilliant engineer, but an unduly modest man, he left no written record of his notable works. R.F. LEGGET

Hobson, Robert, industrialist (b at Berlin [Kitchener], Canada W 13 Aug 1861; d at Hamilton, Ont 25 Feb 1926). Hobson worked first for the Grand Trunk Ry and in 1896 he became secretary-treasurer of the Hamilton Blast Furnace Co. His executive abilities soon brought him to the top of a firm that before his death became Canada's leading steel producer. In 1899 he became general manager of the Hamilton Steel and Iron Co, and in 1910 VP and general manager of the new Steel Co of Canada (STELCO). By 1916 he was president. During these years he presided over a massive expansion and modernization of the corporation's steel plants and helped to build a secure base for it in widely diversified markets. Simultaneously, his personal influence in the larger business community grew enormously, as his directorships in manufacturing, transportation and finance proliferated. By the 1920s he was in the front ranks of Canada's "captains of industry." CRAIG HERON

Hochelaga, native village located at the present site of MONTRÉAL. The arrival of Jacques CARTIER at the village in Oct 1535, where he read the Gospel to the Indians and climbed Mt Royal to survey the new world, has become part of Canadian lore. The local inhabitants were IROQUOIS, who lived in palisaded settlements and engaged in agriculture. They likely numbered about 1500. The French offended the Hochelagans by refusing to participate in a feast prepared in their honour and by their abrupt departure. On Cartier's third voyage, in 1543, he skirted the village and followed a trail to the Lachine Rapids. When the French again returned to the area in 1603, the Hochelagans had vanished. *See* STADACONA. JAMES MARSH

Hockey, Ice Stick and ball games were likely first played on ice in northern England, and British soldiers brought the tradition to Canada early in the 19th century. Variations of the games bandy and shinty were played on ice by British troops garrisoned in Halifax and Kingston in the 1850s, or earlier. The work "hockey" is probably derived from the French *hoquet* ("shepherd's crook"), referring to the shape of the stick, and the nickname "shinny" for informal hockey doubtless comes from the game's origins in shinty. There is evidence that New York Dutch and New Englanders also played a game similar to hockey during colonial times. But these were formless affairs, and ice hockey as we know it was first played in Montréal in 1875, with a set of rules formalized by J.G.A. Creighton, a McGill student. Substitution of a flat, wooden disc (puck) for a ball gave the players more control.

In 1879 the first organized team, the McGill University Hockey Club, was formed, and with the advent of a basic set of rules the sport quickly spread across Canada. The first "world championship" was held in 1883 at the Montréal Ice Carnival and was won by McGill. The first national association, known as the Amateur Hockey Assn of Canada, was formed in 1886, with representatives from Québec City, Montréal and Ottawa. A group of colleges, universities and military and athletic clubs formed the Ontario Hockey Assn in 1890. Gov Gen Lord STANLEY donated a trophy in 1893 for the national championship, and the first STANLEY CUP game was played 22 Mar 1894, with Montreal AAA victorious before a crowd of 5000.

Early hockey was played in rudimentary conditions, mostly outdoors on patches of natural ice, with snowbanks for boards and wooden posts for goals. There were 9 players per side on the ice, and the puck could not be passed forward. The on-side rule and primitive face-off ("bully") were adapted from RUGBY. With speed and rough play the game had immediate attraction, and strong local rivalries developed. The sport spread to US universities, beginning with Yale in 1893. Europe's hockey origins date to Vienna in 1885. Belgium, Bohemia, France, Great Britain and Switzerland formed the International Ice Hockey Federation in 1908 and Germany joined 1909. Winnipeg Falcons won the first international world championship, held at the Winter Olympics, Antwerp, 1920. Toronto Granites overwhelmed all opposition to win the 1924 Winter Olympics and U of T Grads won again for Canada in 1928.

Olympic hockey in the 1920s, when Canadian amateurs were still able to dominate international competition (*courtesy Canada's Sports Hall of Fame*).



The development of hockey in Canada was profoundly changed by the growth and final ascendancy of professionalism. In the prevailing climate, playing for money was considered immoral, but many players accepted money secretly. The first overtly professional league was formed in 1903 with teams from Pittsburgh, Pa; Sault Ste Marie, Ont; and Houghton, Calumet and Sault Ste Marie, Mich. Most of the best players were Canadian; they commanded extravagant salaries, lived nomadically from one season to the next and played for the highest bidder. At one time, Fred "Cyclone" TAYLOR was the highest-paid athlete in N America. The Ontario Professional League, organized for the 1908 season, was the first openly professional league in Canada. The Eastern Canada Hockey Assn turned professional in Nov 1908. The rival National Hockey Assn was formed 1909 and was reorganized 1917 as the NATIONAL HOCKEY LEAGUE. Professional hockey soon required indoor stadiums, artificial ice and large payrolls. Successful teams in smaller centres, such as Renfrew Millionaires, eventually disappeared; the NHL teams were all in larger cities: MONTREAL CANADIENS, Montreal Wanderers, Ottawa Senators, Toronto St Pats and, briefly, Quebec Bulldogs and Hamilton Tigers.

Montreal Maroons entered the NHL in 1924 and the league successfully moved into the lucrative urban market of the US, adding Boston Bruins (1924), New York Americans (1925), Pittsburgh Pirates (1925), New York Rangers (1926), Chicago Black Hawks (1926) and Detroit Cougars (1926). However, almost every one of the players came from Canada. The NHL dominated hockey, monopolized players and controlled salaries and player movement. A few exceptional players were paid up to $10 000 per season, but in the 1920s the average salary had dropped to $900, despite player protests and a threatened strike. After 1945 the controversial C-Form gave NHL teams exclusive control over the future careers of boys from age 15. The sole purpose of amateur junior hockey became the development of players for the NHL — not to win titles, or to represent a community, but to identify individual prospects.

The present form of the sport took shape in the professional leagues, the NHL and the Pacific Coast League. Key innovations were 3 twenty-minute periods (1910), 6 players (1911) and a gradual relaxation of the stricture against the forward pass: allowed between blue lines (1918), within any of the 3 zones (1929-30), across blue lines (1930-31). The red line was added 1943-44. The result was a faster game. Although competition remained keen in smaller centres for the amateur trophies, the Allan Cup and Memorial Cup, the focus remained on the NHL, though the number of teams dwindled to 6, with only TORONTO MAPLE LEAFS and Montreal Canadiens in Canada. The Ottawa Senators dominated the 1920s, with 4 league titles and 4 Stanley Cup victories, but folded in 1934. Some early exploits live on: Joe MALONE scored 7 goals in 1 game in 1920. George HAINSWORTH won the VEZINA TROPHY in its first 3 years. In Mar 1923 Foster HEWITT broadcast a game on radio for the first time. Outstanding players of the era included Frank "King" CLANCY, Charlie CONACHER, Bill COOK, Aurel Joliat, Lester Patrick and Nels STEWART. Howie MORENZ was the flashiest player, and Eddie SHORE the premier defenceman.

The schedule continued to increase, to 48 games in the 1930s and 70 games in 1949-50. The Toronto Maple Leafs, led by Walter "Turk" BRODA, Syl APPS, Ted KENNEDY and Max BENTLEY, were the dominant team of the 1940s, winning the Stanley Cup 6 times in 10 years. But Maurice "Rocket" RICHARD of the Canadiens was clearly the outstanding offensive player, scoring 50 goals in 50 games in 1944-45 — 5 goals and 3 assists in 1 game.

The outstanding team of the early 1950s was Detroit Red Wings, led by Gordie HOWE (who won the scoring championship 5 times and the HART TROPHY 4 times in the decade), Red KELLY, Ted LINDSAY and Terry SAWCHUK. In the mid-1950s the Montreal Canadiens built possibly the most powerful team in NHL history, with Maurice and Henri Richard, Bernie GEOFFRION, Jean BELIVEAU, Jacques PLANTE, Dickie Moore, Doug HARVEY and others. The Canadiens won the Stanley Cup 6 times, including a record 5 straight.

The NHL expanded into 6 American centres in 1967: Los Angeles, Oakland, St Louis, Minnesota, Pittsburgh and Philadelphia. VANCOUVER CANUCKS were added 1969-70, with Buffalo. Toronto won the Stanley Cup 4 more times before expansion, and Montréal began another string. Chicago managed its first Stanley Cup victory in 23 years in 1960-61, led by the brilliant Bobby HULL and Stan MIKITA. Scoring increased in the diluted league, and Phil ESPOSITO of Boston Bruins set new records for goals in a season (77) and points (152), while defenceman Bobby ORR revolutionized his position, becoming the first defenceman to win the scoring championship. The offensive emphasis of the sport was typified in the 1980s by the incredible scoring feats of Wayne GRETZKY.

In 1971 the WORLD HOCKEY ASSN was organized, signing more than 70 players from the NHL, including Bobby Hull. It began with 12 teams and grew to 14 before rising expenses and dwindling crowds reduced it to 7. In 1979 the feud between leagues ended with a merger, as WINNIPEG JETS, EDMONTON OILERS, QUEBEC NORDIQUES and Hartford Whalers were assimilated by the NHL. The competition for players had substantially raised salaries and finally brought NHL teams to more Canadian cities. In 1980 a team was moved from Atlanta, Ga, to become the CALGARY FLAMES. In 1983-84 Edmonton became the first of the ex-WHL teams to win the Stanley Cup, ending a 4-year reign by the New York Islanders.

Canadian dominance of hockey continued into the 1950s, and senior amateur teams were usually good enough to win international competitions. However, hockey spread rapidly in Europe, particularly in the Soviet Union after WWII, and Soviet teams won the world championship in 1954 and the Olympic gold medal at Cortina 1956. From 1963 to 1973, the Soviets won 11 of 12 Olympic and world championships, but Canadians clung to the belief that the Soviets would collapse in competition with professionals. Finally an NHL all-star team met the Soviet "amateurs" in the 1972 CANADA-SOVIET HOCKEY SERIES, perhaps the most dramatic sports event in Canadian history. Canada won 4 games, lost 3 and tied 1, but the myth of Canadian hockey supremacy was shattered. Canada managed to win the Canada Cup, an international competition held every 4 years in which Canada can use professionals, in 1976 and 1984, but the Soviets have mostly dominated encounters with NHL teams. The spread and growing proficiency of hockey in Sweden, Finland, Czechoslovakia and the US is reflected in the increasing number of players from these countries in the NHL.

Hockey is Canada's national game, the chief sports preoccupation of its male youth, and is still intimately woven into its self-image and mythology. It is now one of the world's great sports, played seriously in at least 20 countries. The Soviet style, which emphasizes speed, passing and teamwork, has developed the strongest characteristics of the sport and helped to reinvigorate the Canadian game. JAMES MARSH

Hockey Hall of Fame, founded in 1943, was the result of meetings of the NATIONAL HOCKEY LEAGUE and Canadian Amateur Hockey Assn. The present buildings at Exhibition Place, Toronto, were officially opened in 1961 by PM John G. Diefenbaker and US Ambassador Livingston T. Merchant. A governing committee comprising representatives from the NHL, CAHA, Metro Toronto and the Canadian National Exhibition Assn administers operations, as well as electing builder members. A selection committee, composed of knowledgeable persons from the game and the media, considers player candidates. A maximum of 3 player members may be elected annually, with consideration based on playing ability, integrity, character and contributions to team play and to the game of HOCKEY. Membership at the end of 1983 was 242 — 170 players, 63 builders and 9 referees.

The Hall is open year-round to the public and has outstanding memorabilia: goaltenders' masks and equipment; players' sticks, skates and pucks; major trophy collections (including the STANLEY CUP); hockey art, geography, international sweaters and assorted other items of interest to hockey fans. M.H. REID

Hocquart, Gilles, INTENDANT of NEW FRANCE (b at Mortagne-au-Perche, France 1694; d at Paris 1 Apr 1783). He followed his father into the Marine service and was posted to Rochefort from 1722 until 1729 when he was appointed to New France as financial commissary and acting intendant. He was promoted intendant in 1731. Instructed to expand trade to benefit France while curbing government expenditures, Hocquart was expected to develop the colony's possibilities. To do so he tried to encourage every kind of Canadian undertaking, such as the FORGES SAINT-MAURICE and shipbuilding. He eventually succeeded in getting government funds to assist both endeavours. He also promoted agriculture and to assist trade had roads built between Québec C and Montréal and from the latter to Lk Champlain. By 1740 he could claim considerable success in improving New France's economic situation, but the collapse of the underfinanced Saint-Maurice ironworks, the bad harvests of 1741-43 and war between France and Britain in N America 1744-48 destroyed his attempts to stimulate private economic efforts and caused large deficit crown expenditures. Replaced in Canada by François BIGOT in 1748, Hocquart was intendant at Brest until retiring in 1764. MARY MCDOUGALL MAUDE

Hodgetts, Charles Alfred, physician, public-health official, teacher, administrator (b at Toronto 23 Aug 1859; d at London, Ont 3 Apr 1952). Hodgetts was medical inspector and later secretary and chief officer of the Ontario Provincial Board of Health and medical adviser 1910-20 to the federal Commission of Conservation. An advocate of PUBLIC HEALTH and dispenser of practical medicine, he emphasized prevention of disease. Public-health officials in the late 19th and early 20th centuries were investigating specific diseases and how to control them, and Hodgetts in particular perceived improved housing and town planning to be important. He considered quick treatment in the case of accident or sudden illness essential, and between 1896 and 1910 devoted much of his time to the RED CROSS, being commissioner overseas 1914-18. He worked tirelessly for the St John Ambulance Assn 1910-32 and was chief officer 1921-32. GODFREY L. SPRAGGE

Hodgins, Jack Stanley, novelist, short story writer (b at Comox, BC 3 Oct 1938). His fiction blurs the old distinction between novels and stories which while sometimes experimental retain a love of narrative. *Spit Delaney's Island* (1976), *The Invention of the World* (1977), *The Resurrection of Joseph Bourne* (1979, Gov Gen's Award) and *The Barclay Family Theatre* (1981) all deal with characters (often the same ones from book to book) reconstructed from the author's Vancouver I childhood. In his hands, they are ec-

centric but realistic characters, deployed with stylistic suppleness in life-affirming situations.

Hodgson, George Ritchie, swimmer (b at Montréal, Qué 12 Oct 1893; d there 1 May 1983). Hodgson was Canada's first Olympic swimming champion. He received little formal training as a swimmer but practised summers at his family's cottage in the Laurentians and swam daily in winter at the Montréal Amateur Athletic Assn pool. Representing Canada at the 1911 Festival of the Empire Games, he defeated the world record holder over the 1-mile (1.6 km) distance. At the 1912 Stockholm Olympics he won gold medals in the 400 m freestyle and 1500 m freestyle, setting world records in both. They were not broken until 1924, by the famous American swimmer, John Weissmuller. Hodgson attended McGill and served with distinction in the RAF in WWI. J. THOMAS WEST

Hodgson, Stuart Milton, public administrator, labour leader (b at Vancouver 1 Apr 1924). Hodgson left school in 1940 to work for H.R. MACMILLAN's plywoods division. In 1942 he joined the RCN and was discharged in 1945 after serving on the Murmansk run. Hodgson then returned to the BC lumber industry, joining the International Woodworkers of America in 1946. In 1948 he was elected financial secretary of his local and in 1955 attended the ILO Geneva Conference as the Canadian Congress of Labour delegate. He was appointed to the NWT Council 1964 and served as deputy commissioner 1965-67 and commissioner 1967-79. For his service he was presented the public service's Outstanding Achievement Award in 1976. Canadian co-chairman of the INTERNATIONAL JOINT COMMISSION 1979-81, he was appointed chairman and chief executive officer of the BC Ferry Corporation in 1981. ROD MORRISON

Hoedeman, Jacobus, "Co," director of animated films (b at Amsterdam, Holland 1 Aug 1940). Trained in photography, Hoedeman made his first animated film 1956. He immigrated to Canada in 1965 and soon joined the NFB. Two years later he directed his first film. While studying in Czechoslovakia in 1971, he learned the technique of animating puppets, an art in which he has since become a master. Later he animated several Inuit legends. In 1977 Hoedeman produced *Le Château de sable,* for which he won an Oscar. He revived the characters from this film in *Le Trésor des Grotocéans* (1980). His latest film is *La Fête* (1983). PIERRE VÉRONNEAU

Hoffman, Abigail, track and field athlete, sport administrator (b at Toronto 11 Feb 1947). As a 9-year-old hockey player, she unwittingly caused controversy by entering a male-dominated sport; she later joined the Toronto Olympic Club, winning her first national championship in the 880-yd (806 m) race at the age of 15. She competed internationally 1962-76 in 4 Olympics, 4 Pan-American Games (2 gold medals) and 2 Commonwealth Games (1 gold). In Ontario, and then as director of Sport Canada (the federal amateur-sport administration), Hoffman is recognized as a campaigner for athletes' rights and women in sport. TED BARRIS

Hoffmeister, Bertram Meryl, soldier, businessman (b at Vancouver 15 May 1907). Hoffmeister commanded the Seaforth Highlanders in Sicily, the 2nd Infantry Brigade at Ortona (1943) and the 5th Canadian Armoured Division, which distinguished itself under his courageous leadership. One of a very few nonregular officers to command a division, he was appointed to take the 6th Division to the Pacific theatre (1945). When the Japanese war ended, Hoffmeister resumed his career in the BC forest industry and was president and chairman of MACMILLAN BLOEDEL LTD, BC's agent general in London and president of the Council of Forest Industries of BC. W.J. MCANDREW

Hog Farming Swine (family Suidae) were first brought to what is now Canada in 1598 by the Marquis de La Roche-Mesgouez as part of his unsuccessful venture on SABLE ISLAND. Apart from wild game, pork was the most popular meat of early settlers. It could be preserved in heavy brine and was available as a meat source during the long winters. Today, there are over 10 million hogs on Canadian farms (about 45 million in the US and 300 million in People's Republic of China). The terms "pig," "swine" and "hog" are generally interchangeable, although some farmers reserve "hog" to refer specifically to swine raised for market.

In 1983 just over 13 million hogs were sent to market, 3% more than in 1982. In 1983 marketed hogs yielded about $1.7 billion in farm cash receipts, about 9% of the national total. The hog industry is more important in some provinces than others: in 1983 it provided 22% of agricultural income in Québec, 2% in Saskatchewan. In that year, BC produced 2% of the national total; Alta, 11.8%; Sask, 4.3%; Man, 9.0%; Ont, 32.4%; Qué, 33.7%; NB, 1.0%; NS, 1.3%; PEI, 1.2%. There are approximately 50 000 hog producers in Canada. Hog farms vary from large, specialized operations, which market several thousand hogs annually, to small mixed farms marketing 100 hogs or less. There are 5 main swine breeds in Canada. Cross-breeding programs are recommended because they result in larger litters of more vigorous pigs, and yield market animals that grow faster and more efficiently.

Yorkshire Hogs originated in England and are all white with erect ears. The most numerous breed in Canada, it is noted for vigour, prolificacy and efficient feed conversion. Yorkshire sows commonly farrow over 10 pigs per litter.

Landrace Hogs originated in Scandinavia and are noted for prolificacy, good mothering ability and a lean carcass with a high proportion of ham. They are commonly crossed with other breeds, yielding hybrid vigour in the young.

Lacombe Hogs are the first livestock breed developed in Canada, a hybrid of Landrace, Berkshire and Chester White. Developed at the Agriculture Canada RESEARCH STATION Lacombe, Alta, the breed was first licensed in 1957 and is propagated in 24 countries. Hogs are all white with drooping ears and have a slightly heavier bone structure than the Landrace. Rapid growth rate and high lean content characterize progeny of crosses between Lacombe and other breeds.

Duroc Hogs originated in the US, are all red (golden to mahogany), with drooping ears, and have a good carcass and feed efficiency. The Duroc is a hardy breed, noted for large litters.

Hampshire Hogs originated in Kentucky and are black with a white belt around the shoulders. They are exceptionally well muscled, but are somewhat shorter than the Yorkshire and produce smaller litters. When used correctly in a cross-breeding program, Hampshires yield superior carcass quality in offspring.

A breeding sow or boar requires about 1 t of feed annually. The market hog converts feed to gain with an efficiency of about 3:1, ie, more efficiently than beef cattle but less efficiently than broiler chickens. The market animal (100 kg) typically yields about 78 kg of trimmed carcass, following slaughter and evisceration. Carcass quality and price paid to the producer is determined by an index, measured by a government grader, which reflects lean meat yield. Slaughtered animals must be disease free and are inspected by government veterinarians. Canadian pork is produced under a high-standard national Health of Animals program (*see* COMMODITY INSPECTION AND GRADING; FOOD LEGISLATION; VETERINARY MEDICINE). As a result Canada is free of serious livestock diseases (eg, foot-and-mouth disease, swine fever). Since 1937 the industry has had access to a uniform national testing system, the National Record of Performance Swine Testing Program, which provides breeders with a basis for assessing their breeding stock. The Canadian Pork Council (est 1966) represents hog producers. Hog processing provides more jobs than cattle processing, since two-thirds of the meat is sold in processed rather than fresh form. The average Canadian consumed 29 kg of hog meat (pork, bacon, ham, sausages, etc) in 1983. About 158 000 t were available for export.

R. BLAIR

Hogg, Frank Scott astrophysicist (b at Preston, Ont 26 July 1904; d at Richmond Hill, Ont 1 Jan 1951). In 1929 Hogg received the first doctorate in ASTRONOMY awarded by Harvard, where he pioneered in the spectrophotometry of stars and in the study of the spectra of comets. He was assistant editor of the journal of the Royal Astronomical Soc of Canada from 1937. During WWII he developed a 2-star sextant for air navigation. Head of the Department of Astronomy at U of T and director of the David Dunlap Observatory from 1946 until his death, Hogg continued its major research program, a study of the motions of faint stars in the line of sight.

PETER M. MILLMAN

Hogg, Helen Battles, née Sawyer, astronomer (b at Lowell, Mass 1 Aug 1905). She married F.S. HOGG in Sept 1930. She began her research in the field of globular star clusters and their variable stars in graduate school and in 1931 received a doctorate in ASTRONOMY at Radcliffe. She joined the teaching staff of U of T in 1936 and was appointed professor emeritus in 1976. Making use of the major telescopes at Victoria, BC, Tucson, Ariz, and Richmond Hill, Ont, Hogg became a leading world expert in her field of specialization and has received numerous honours, including Companion of the Order of Canada, the Annie J. Cannon Prize of the American Astronomical Society (1949) and the Rittenhouse Silver Medal (1967). Well known for the clarity of her discourses in lectures and on radio or television, Hogg has published numerous scholarly articles and the popular book *The Stars Belong to Everyone* (1976); for 30 years she wrote a weekly column for the Toronto *Star*. In recognition of her contribution to the public's understanding of astronomy, she was the first Canadian to be awarded the Klumpke-Roberts Award (1983). Minor Planet No 2917 has been named Sawyer Hogg. PETER M. MILLMAN



Helen Hogg, a leading world astronomer in the field of star clusters. Minor Planet No 2917 is named Sawyer Hogg for her (*courtesy National Film Board/Photothèque*).

Holgate, Edwin, painter, engraver (b at Allandale, Ont 19 Aug 1892; d at Montréal, Qué 21 May 1977). In 1895 the Holgate family moved to Jamaica where Edwin's father was an engineer. Around 1897 Edwin returned to Toronto to study and in 1901 the Holgates settled in Montréal. Edwin became a part-time student *c*1905 at the Art Assn of Montréal under William BRYMNER and *c*1910 took a summer course with Maurice CULLEN. In 1912, during a trip to Paris, he enrolled in the Grande Chaumière. He also travelled in Ukraine and Japan. He came home

in 1915 and his first exhibition was at the Arts Club of Montréal in 1922. He taught engraving at Montréal's École des beaux-arts 1928-34, and about 1930 was invited to join the GROUP OF SEVEN. He was known primarily as a portraitist and painted an unusual series of female nudes in outdoor settings during the 1930s. In 1935 he was elected associate of the Royal Canadian Academy of Arts. The National Gallery of Canada held a retrospective of his work in 1975-76.
MICHEL CHAMPAGNE

Holiness Churches, a loose family of some 20 Protestant denominations in Canada that are in general biblically conservative if not fundamentalist, Arminian in theology (ie, rejecting CALVINIST predestination and holding out hope of salvation for all), and advocates of austerity and discipline in lifestyle. The term "holiness" derives from a commitment to the individual pursuit of "Christian perfection," also termed "second blessing," "sanctification" or "holiness." This state, whether achieved instantaneously or gradually, comes through the action of God's Spirit following EVANGELICAL conversion. A variety of sources in METHODISM, German pietism and American revivalism help explain a number of secondary differences in belief and practice. Holiness was a central concern of early Methodism in both Britain and the US; and some groups (SALVATION ARMY, Free Methodists and Wesleyan Methodists) stem from schismatic Methodist attempts to recover elements of this tradition. Other bodies originated in revival movements among German-speaking settlers in Pennsylvania. Thus the practices of footwashing and adult baptism by immersion, as well as a tradition of Christian PACIFISM, reflect MENNONITE, Tunker or BAPTIST roots of groups such as BRETHREN IN CHRIST and Church of God.

The holiness revival of the latter half of the 19th century — which gave rise to several groups, notably the Church of the Nazarene — influenced all holiness groups to some degree. Camp meetings and manifestations of religious fervour characteristic of them found renewed vigour when these were falling into disrepute in mainstream Methodism. Like other evangelicals of the period, holiness churches founded BIBLE SCHOOLS that inculcated denominational tradition along with secondary schooling; they established and supported extensive missionary endeavours outside Canada; a number joined in the evangelical crusade for Sunday observance and PROHIBITION. The authority of individual religious experience prompted a larger leadership role for women, and a few of the churches were ordaining women ministers by the beginning of this century. Modern PENTECOSTALISM originated in American holiness circles about 1900; the ensuing controversy over the Pentecostals' belief in a further blessing, "baptism of the Holy Spirit," brought schism in several bodies. This history, as much as theological divergence, explains a continuing holiness reticence towards neo-Pentecostalism, despite obvious similarities in the 2 traditions.

Historically, holiness groups were concentrated in southwestern and eastern Ontario and the Prairie provinces; recent statistics confirm this pattern, although churches are found in all regions of Canada. The movement has been traditionally prone to schism. The period since WWII, however, has seen numerous unions. Today, denominations range in size from a handful of churches to the more than 20 000 adherents to the Brethren in Christ and a similar number to the Free Methodist Church. Educational institutions have undergone upgrading, in keeping with a trend towards a more learned ministry. Distinctive standards of dress and deportment have been significantly attenuated. Holiness teaching now tends to emphasize the concept of growth toward sanctification, at the expense of the notion of instantaneous acquisition. A significant element within several denominations (Missionary Church, Christian and Missionary Alliance and Salvation Army) would question the validity of their classification today as holiness, despite their origins and earlier history.

The following are the most significant members of this family in Canada. Groups German-speaking in origin include Brethren in Christ, formerly Tunkers or River Brethren, who entered Canada 1788; the Church of God (Anderson, Indiana); the Evangelical Association or Evangelical Church and the United Brethren in Christ, which united 1946 to form the Evangelical United Brethren. In 1968 the EUB's Ontario section entered the UNITED CHURCH; the Western Conference remained independent as the Evangelical Church in Canada and, after its 1982 merger with the Evangelical Church of N America, became known simply as the Evangelical Church.

Two Ontario Methodist ministers, Nelson Burns and Ralph Cecil HORNER, actively promoted holiness within their denomination through the organization of autonomous Holiness Associations before their deposition from the Methodist ministry (1894 and 1895 respectively). Through Horner's subsequent work 4 uniquely Canadian bodies came into existence: Holiness Movement Church (1897); Standard Church of America (the result of a 1916 schism in the HMC); the Gospel Workers Church, fd about 1902 by Frank Delaney Goff, a Horner convert; and the Bible Holiness Movement (1949). Among bodies of American origin, the Free Methodist Church and the Church of the Nazarene have enjoyed considerable success since their entry into Canada (1880 and 1908 respectively). In 1958 the Holiness Movement Church merged with the Free Methodist Church. That year most of the Gospel Workers joined the Church of the Nazarene.

Unlike all the foregoing, the Reformed Baptist Alliance, the result in 1888 of holiness schism within the Free Baptist Church, was centered primarily in NB and NS. In 1966 it united with the Wesleyan Methodist Church of America; in 1968 these were joined by the Pilgrim Holiness Church to form the Wesleyan Church. Since 1943 most holiness denominations have been loosely associated in the Canadian Holiness Federation. The Free Methodist and the Wesleyan Churches are also members of the World Methodist Council. R. GERALD HOBBS AND HELEN HOBBS

Reading: S.D. Clark, *Church and Sect in Canada* (1948); Melvin E. Dieter, *The Holiness Revival of the Nineteenth Century* (1980); Charles Edwin Jones, *A Guide to the Study of the Holiness Movement* (1974) and *Perfectionist Persuasion* (1974).

Holland, Samuel Johannes, surveyor, cartographer, military engineer (b at Nijmegan, Netherlands 1728; d at Québec, LC 28 Dec 1801). Holland took part in the sieges of LOUISBOURG (1758) and QUÉBEC (1759) and the BATTLE OF STE-FOY (1760), surveyed PEI and Cape Breton I, and founded a system of township surveys in Lower and Upper Canada. Prior to and during his service in the Dutch and British armies 1745-60, he apparently mastered the skills of an artillery officer, a military engineer, cartographer and surveyor — as well as displaying exemplary courage under fire. In 1764 he was appointed surveyor general of Québec and of the northern district of N America. After 1783, the massive influx of LOYALIST settlers following the American Revolution offered him a new challenge in Québec. Holland's system of rapid surveys to create new townships was effective and imaginative, and has proven accurate. And from his vantage point on Council as surveyor general, he was able to get the colonial legislature to enact professional standards for land surveyors.
F.J. THORPE

Holland Marsh, 2900 ha of organic (muck) soil, is located near Bradford, Ont, 50 km N of Toronto. Draining to the NE by the Holland R (which empties into Cook's Bay, an arm of Lk SIMCOE), the marsh is a flat, level area lying in a shallow basin (oriented in a NE-SW direction) that was an arm of glacial Lk Algonquin. As the lake level dropped and the land rebounded when the glaciers receded, a marsh was formed containing sedges, bullrushes, various marsh grasses and some trees. Dead vegetation accumulated at about 30 cm per 500 years, forming a layer of organic material overlying a clay pan in the basin. In this natural state the marsh and river were home to many species of fish, small animals and birds. The first human use of the marsh was by local Indians (latterly the Huron) as a source of food. Early European settlers (about 1825) also fished and hunted here. Around 1900 the Bradford Mattress Factory used marsh grasses as stuffing for mattresses.

In 1904 W.D. Watson, a Bradford grocer, persuaded W.H. Day, professor of physics at the Ontario Agricultural College, Guelph, to investigate the possibility of draining the marsh. Day tested the soil and experimented successfully in growing vegetables. In 1925 drainage operations began and a canal and dikes 28 km long and 2 m deep were constructed around the marsh to divert the Holland R. Pumps were installed to control the water table within the dikes. The project was completed 1930. In 1931 and 1934, 18 Dutch families came to the marsh and formed the nucleus of an expanding and prosperous agricultural community. After WWII, more immigrants from Holland, Europe and Asia settled here. The marsh today is a market garden for the Ontario and foreign markets, producing carrots and onions in particular, as well as lettuce, potatoes, celery, parsnips, cabbage, cauliflower and beets. There are some greenhouses in which tomatoes, cucumbers and commercial flowers are produced. *See* SWAMP, MARSH AND BOG.
A.M. BLAIR

Holling, Crawford Stanley, "Buzz," ecologist (b at Theresa, NY 6 Dec 1930 of Canadian parents). One of the best-known Canadian forest entomologists, Holling had gained international recognition for his work in systems analysis, especially in relation to the management of natural resources. He was educated at U of T and UBC. He was known to his scientific colleagues for his research in forest entomology with the Canada Dept of Forestry 1952-64 at Sault Ste Marie, and 1965-67 at Victoria, but his public prominence dates from his subsequent work at UBC, where he became professor of zoology in 1967 and was director of the Institute of Animal Resource Ecology 1969-73. Addressing a variety of resource management problems using a workshop technique, Holling and his colleagues developed a worldwide reputation for incisive and perceptive analysis. Their advocacy of "adaptive management policies" has made a significant contribution to understanding resource management problems of the modern world. Holling was director of the International Institute of Applied Systems Analysis in Vienna 1981-84.
PETER LARKIN

Holly, common name for shrub of the holly family, Aquifoliaceae. The true hollies belong to genus *Ilex,* comprising some 400 species worldwide, mostly in Central and S America. Two species occur in Canada. Although well-known for their spiny leaves and red berries, many hollies are nonspiny with black berries. Inkberry (*I. glabra*) has black berries and shiny, evergreen leaves; black alder (*I. verticillata*) has bright red berries and dull green, deciduous leaves. The closely related mountain holly (*Nemopanthus mucronata*) is deciduous and red berried. All 3 inhabit wet woods and swamps in eastern Canada. Numerous cultivars exist, selected for their

ORNAMENTAL qualities (eg, leaf variegation) and compact growth. The name "holly" (from holy) suggests its long association with folklore and religion. The druid ritual of bringing sprigs of the plant indoors to provide winter refuge for woodland spirits continues today at Christmastime. The hard, white wood is used by cabinetmakers. Various parts of the holly plant were used to make a tonic in Europe and N America, and species like *I. paraguariensis* (yerba maté) provide a caffeine tea in Central and S America and Asia. ROGER VICK

Holman, NWT, UP, pop 300 (1981c), is located on the W coast of VICTORIA I, on inlets of Amundsen's Gulf, 925 air km N of YELLOWKNIFE. The area is the ancestral homeland of the COPPER INUIT. First established 1940 as an HBC trading post, it was likely named for J.R. Holman, a member of the Inglefield arctic expedition (1853-54). It is famous for the Holman Eskimo Co-operative which sells Inuit prints around the world. The Inuit were first taught to make prints by Rev Henri Tardi, an Oblate who settled in the area in 1939. Although the Inuit residents trap, hunt and seal, PRINTMAKING has become the major source of income. ANNELIES POOL

Holmes, John Wendell, diplomat, author (b at London, Ont 18 June 1910). Holmes worked for the CANADIAN INSTITUTE OF INTERNATIONAL AFFAIRS 1940-43 before joining the Dept of External Affairs. Liberal, urbane, balanced in his judgements, Holmes served in London, Moscow, New York and as assistant undersecretary of state, 1953-60; he has written on Canada and international institutions during his period in External Affairs in *The Shaping of Peace* (1979-82). In 1960 he returned to direct the CIIA; he also taught at York and U of T and became the country's most highly respected commentator on foreign policy. Collections of his persuasive essays are *The Better Part of Valour* (1970) and *Canada: A Middle-Aged Power* (1976). NORMAN HILLMER

Holmes, Simon Hugh, lawyer, publisher, politician, premier of NS (b at East R, NS 30 July 1831; d at Halifax 14 Oct 1919). One of the most prominent political figures in NS immediately after Confederation, he was influential in the development of provincial mines and railways. He began his career in 1862 as editor-proprietor of the Pictou *Colonial Standard* and was admitted to the bar in 1864. In 1871 he was elected to the legislature as Liberal/Conservative member for Pictou County, and in 1874 he was named leader of the Opposition. A Tory administration was returned in 1878, and Holmes served as premier and provincial secretary until 1882, when he retired from politics and publishing to become prothonotary and crown clerk for Halifax County. LOIS KERNAGHAN

Holt, Sir Herbert Samuel, capitalist (b at Geashill, King's County, Ire 12 Feb 1856; d at Montréal 28 Sept 1941). Holt immigrated to Canada in 1873 and worked as an engineer and contractor on railway construction projects, including the mountain section of the main line of the CPR. He became prominent in the Montréal business community following the merger of several utility companies into Montréal Light, Heat and Power Company in 1902. Under Holt's direction, the company acquired a monopoly over the distribution of hydroelectric power in Montréal and a large share of the generation and transmission of power from various sites in Québec. He was briefly president of the Sovereign Bank of Canada and in 1908 was elected president of the ROYAL BANK OF CANADA, a position he held until 1934. During his presidency the Royal Bank absorbed a number of smaller banks and extended its operations to become the largest institution of its kind in Canada and the third largest in N America. In the late 1920s Holt, with J.H. GUNDY, was active in company mergers in the pulp and paper, textiles, utilities, coal and steel industries. He was created a KB in 1915. T.D. REGEHR

Home Economics describes an area of study and a group of related professional occupations, both of which aim at improving the quality of life of individuals and families by encouraging the effective management of personal resources, eg, time, money and consumer goods.

The study of home economics, which is based on both social and physical sciences, originated at the turn of the century in the US at a series of meetings of academics and national leaders in Lake Placid, NY, who were seeking remedies for the social ills of the day. Ellen Richards, who advocated the idea of "applying science for use in everyday life" is considered by many to be the founder of the field. At the Fourth Lake Placid Conference in 1902 a committee of 7 developed the first and often quoted definition of home economics: "the study of the laws, conditions, principles and ideals concerned with man's immediate physical environment and his nature as a social being and specially the relation between those two factors." One of the members of this committee was a Canadian, Mill Alice A. Chown of Kingston, Ont.

At the same time, in Canada, Adelaide HOODLESS was promoting the establishment of what was then called domestic science. She headed the first program at University of Toronto and was a founding member of the Federation of Women's Institutes, an organization that had a close association with home economics in its earlier days.

The MacDonald Institute, founded at Guelph in 1903, offered was what called "the diamond ring course" because it was seen and promoted as a means of obtaining a husband. There was a 3-month practical program, which included courses in millinery, dairying and poultry raising with strong emphasis on home production, and a 2-year program for teachers who spread theories and practices of household science to rural communities via schools. In the 1960s the institute revised its curriculum in recognition of an increasing need in society for consumer education. It was also evident that the needs of the food industry would be better met through the study of the behavioural aspect of nutrition, eg, product development, consumer acceptance and institutional food-service management. Instructors were imported from other areas (eg, anthropology) to fill out the new specializations. In 1969 the MacDonald Institute was divided into 2 departments and renamed the College of Family and Consumer Studies. Graduates received a Bachelor of Applied Science degree. The college also houses a school of hotel and food administration; graduates are awarded Bachelor of Commerce degrees. In 1983, 30 of 925 Bachelor of Applied Science students were male, compared to 50% of those in the hotel and food administration program.

In high schools in some Canadian provinces the study of home economics is now called FAMILY STUDIES, reflecting an emphasis on the study of family living and family relationships. The 2 largest university programs in home economics are offered at University of Manitoba and University of Guelph. A new undergraduate program introduced at Manitoba in 1980 offered courses in textiles, family studies and food and nutrition. Enrolment increased 50% from 120 in 1980-81 to 186 in 1981-82, and by 1983 was over 200, including (over 2 years) 20 men. At University of Alberta, the next largest home economics training institute, the options offered to graduates now include dietetics, conservation, merchandising of textiles, etc. At McGill the School of Household Science became in 1968 the School of Food Science, and the home economics major was shifted to the Faculty of Education. U of T Faculty of Household Science was replaced by the Department of Nutritional Sciences in the Faculty of Medicine. Simultaneously, the Ryerson Polytechnical Institute developed a 4-year degree program in food, nutrition and consumer and family studies.

Graduates of 4-year degree programs in home economics (or equivalent programs) are eligible to join the national professional organization, the Canadian Home Economics Assn, and to work as home economists. Many graduates also join provincial and local organizations. The graduates are usually employed in professional or in business situations, eg, food companies, utility companies, supermarkets, home-equipment manufacturers, etc. Some home economists free-lance; others work in the media and in advertising, product promotion and testing.

A large number of home economists teach in high schools and work in agriculture-related activities and many work as credit and family counsellors. MAY MASKOW

Homesteading, a late 19th- and early 20th-century phenomenon, in which immigrants were attracted to the Canadian West by government advertisements of "free" land. Under the DOMINION LANDS POLICY, 160 acres cost only $10,



Breaking the land in bush country near Treherne, Man, 1914. A new homesteader was required to cultivate a specified area in 3 years in order to maintain possession of the land (*courtesy Provincial Archives of Alberta/E. Brown Collection*).



Homesteaders' shack, 1918. Homesteaders were required to build a dwelling within 3 years (*courtesy Provincial Archives of Alberta/H. Pollard Collection*).

but the homesteader had to build a house, often of LOG or SOD, and cultivate a specified area within 3 years. A new homesteader required basic agricultural implements, and since horses were expensive, most used oxen to clear and break the land. A fireguard to protect farm buildings had to be ploughed, and a vegetable garden planted and game hunted to supplement the food supply. If the water was of poor quality, homesteaders had to collect rainwater or melt snow. In many areas a homestead had to be within 15 km of a railway to be farmed economically; the reservation of land for the HBC or railways within this belt was a source of frustration, for the poor or latecomers were forced to settle away from markets and towns. The railroads did provide employment for homesteaders until their farms began producing.

Homesteaders and their families were often separated from friends and relatives, and many suffered years of hardship and loneliness. One of the greatest difficulties was the absence of roads and bridges. Most trails were impassable when wet. In the autumn homesteaders waited until the ground was frozen before transporting their produce to the railhead. Farm accidents often resulted in permanent injury or, because doctors were rare, death. Drought ruined those who settled in the arid Palliser Triangle. For many the price of homesteading was too high; they cancelled their claims and moved away. Adversities, however, bound homesteaders together. Prejudices were lessened as people helped one another. Building and quilting bees were common. Doors were kept unlatched and lanterns hung at night to guide travellers. At first, recreation was confined to the lonely homestead, but as communities grew there were sport days and a variety of entertainment at the community halls. Homesteading on the Prairies declined after WWI as IMMIGRATION fell off and movement toward the cities increased. *See* PIONEER LIFE.

JANE MCCRACKEN

Homicide Canadian law recognizes 3 types of culpable homicide: murder (1st and 2nd degree), manslaughter and infanticide. Murder is the killing of one human being by another with malice aforethought; infanticide is the killing of a newborn child by its mother; and manslaughter, which includes the lesser offence of criminal negligence, is any homicide that is neither murder nor infanticide. Canada is the only nation in the western hemisphere whose homicide rate is as low as that of Europe. International homicide statistics are generally unreliable and always outdated, but Canada's rate is roughly 5% that of Mexico or Colombia; 25% that of the US; equal to that of France or New Zealand; and triple the rate of Norway and the Netherlands. After increasing in the late 1960s and early 1970s, the Canadian homicide rate began to decline in 1975 and dropped an average of 5% annually until 1981, when it again began to rise. The Maritimes have the lowest homicide rates in Canada, and Newfoundland (0.68 in 1981) has the lowest of all. Québec's rate (2.93) was lower than Alberta's (3.43) and BC has the highest provincial rate (4.02), but the NWT and the Yukon have the highest rates of all (11.57 and 4.57 respectively). These sparsely populated territories also have Canada's highest rate of increase, while in the US the increase is highest in the major metropolitan areas, but this discrepancy may reflect the location of the 2 countries' socially alienated populations, America's blacks in urban slums, Canada's native peoples in the North (*see* NATIVE PEOPLE, LAW). Less than 2% of the Canadian population, the INUIT, INDIANS and MÉTIS, comprised 16% of the homicide victims between 1961 and 1974. "Gangland" murders account for only 5% of Canadian homicides, but the proportion is increasing rapidly, especially in Québec and BC (*see* ORGANIZED CRIME).

Six of every 10 homicide victims in Canada are male, except victims between the ages of 7 and 15 who are often also victims of sexual assault. Almost half of all homicide victims are between the ages of 20 and 39, while nearly 23.5% are children under 16 or adults over 60. Approximately 43.4% of female homicide victims are killed within domestic relationships, more than double the proportion of male victims. Interracial homicide is rare. Homicide suspects are most likely to be unmarried males (females are outnumbered 5 to 1) between the ages of 20 and 39 and with little education; but the largest suspect rate increases are among females aged 16 to 19 and males aged 11 to 15 and 20 to 29, disturbing indices of social instability. Between 1961 and 1974, of 3061 homicide suspects tried, 2121 were convicted and 705 acquitted (231 because of insanity); the remainder were found unfit to stand trial or had their charges altered. Only 2 were executed during that period, and almost 50% served between 1 and 10 years in prison. Females are more likely to receive suspended sentences or be declared unfit to stand trial, a possible reflection of the broader pattern whereby more lenient sentences are imposed on domestic homicides. Despite the controversies over the parole and release of murderers, few murders have been committed by convicted murderers on parole. Between 1961 and 1974, for example, only one such murder occurred; the murderer was subsequently executed.

The causes of homicide and of varying homicide rates in different nations remain unclear, although various and usually contradictory theories ascribe both to biological, psychological or sociological factors. LAW REFORM, such as it is, appears to have little or no effect on reducing homicide. Whether the reform involves the abolition or restoration of CAPITAL PUNISHMENT, the restriction or distribution of firearms (*see* GUN CONTROL), or lowering the level of brutality in prison life (*see* PRISON), the proponents of either side typically conduct their arguments from emotional or moral positions without reference to objective analysis, an unsatisfactory state of affairs that will undoubtedly continue.

ELLIOTT LEYTON

Homosexuality [from the Greek, "homo," meaning same], also called inversion, can be characterized generally as sexual preference for one's own gender. Homosexuals may be male (now widely called "gay") or female (now widely called "lesbian"). Exclusive homosexuality, like exclusive heterosexuality, is uniquely human. Homosexual preference takes many and varied forms. Some persons in whom it is limited to fantasy may try to lead asexual lives, or they may attempt to suppress their inclinations by marrying. Many, however, eventually lead double lives, anxiously hiding from their friends, spouses and children a secret world of homosexual liaisons. Some persons (widely known as bisexual) are able to combine homosexual and heterosexual activity. Where homosexual preference is allowed social expression, it tends to increase in frequency (like other stigmatized action, eg, divorce). In recent years growing numbers of homosexuals have accepted their preference as natural and inherent to their personalities. Some take pride in it and form organizations to promote gay liberation. Like heterosexual behaviour, homosexual behaviour ranges from anonymous sex, promiscuity and prostitution to romantic affairs and lifelong faithful relationships.

Homosexual practices are among the most ancient manifestations of human sexuality and different societies have reacted to them in various ways, from toleration and permissiveness to condemnation. In a 1951 study it was found that 49 of 76 societies condoned some forms of homosexuality, regarding them as normal and even encouraging them for certain groups of individuals. Some societies believed homosexuals possessed magical powers, and conferred SHAMAN status upon them. The ancient Greeks considered homosexuality normal as well. In certain societies homosexuality has generally been more tolerated for certain groups, eg, artists, actors, sailors, or among the noble "favourites" in certain royal courts.

At various times in Western history homosexuality has been savagely punished. This intolerance is rooted in the ancient Judeo-Christian disgust for sexual acts associated with paganism and decadence. Leviticus 20:13 condemns homosexuals to death. Though there is no Gospel record of Jesus' opinion on the topic, the early Christian church under the leadership of Paul condemned homosexuality, and ecclesiastical and secular law attempted to prevent, control and eradicate it. In certain periods of Western Christendom, allegations of homosexuality were enough to condemn the accused to torture and death by fire; the last recorded Christian burning of homosexuals occurred in Amsterdam in 1730.

In the 19th century the medical definition of homosexuality as an illness began to displace the religious definition as sin. To denote the practice without using the traditional epithets (sodomite, bugger, queer, etc), the Austro-Hungarian doctor and sexologist K.M. Benkert in 1869 coined the word homosexual. In their search for causes of homosexuality, scientists and clinicians have proposed heredity, hor-

mones, genital malfunction, childhood crisis, inadequate parenting, adolescent peer relationships and mental disorder, among other causes, but there is no conclusive evidence to support any of these as a single cause, and some have been effectively disproved. Recent investigations have challenged Freud's influential theory that homosexuality is an expression of a biological bisexuality common to all human beings by suggesting that human beings are psychosexually neutral at birth and that homosexuality is an adaptive response to a combination of certain experiences. Drugs, electric shock, behavioural therapy and psychotherapy are among the treatments used to cure homosexuals, but none can claim significant success.

The search for causes is frustrated because the same person, at different times and with different partners, may achieve sexual gratification homosexually and heterosexually. Some persons change from a predominantly homosexual lifestyle to one that is heterosexual, or in the opposite direction. Homosexuality and heterosexuality are probably both caused by learning experiences and social conditions. Change in social conditions, eg, confinement in prison, may result in a change of sexual preference, and release from prison may or may not result in another change. That homosexuality is simply a sexual variation (as is chastity or polygamy) won considerable international support in the 1920s as a result of the work of Dr Magnus Hirschfeld's Institute of Sexual Science in Berlin. In 1897 Dr Hirschfeld formed the Scientific Humanitarian Committee to lobby for the abolition of the criminal laws against homosexuals. But in 1933, at the instigation of the Nazi press, students raided the premises and burned the institute's books and documents. Later, from 100 000 to 400 000 homosexuals in Nazi-occupied Europe were killed in concentration camps; others were forced to wear an identifying badge, a pink triangle, which has since become the emblem of gay liberation movements.

In 1948 American biologist Alfred Kinsey published a survey of American male sexual activity, shocking many by revealing statistical estimates that 37% of males had enjoyed homosexual orgasm at least once and that exclusive homosexuals were at least as large a minority as American blacks. The black struggle for equal civil rights inspired a similar movement among homosexuals. Nevertheless most homosexuals must hide their preference in order to obtain employment and accommodation and many still dare not tell parents or close friends. Because social tolerance is greatest in large cities, many young homosexuals gravitate there and indeed only in modern industrialized societies do homosexuals develop specific subcultures. In some districts of large Canadian, American and European cities, gay men and lesbians form a large enough minority to develop their own social world, comparable to an ethnic community. The "gay world" of a city such as Montréal, Toronto or Vancouver includes bars, discos, sports teams, political and religious groups, gay businesses, medical and legal services, newspapers and publishing houses and even charitable foundations. Smaller centres have some of these facilities, but they are more covert. In the 1960s, gay urban communities became the base for political action. Gay liberation groups encouraged many secret homosexuals in prestigious positions to "come out of the closet."

In 1974, following studies revealing that no particular physical or personality type was associated with homosexual preference and public revelation that many homosexuals were respected and effective members of society, the American Psychiatric Association removed homosexuality from its catalogue of illnesses (it is now classified as "sexual orientation disturbance"). Since then, a wide range of churches, corporations and academic organizations have adopted more tolerant positions, but other groups have strongly opposed toleration of homosexuality.

From Confederation to 1969, under Canada's criminal law, homosexuality was punishable by up to 14 years in prison. In 1969 the law was amended by exempting from prosecution 2 consenting adults of at least 21 years of age who engaged in these "indecent acts" in private. However, homosexual acts before age 21 or with a third person present are still illegal. According to a 1981 federal survey, only 33% of Canadians would support laws allowing homosexuals the same civil rights as heterosexuals, but some large cities, eg, Ottawa and Toronto, and one province, Québec, have enacted laws against discrimination on the basis of sexual preference. In several Canadian cities, however, including Toronto, police continue to enjoy public support for massive arrests of homosexuals. It is clear that homosexuality will continue to be a controversial issue in Canada for years to come.

JOHN ALAN LEE

Honderich, Beland Hugh, newspaper executive (b at Kitchener, Ont 25 Nov 1918). As head of the *Toronto Star*, Honderich has transformed a sensationalist but profitable working-class paper into a better modulated and equally profitable middle-class one that is less rigid in its liberalism. He began his career on the Kitchener-Waterloo *Record* in 1935 and went to the *Star* in 1943 as a reporter. Later its financial editor, he became editor in chief (1955), president and publisher (1966) and chairman and publisher (1969), and is now chairman of Torstar, the parent company. The *Star* is Canada's largest circulation newspaper but Honderich, because of his total involvement in it, remains little known outside the business.

Honeysuckle, common name for PLANTS, usually woodland shrubs, of genus *Lonicera*, family Caprifoliaceae. Honeysuckle leaves were a favourite goat food, hence the name *caprifolium* [Lat, "goat's leaf"]. More than 150 species of *Lonicera* are widespread in the Northern Hemisphere; 9 are native to Canada. They are distributed transcontinentally, from the subarctic to southern Canada. Flowers are in pairs or 6-flowered whorls, and are showy in some species commonly under cultivation, eg, Japanese honeysuckle (*L. japonica*), woodbine (*L. periclymenum*), trumpet honeysuckle (*L. sempervirens*) and Tatarian honeysuckle (*L. tatarica*). The most common Canadian species are: *L. canadensis*, *L. dioica* and *L. oblongifolia*, which are red berried; and *L. involucrata* and *L. villosa*, which are black berried. All of these have yellowish flowers. Seven species, including *L. caprifolium* (Italian woodbine), *L. periclymenum* (woodbine honeysuckle) and *L. tatarica*, have been naturalized in Canada from garden escapes. Woodbine and the related climbing honeysuckles are limited to the mildest regions of Canada. Tatarian honeysuckle is very cold hardy and a valuable prairie ORNAMENTAL. Berries are generally nauseously bitter and purgative. N American Indians used berries and root bark for digestive problems and gonorrhea, and as a tonic.

ROGER VICK

Hong Kong In 1940 the British regarded their crown colony of Hong Kong and its 20 000-man garrison as expendable in the event of war with Japan and decided against reinforcing it. But in Sept 1941 the Canadian government agreed to send the Royal Rifles of Canada (a Québec unit) and the Winnipeg Grenadiers, although they were not considered fit for action. They arrived on 16 Nov 1941 and 22 days later the Japanese attacked the colony's New Territories on the mainland. On Dec 18 the Japanese crossed to the island of Hong Kong and on Christmas Day the governor surrendered. Of 1975 Canadians, 557 were killed or died in prison camps. Political



Personnel from HMCS *Prince Robert* visiting liberated prisoners-of-war at Sham Shui Po Barracks, Hong Kong, Sept 1945 (*courtesy Public Archives of Canada/PA-116808*).

pressure at home forced the Canadian government to appoint a royal commission to investigate the circumstances of Canada's involvement. The sole commissioner, Chief Justice Sir Lyman Duff, misinterpreted or ignored evidence and exonerated the Cabinet, the Department of National Defence and senior members of the General Staff. In 1948 a confidential analysis by Gen Charles Foulkes, chief of the general staff, found many errors in Duff's assessment, but concluded that proper training and equipment would have made little difference. *See* WORLD WAR II.

BRERETON GREENHOUS

Reading: Carl Vincent, *No Reason Why* (1981).

Honours, The achievement of excellence in any field of endeavour has always won popular respect and acclaim. From earliest times, heroism, military and athletic prowess, outstanding leadership and civic merit have been rewarded in tangible and symbolic ways. The conferment of honours was formerly a prerogative of emperors and kings, but is nowadays the practice of even the most egalitarian regimes. The many forms of honour include the victor's triumph in ancient Rome and the astronauts' ticker-tape parade, the accolade received from the sovereign's hand and the award of the Nobel prize, the badge of knighthood and the Olympic medal, military decorations worn on the uniform and the rosette displayed in the button-hole.

Marks of royal favour have been known in Canada from the beginning of European colonization. Settlers in NEW FRANCE in the 17th century took for granted that the governor and his principal officials would be of noble rank. Contrary to Old World tradition, the acquisition of land in the colony did not affect the owner's status: the SEIGNEURS as principal landholders did not, on that account, gain entry into "la noblesse." Some were ennobled by the king, however, for their part in developing and defending the colony (*see* CROIX DE SAINT LOUIS).

When the colony came under the British Crown after 1760, titles were not uncommon among the officials sent out to conduct civil and military affairs. Titular distinctions from the French period gradually fell into disuse. No indigenous form of honours was introduced to recognize the contributions of those who were instrumental in the growth of RESPONSIBLE GOVERNMENT and the maturing of the colony's institutions, but an attempt was made to include such a provision in the arrangements leading up to CONFEDERATION. In 1866 Lord Monck, then governor general of British North America, sent a dispatch to the COLONIAL OFFICE in London recommending the creation of an order of knighthood for Canada as an incentive to public service. Awards would be made by the new Dominion's governor general on behalf of the sovereign. In order to underline the award's Canadian character, he suggested calling it the "Order of St Lawrence." The proposal was quietly shelved by the home government. To relinquish control of honours, in the opinion of the colonial secretary, must inevitably lead to a

weakening of the imperial tie. It was concluded that there should be no separate order for Canada but that the governor general would be asked to name a few persons each year for appointment to existing British orders. This policy, to which successive British ministers adhered, was a source of recurring friction between Ottawa and London until honours for Canadians were discontinued entirely after WWI.

Sir John A. Macdonald, Canada's first prime minister, did not contest the British policy, but he pressed constantly for a more generous annual allotment of places. Alexander Mackenzie, prime minister 1873-78, would accept no title himself but became incensed upon learning that London planned to honour a prominent Canadian entirely without reference to Ottawa. In response to Mackenzie's protest to the governor general, the colonial secretary replied that if the choice of recipients were controlled by the colonial government, party affiliation would be bound to override all other factors, and he stated flatly that the responsibility to advise the sovereign in these matters was his alone.

Preparing the honours lists each year troubled PM Sir Wilfrid Laurier in his turn, and resulted occasionally in strained relations with the governor general. Honours was a touchy subject with members of Cabinet, and frustration led to a renewed attempt to gain some control of the nomination process. In 1902 an order-in-council was passed which would require the governor general to seek the advice of the ministry about the annual honours lists, but the response from the Colonial Office was little different from the position taken 25 years earlier.

By 1911, when Sir Robert Borden became prime minister, titles in Canada were being viewed with growing public disfavour. A knighthood conferred on Max AITKEN, an expatriate Canadian who had been elected to the British Parliament, provoked widespread criticism. There were further shock waves a few years later when Sir Max Aitken, with the help of influential political friends, received in quick succession a baronetcy and then a peerage, and entered the House of Lords as Lord Beaverbrook. Abuses were becoming more frequent, and Canadian public opinion hardened with the announcement of some of Borden's candidates for titles during WWI. When the UNION GOVERNMENT took office after the 1917 election, the matter came to a head. A parliamentary committee recommended and the House of Commons in 1919 adopted the "Nickle Resolution," which brought to an end the granting of both titular and nontitular honours to Canadians.

There was a brief revival of the defunct honours policy during the Conservative administration of Prime Minister R.B. Bennett, and several knighthoods and lesser distinctions were awarded 1934-35, but shortly after the Liberals were returned to office in 1935 the prohibition was reinstated. Sir Charles G.D. ROBERTS was one of the last to be knighted in 1935.

Consequently, at the outset of WWII Canadians in the armed services were not entitled to receive awards in the orders of chivalry for which other Commonwealth personnel were eligible. A parliamentary committee appointed in 1943 recommended that the ban on nontitular honours be lifted, thus clearing the way for many members of the military and civilians to receive recognition for wartime services. A further recommendation, favouring the creation of a Canadian order, led to the establishment of the "Canada Medal," a single all-purpose national honour. An initial list of suggested recipients was drawn up but was rejected by the prime minister. Mackenzie King had a deep distaste for the concept of honours, and on reflection he decided that instituting the Canada Medal had been a mistake. No award was ever made.

After the war the subject was kept alive, chiefly in military circles. In 1951 Vincent Massey, chairman of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS, AND SCIENCES, was asked by PM Louis St. Laurent to include a report on the subject of honours. In response a draft scheme was submitted favouring the creation of an elaborate five-tier Canadian order. The proposal came to nothing.

Fifteen years later the approaching centenary of Confederation brought the notion of national honours back into focus. PM Lester Pearson seized the opportunity of the CENTENNIAL celebration to reinforce the theme of Confederation: the fruitful union of diverse elements in a vigorous and independent state. In 1965, in the face of loud and sometimes bitter opposition, he piloted a bill through parliament giving Canada a national flag (*see* FLAG DEBATE). In the spring of 1967, not a dissenting voice was heard when he announced the creation of the ORDER OF CANADA. On 1 July 1967, the proposal made by Lord Monck a century before at last became a reality. Five years later the honours systems was fleshed out with the addition of the ORDER OF MILITARY MERIT and a group of DECORATIONS FOR BRAVERY. The administration of honours is the responsibility of the Chancellory of Honours, Government House, Ottawa. *See* MEDAL; VICTORIA CROSS; GEORGE CROSS.

CARL LOCHNAN

Hood, Hugh John, writer, academic (b at Toronto 30 Apr 1928). Hood's extensive writings present a view of Canadian experience in this century realistic in detail and emblematic in intent. A Roman Catholic, he has dealt with characters and situations embodying religious, philosophical and allegorical themes. Numerous short stories have appeared in such volumes as *Flying a Red Kite* (1962), *Around the Mountain* (1967), *The Fruit Man, the Meat Man and the Manager* (1971), *Dark Glasses* (1976) and *None Genuine Without This Signature* (1980). *Selected Stories* appeared in 1978. Among his novels, *White Figure, White Ground* (1964) is noteworthy, and 4 works in his *New Age* series (12 vols) have appeared: *The Swing in the Garden* (1975), *A New Athens* (1977), *Reservoir Ravine* (1979) and *Black and White Keys* (1982). He has also published 2 essay collections and a sports biography. Educated at U of T, he has taught in the English department of U de Montréal since 1961.

DENNIS DUFFY

Hood, Robert, arctic explorer, artist (b at Portarlington, Ire 1797; d near Starvation Lk, NWT 20 Oct 1821). Hood joined the Royal Navy at age 14. In 1819 his artistic abilities gained him an appointment with the arctic land expedition led by Sir John FRANKLIN. As primary surveyor and draughtsman, Hood plotted accurately from a birchbark canoe thousands of miles of rivers and lakes and nearly 1000 km of the northern coast of N America. He was the first to demonstrate that the NORTHERN LIGHTS is an electrical phenomenon, and made important observations on climatology, anthropology and natural history. Returning across the Barren Lands, already weakened by starvation and only 50 km from the previous winter's buildings, Hood was shot by Michel, a voyageur turned cannibal.

C. STUART HOUSTON

Reading: C. Stuart Houston, ed, *To the Arctic by Canoe, the Journal and Paintings of Robert Hood* (1974).

Hoodless, Adelaide, née Hunter, educational reformer, founder of the Women's Institutes (b at St George, Canada W 26 Feb 1857; d at Toronto 26 Feb 1910). Hoodless was jolted out of a comfortable middle-class life when an infant son died in 1889 after drinking impure milk. Thereafter she devoted herself to women's causes, specifically to the better education of women for motherhood and household management. She campaigned for domestic science (home economics) in the schools and advised the provincial department of education on this subject. In 1897 she founded the first Women's Institute (Stoney Creek, Ont); within a few years this movement spread across Canada and around the world. Working with Lady ABERDEEN, she helped found the National Council of Women, Victorian Order of Nurses and the national YWCA. Basically conservative, Hoodless believed women's natural destiny lay in the home, and she never supported the suffragette cause. She was the author of *Public School Domestic Science* (1898).

ROBERT M. STAMP



After her infant son died of drinking impure milk, Adelaide Hoodless devoted herself to women's causes, particularly better education for motherhood, and was an early advocate of home economics in the schools (*courtesy Public Archives of Canada/C-85284*).

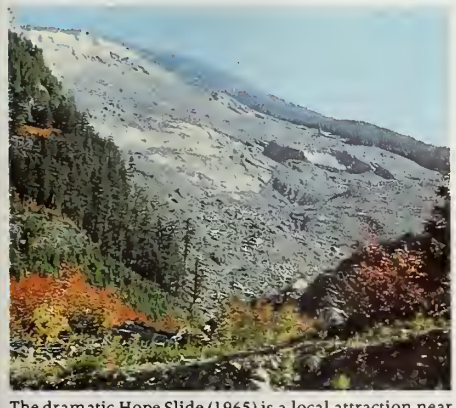
Hoodoo Rock, a strange, often fantastically shaped, naturally carved rock or earth pedestal, pillar or column. Hoodoos may range from a few centimetres to several metres in height. They result from the combined erosional action of WIND, RAIN and running WATER, which together with a variety of physical and chemical weathering processes sculpt the material into different shapes. Use of the term appears to be largely restricted to western N America. Hoodoos tend to be best developed in horizontally



Hoodoo rocks, Yoho National Park, BC. Hoodoos are formed by the combined erosional action of wind, rain and running water (*courtesy Parks Canada*).

bedded rocks or strata in which relatively soft units are interspaced with more resistant ones, eg, alternating layers of shale and sandstone. Differential weathering and erosion is enhanced, the soft material being removed more rapidly than the hard. Hoodoos are often capped by a resistant layer (cap rock) which protects the lower units. Removal of the cap rock results in rapid destruction of the unprotected base. Hoodoos are well developed in the BADLANDS of Alberta near Drumheller, in DINOSAUR PROVINCIAL PARK and near the MILK R. Excellent examples also occur in glacial-outwash deposits on the COLUMBIA R north of Cranbrook, BC, and in glacial-lake sediments in the OKANAGAN VALLEY near Penticton, BC. I.A. CAMPBELL

Hope, BC, Town, pop 3205 (1981c), inc 1929, is located on the Trans-Canada Hwy, 150 km E of Vancouver; it sits on the E bank of the FRASER R, surrounded on 3 sides by the mountains of the Cascade (or Coast) Range. The junction of the Trans-Canada and the trans-provincial Hwy No 3 makes it the gateway to the interior. Hope was established 1848-49 as a HBC post at the W end of their Brigade Trail from Fort Kamloops, and may have been so named in the hope that this trail would provide an all-British route between Fort Kamloops and Fort Langley. A townsite was laid out by the Royal Engineers in 1858 during the rush for gold on the nearby sandbars of the Fraser. In 1860 Edgar DEWDNEY opened the first pack trail, the Dewdney Trail, to the E. Hope became a station on the CPR mainline in 1886 but further growth awaited the advent of automobile traffic. Today logging, tourism and mining in the district are the town's economic base. Local attractions are the Hope Slide (1965), the Coquihalla Canyon and the wilderness of Manning Provincial Park. JOHN R. STEWART



The dramatic Hope Slide (1965) is a local attraction near the town of Hope, BC (*photo by Valerie L. May*).

Hopkins, John Castell, journalist, encyclopedist (b at Dyersville, Iowa 1 Apr 1864; d at Toronto 5 Nov 1923). He became assistant editor of the Toronto *Mail and Empire* in 1890 and wrote a number of pamphlets, biographies and histories, including the deferential *Life and Work of the Right Hon. Sir John Thompson* (1895) and *Progress of Canada* (1901, rev as *The Story of Canada* (1922). He edited *Canada: An Encyclopaedia of the Country* (6 vols, 1898-1900) — Canada's first ENCYCLOPEDIA — and succeeded George Morang as editor of the *Annual Review of Canadian Affairs*. DAVID EVANS

Horetzky, Charles George, photographer, explorer, civil servant (b at Edinburgh, Scot 20 June 1838; d at Toronto 30 Apr 1900). An employee of the HBC, he was at Ft Garry in 1869 during the RED RIVER REBELLION. In 1871 he was hired by the CPR survey primarily for his abilities as an amateur photographer. He is best known for his 1871-79 survey photographs of northern BC and northern Ontario. Though intelligent, fearless and innovative, he was impatient and quick to take offence, traits that cost him his job in 1880. He worked for the Ontario government supervising public works 1883-1900 and wrote *Canada on the Pacific* (1874) and 2 other pamphlets. ANDREW BIRRELL

Horn, Kahn-Tineta, meaning "she makes the grass wave" in Mohawk, political activist, fashion model, civil servant (b in New York C, NY 16 Apr 1940), member of the Mohawk Wolf Clan of Caughnawaga, Qué. She attracted national attention to Indian causes in the 1960s and early 1970s by her lively and controversial criticisms of Indian conditions. She had already been a model and public speaker for some years when in 1964 she was fired from her posts in the National Indian Council in a controversy over policy and organization of centennial celebrations. Throughout the 1960s she took part in numerous Indian protests, including one in which she dumped rats in a government meeting to illustrate illegal dumping on her reserve. She advocated "Indian apartheid" or separate development, including preservation of the reserve system, teaching by Indians only, and the banning of Indian-white intermarriage. She founded and directed the Indian Legal Defence Committee, 1967-71. Since 1972 she has held various positions in the social, community and educational development policy sections of the federal Dept of Indian Affairs. BENNETT MCCARDLE

Hornby Island lies in the Str of GEORGIA between VANCOUVER I and mainland BC, SE of the island community of COURTENAY. It is a wooded island with a shoreline of sandbanks and rock shelves. Whaling was carried out in the 19th century from a shore station on the E coast; today it is a busy recreation area. Sandstone ledges along the shore show good examples of Indian petroglyphs. The name refers to R.A. Phipps Hornby, commander of the Pacific Station 1847-51. DANIEL FRANCIS

Horne-Payne, Robert Montgomery, financier (b in Eng; d at Brentwood, Eng 30 Jan 1929). Long an invalid, he rarely visited Canada, but his financial skills left an imprint on the landscape and a northern Ontario town (Hornepayne) bears his name. He has been credited with directing $500 million of British capital to Canada 1894-1928, through the British Empire Trust Co, which he founded. So influential was Horne-Payne that when he warned British investors in June 1913 of reckless Canadian municipal borrowing, several western mayors protested. As chief fund raiser for William MACKENZIE and Donald MANN, he was London director of the Canadian Northern Ry from 1901 until the Canadian government took it over in 1918. From its inception in 1897 until its sale to Canadian interests in 1928, he was an active chairman of the board of the BC Electric Ry. He was also a director of other Canadian firms and was associated with Canadian capitalists in Latin American utility companies, notably Brazilian Traction, Light, Heat and Power Co. PATRICIA E. ROY

Hornell, David Ernest, aviator (b at Lucknow, Ont 26 Jan 1910; d at sea 25 June 1944). He was awarded the VICTORIA CROSS for destroying a German U-boat while under extreme fire, and for fortifying his comrades in the ordeal after their flying boat crashed. Blinded and exhausted, Hornell died shortly after being rescued at sea. JAMES MARSH

Horner, John Henry, "Jack," rancher, politician (b at Blaine Lk, Sask 20 July 1927). He has carved a controversial public career since his election to the House of Commons in 1958. Supported by his central Alberta constituency, Horner soon earned a reputation as a spokesman for western farmers and as an arch conservative; later he was known as one of the "DIEFENBAKER cowboys." After his failure to gain the Tory leadership in 1976, Horner crossed the floor of the House on 20 Apr 1977 to become a Liberal and the next day was appointed minister without portfolio. In Sept he became minister of industry, trade and commerce, but he was rejected by his constituents in the 1979 election. He was soon appointed to the board of the Canadian National Ry and in June 1982 was named chairman of the board. On 1 Mar 1984, he was appointed administrator of the new Grain Transportation Agency. PATRICIA WILLIAMS

Reading: J.H. Horner, *My Own Brand* (1980).

Horner, Ralph Cecil, evangelist, church leader (b in Pontiac County, Canada E 22 Dec 1854; d at Ivanhoe, Ont 12 Sept 1921). After a short, stormy career as Methodist minister, he founded and led a series of HOLINESS CHURCHES. Converted and sanctified in Methodist camp meetings (1872), Horner studied theology at Victoria College, Cobourg, Ont, 1883-85 and oratory in Philadelphia 1885-86. A powerful preacher, already active in evangelistic missions, he was ordained by the Montreal Conference of the Methodist Church in 1887. Mounting criticism of his teaching and methods, and failure to submit to conference discipline brought his deposition 1894-95. Taking some Methodist clergy and laity with him, he joined the Wesleyan Methodists of NY, then formed an independent Holiness Movement Church, becoming its bishop. By 1900 his movement had a Bible College and a publishing house in Ottawa, and claimed some 6000 adherents, mainly in eastern Ontario and on the Prairies. In 1916 criticism of his leadership resulted in schism, and Horner founded the Standard Church of America. R. GERALD HOBBS AND HELEN HOBBS

Hornet, common name for larger WASPS of family Vespidae, order Hymenoptera. The striking, black and white, bald-faced hornet (*Vespula maculata*) is common across Canada. The European hornet (*Vespa crabro*), a large yellow and black, introduced species, is found in southern Ontario. In addition, queens of various species of yellow jacket wasp, being considerably larger than workers, are sometimes called hornets. All are social wasps. They build nests of wood fibres, masticated into coarse paper, usually greyish in colour. Nests are attached to trees or shrubs, or suspended from eaves. Occasionally they may build in cavities in walls, hollow trees or under the ground. In fall workers and males die, but young, mated queens hibernate. In spring each queen may initiate a new colony. M.V. SMITH

Horse (*Equus caballus*), herbivorous MAMMAL possessing single toes or hoofs (ie, ungulate), contributing to its speed. Customary gaits are walk, trot, canter and gallop. Horses are friendly, moderately intelligent animals, capable of being excellent helpers and companions for humans. Indeed, the horse can share with the dog the distinction of being man's best friend. Giving more than friendship, horses have for hundreds of years been mankind's most faithful slaves, furnishing muscle and stamina for heavy work in AGRICULTURE and endurance to cope with heavy loads on long trails in pioneer transportation. When forced from traditional occupations by mechanical power, horses were immediately returned to service in new and important roles in sport and recreation. In some parts of the world, horse meat is a common item of diet but Canadians have never shown much interest in eating their best animal friends. Selection for different purposes led to wide variations and many breeds. In size, for example, the range in height would be from 10-12 hands in the case of some Shetland ponies to 17 hands in certain big breeds. A hand, the horseman's unit in measuring height at the withers, is about 10 cm. More than 25 recog-

nized breeds have been introduced and bred in Canada.

The horse is a pioneer in these parts and should be treated with appropriate respect. With the exception of the turkey, it is the only member of Canada's barnyard community whose family was native to the Americas, and much of the 40-million-year family history is written, convincingly, in the rocks. FOSSIL evidence of the primitive horse's existence has been found elsewhere, but nowhere is there such a long, unbroken paleontological record as on this continent. Written here is the step-by-step story of change from the small and primitive *Eohippus* (the size of a wirehaired terrier) to horses which, in size and appearance, resemble those of modern times. The "dawn horse" had 4 toes on each foreleg, 3 on each hindleg. The little fellow, without much means of protection, lived in swamps. There may be doubt about its diet, but from the shape of its feet, the relatively small size of stomach even today and the survival of canine teeth in males, there is reason to suspect that *Eohippus* was not a strict vegetable feeder.

Members of the race must have been extremely numerous on this continent, at least until struck by disaster and extinction in the Americas. Horses were still here when the first humans arrived some 40 000 to 25 000 years ago. Early N American humans feasted on horse meat and left the proof at campfire sites, where horse bones, arrowheads and ashes have been found together (*see* PREHISTORY). Some horses of that period passed from N America to Asia by way of the land bridge that admitted the first humans to this continent (*see* BERINGIA). Thus, they escaped extinction and spread across Asia. It is believed that the first domestication was in China, and eventually domesticated stock reached the Mediterranean and N Africa where improvement took place. Some of the improved horses, taken by invaders to Europe, were left behind and imprinted their quality upon the horse stock of Spain and France. Columbus, on his second voyage westward in 1493, may have taken Spanish horses to the West Indies. In any case, Hernando Cortez, a Spanish conquistador, landed 16 or 17 horses on the N American mainland in 1519. N American horses had gone around the world and, after a long absence, were back on their native soil.

Horses for Settlers North American Indians were quick to adopt the use of horses, and horses moved from one tribe to another, generally by theft. By Arthur Silver Morton's estimates, horses in the possession of the Indians were seen in the valley of the Bow R in 1730. Before long, Indians of all the western tribes had horses and, when the Selkirk settlers arrived at the RED RIVER in 1812, urgently needing livestock, they rejoiced at the prospect of obtaining horses from tribesmen.

The first horses in what is now eastern Canada were brought from France for the use of settlers beside the St Lawrence. In 1665, Louis XIV directed the shipment of 21 mares and 2 stallions from the royal stables. From these and later importations came the Québec strain of hardy black horses, ultimately recognized as the French Canadian or Canadian breed, still prized by many Québec farmers.

For settlers coming into UPPER CANADA and then westward to Manitoba and the Territories, power was one of the most crucial needs. Some used oxen for a while because they were more readily available and could "live off the land," but ultimately every farmer wanted horses and then better horses. Improvement depended on the importation of sires of approved breeds. The first purebred stallion in the West was Fireaway, a Norfolk trotter brought from England by the Hudson's Bay Company for the benefit of Red R settlers. He was an overwhelming success. Thereafter, demand was for stallions of heavy breeds. British settlers wanted breeds from their homeland (eg, Clydesdale, Shire, Suffolk). Settlers from Europe and the US favoured Percherons and Belgians. Canadian farms became scenes of the mighty "Battle of the Breeds." Reflecting an early predominance of British settlers, the Scottish Clydesdale, with stylish white markings and showy action, led in popularity, but in time the bigger Percherons of French origin and the still bigger Belgians took the lead.

By 1921, when almost every Canadian farmer was a horseman, the horse population stood at 3.5 million. Saskatchewan had one million, mainly of Clydesdale, Percheron and Belgian breeding. The interbreed rivalry continued and reached the point where Clydesdale supporters were known to sit on one side of a country church, while Percheron and Belgian devotees sat on the other. But while the breed debates continued, the supremacy of heavy horses was being challenged by mechanical power, first by the heavy steam tractors introduced on big farms in the West (*see* AGRICULTURAL IMPLEMENTS.) These huge steamers were excellent for belt work but slow and awkward for field work, and by 1908, when the world's first agricultural motor competition was held in conjunction with the Winnipeg Industrial Exhibition, heavy, gasoline-driven tractors outnumbered them. During WWI, when farmers were urged to increase production but were denied the needed workers, gasoline and kerosene-driven tractors of smaller kind became attractive. Horse fortunes were about to change.

Horses in Decline It was a landmark event in 1918 when the federal government contracted to buy 1000 2-plow Ford tractors and sell them to farmers at cost (about $800 delivered). These light, 4-cylinder, high-speed tractors signalled a new day for farm power and horse breeding slumped. More and more horses were unemployed and seen as surplus. By 1944 farmers and ranchers were becoming impatient with the thousands of unsalable horses eating valuable grass. In March, at a meeting held at Val Marie, Sask, the Western Horse Marketing Co-operative was organized, with a double purpose: horsemen hoped to realize a return from the surplus and to make more grass available for cattle and sheep. By Oct 1945, horsemen were in the meat business, with their gaze fixed upon postwar food needs in Europe. Slaughtering and processing plants were established at Swift Current and Edmonton and by 1952 officers could report almost 250 000 horses marketed for a return of about $19 million. Most of the return came from canned meat shipped to Europe. In 1983 horsemeat exports totalled over 9 000 t, valued at $26.3 million. Principal buyers were France and Japan. Usually, old or crippled animals are slaughtered; horses are not bred for the purpose.

The Ascendancy of the Light Horse Heavy horses almost disappeared from Canadian farms; horse-drawn machinery was abandoned; harness went to pieces. Familiar old terms such as hame strap, martingale and whippletree were forgotten. But all was not lost. With the decline of the heavy or draft horse and the coming of an age when people had more leisure, Canadians discovered new interests in light horses. The ascendancy of light horse breeds was no less dramatic than the decline of heavy ones. Every type and breed of light horse was useful to some degree. A few, such as the western stock or cowboy horse, were so useful and so irreplaceable that their popularity has never changed. But the search for horses suitable for new sport and recreational uses brought a score of little-known breeds to public attention. The 2 ancient breeds, Arabian and Thoroughbred, have been influential in building and improving other breeds, which include the Hackney, French Coach and German Coach, classified as heavy harness types; American Standardbred and Morgan, seen as roadsters or trotters; American Saddle Horses, Tennessee Walking Horses and Quarter Horses, all of US origin; and the recently popular colour breeds, Palomino, Appaloosa, Pinto and Buckskin. Various pony breeds (eg, Shetland, Welsh, Dartmoor, Exmoor, Fell, Highland, Iceland, New Forest) have been registered at some time with the Canadian National Livestock Records.

Horse racing is known as "The Sport of Kings" (*see* THOROUGHBRED RACING). A succession of English kings gave it their enthusiastic support and Charles II went so far as to order importation of 40 Barb, Turk and Arab mares which became the foundation of the Thoroughbred breed. Every urban centre in Canada has its racetracks and seasonal racing programs. Canadians have demonstrated their love for the races and pleasure in betting. Thoroughbreds and Standardbreds are the principal racing breeds, the former in flat racing under saddles, the latter in HARNESS RACING, with drivers seated in sulkies. The Standardbred, developed in the eastern states, was the original American roadster, a trotter that might be trained to pace. The trotting gait is a diagonal movement, with diagonally opposite legs advancing together. The pace, which some horses do naturally and others by training, is a lateral gait, with both legs on the same side moving together. Good horses with either gait can cover a mile in under 2 minutes.

Light-horse shows became numerous and popular and the Canadian Horse Shows Association furnished uniform rules for contests. Over the years, Canadian horses made many notable records, for example that of the jumper, Confidence, in the East and Barra Lad in the West. The former, owned by Sir Clifford SIFTON, cleared the bars at 245.11 cm at an Ottawa show to establish a world's record, and the latter, foaled at Essondale, BC, and exhibited by Peter Welsh of Calgary, made the incredible jump of 247.65 cm for 6000 spectators at New Westminster in 1925. It was a new world's record but ended tragically; the great horse must have sustained internal injuries and died later the same evening.

Canadian horse shows reached their highest state of competition and glitter at the Royal Agricultural Winter Fair in Toronto, started in 1922. In the West, the comparatively new but excellent facilities of Spruce Meadows, near Calgary, promise to become internationally important. Among the many other light-horse events are RODEO, which reaches its pinnacle at the CALGARY STAMPEDE, and trail riding in mountain regions, started in an organized way by John Murray Gibbon after his arrival in Canada in 1913. Dressage attempts to present the art of training with show-ring finish. For the friends of the Quarter Horse and lovers of stock saddle events, there are the cutting-horse contests. *See also* ANIMAL BREEDING; SABLE ISLAND HORSES; VETERINARY MEDICINE; EQUESTRIAN SPORTS.

GRANT MACEWAN

Reading: E.H. Edwards and C. Geddes, eds, *The Complete Book of the Horse* (1982); Grant MacEwan, *Memory Meadows: Horse Stories from Canada's Past* (1976).

Horseradish, *see* CONDIMENT CROPS.

Horsetail, perennial PLANT of genus *Equisetum,* the only living representative of the very ancient and primitive class Sphenopsida, tree-sized members of which were prominent in the land vegetation of the Carboniferous era (345-282 million years ago). The stems are usually hollow, have cylindrical sheaths of reduced leaves at the nodes, and arise from creeping rhizomes (underground stems). When present, branches are often in whorls at the nodes. Stem internodes are commonly ridged longitudinally, the ridges bearing silica-containing tubercles or bands. They are herbaceous or shrubby and rarely exceed 1 m in height. Horsetails show



Spore-bearing cone of scouring rush (*Equisetum laevigatum*), one of the 10 species of horsetail found in Canada. Horsetails are representative of one of the most ancient vegetations on Earth (*courtesy National Museum of Natural Sciences*).

a form of alternation of generations (a sexual phase alternating with an asexual one), in which each generation is an independent plant. Spores are produced in spore cases borne on stalks which form a fruiting, terminal cone on the fertile stem. The spores germinate, forming plants (prothallia) on which are borne antheridia and archegonia (structures producing sperm and eggs, respectively). The prothallium is the sexual generation. Fertilization of the egg and subsequent development produces the familiar horsetail plant, the asexual generation.

Fifteen species of *Equisetum* (mostly of worldwide distribution) and many sterile hybrids (some widespread) now exist. Ten species occur in Canada: smooth scouring rush (*E. laevigatum*) mainly in the central regions; giant horsetail (*E. telmateia*) on the West Coast and in the Okanagan Valley; common horsetail (*E. arvense*) and variegated horsetail (*E. variegatum*) transcontinentally and far N of TREELINE. Six other species are transcontinental, but do not occur in the High Arctic. Most species occupy moist environments. Common horsetail and scouring rush (*E. hyemale*) are sometimes considered WEEDS. Settlers used silica-encrusted stems of both these species for cleaning and sanding. The former is still used to hone woodwind reeds. Common horsetail has been reported poisonous to livestock in Canada. W.J. CODY

Horton Plain, 71 000 km^2, is the most northeasterly part of the Interior Plains, extending to Amundsen Gulf on the Beaufort Sea, NWT. It consists of a series of dissected plateaus, generally below 800 m elevation, underlain by flatlying Paleozoic sedimentary rocks in the W and by Precambrian sedimentary bedrock in the E. Drainage is provided by 2 scenic rivers, the HORTON and Hornaday. Among its numerous small lakes, the Bluenose (400 km^2) and Horton (166 km^2) are noteworthy. The vegetation is low arctic tundra in the N, dominated by dwarf shrubs and grasses, and woodland in the S, consisting of scattered, stunted spruce with a lichen carpet. The summer range and calving grounds of the large Bluenose caribou herd lie within this region. Paulatuk on Darnley Bay is the only permanent settlement in the area. S.C. ZOLTAI

Horton River, 618 km long, rises N of GREAT BEAR LK in the NWT and empties into Amundsen Gulf. Shallowly entrenched in the upper part of its course, it cuts a deep (up to 200 m) valley into the soft cretaceous bedrock in its lower course. It originally reached the BEAUFORT SEA at Harrowby Bay, but one of its meanders cut a channel to Amundsen Gulf around 1800, shortening its course by some 100 km. Near the present delta are the Smoking Hills, where lignite and jarosite beds are burning, giving off sulphurous smoke. These beds were already burning in 1826 when J. Richardson mapped the shoreline. The river is shallow, but navigable by small craft. Its valley is wooded to within 100 km of its mouth, where the treeless, shrubby tundra begins. A trading post operated at the delta 1918-31, but there are no settlements along the river at present. S.C. ZOLTAI

Horwood, Harold Andrew, columnist, politician, editor, novelist (b at St John's 2 Nov 1923). Horwood supported J.R. SMALLWOOD in the campaign which brought Newfoundland into Confederation, and he represented Labrador in the Assembly 1949-51. Horwood relinquished his editorial responsibilities with the St John's *Evening Telegram* in 1958 and became a free-lance writer and novelist. His best-known works are 2 novels — *Tomorrow Will Be Sunday* (1966) and *White Eskimo* (1972) — and *The Foxes of Beachy Cove* (1967), a thoughtful little book on the back-to-nature theme. He is founding editor of a literary magazine, *The New Quarterly*. D.R. BARTLETT

Hose, Walter, naval officer (b at sea 2 Oct 1875; d at Windsor, Ont 22 June 1965). After 21 years in the Royal Navy, Hose transferred to the Canadian navy in 1912. Until 1917 he commanded the *Rainbow* on the Pacific coast, then the trade defence forces on the Atlantic coast in 1917-18. In 1921 he became director of the Naval Service ("chief of the naval staff" after 1928), an appointment he held until his retirement in 1934. Cuts in defence spending in 1922 and 1933 threatened the navy's survival, but Hose saved the service through determined leadership and by developing the naval reserves founded under his direction in 1923. ROGER SARTY

Hospital Canada has numerous types of hospital, including general (858) and allied, ie, mental, rehabilitation, veterans', extended care and pediatric. Most hospitals are under provincial jurisdiction but some 155 general and psychiatric hospitals are directly under federal jurisdiction.

Historical Development The first HÔTEL DIEU in New France was established in 1639 by 3 sisters of the order Les Religieuses Hospitalières de la Miséricorde de Jésus in Québec City. This hospital is still in operation. By 1694, 3 other religious hospitals had been constructed, including the Hôtel-Dieu in Montréal, and in 1819 and 1829, respectively, general hospitals were opened in Montréal and York [Toronto]. The York hospital had been built several years earlier but had been used as a temporary home for the government after Upper Canada's parliament buildings burned down in Dec 1824.

The first general hospitals were charitable institutions, relying on donations from benevolent organizations and prosperous citizens. The patients paid very little, if anything, and government support was erratic and undependable. In 1867 the Toronto General closed for a year because of lack of funds, and it was partly because of this that the Ontario government passed an Act in the early 1870s providing for annual grants to the hospital and to other charitable institutions. Today nearly all hospital operating revenues come from federal and provincial governments.

Until the early part of the 20th century, hospitals were generally devoted to the treatment of the poor, who suffered in particular from infectious and nutritional diseases, eg, influenza, pneumonia, tuberculosis, gastroenteritis and scurvy. Because the relationship between public sanitation and personal hygiene and disease was largely unknown, and because of the lack of therapeutic drugs, infectious diseases spread uncontrollably. Dirty and overcrowded hospitals were often traps for infection, and most prosperous citizens, who were treated at home, avoided them.

This situation persisted through the early 1900s when tuberculosis hospitals were established to sequester the "incurables" from the general public. "Feebleminded" individuals were dealt with in a similar way and mental hospitals began to expand in both number and size. Between WWI and WWII, however, and before the advent of antibiotics or vaccination programs became widespread, infectious-disease mortality rates began to decrease as a result of enforced PUBLIC HEALTH measures.

By the 1880s, the introduction of safe anesthesia, aesepsis (ie, prevention of infection) and of improved surgical techniques led to decreased mortality from conditions such as postoperative hemorrhage and gastrointestinal abnormalities (*see* MEDICINE, HISTORY OF). Because these techniques required sophisticated equipment, specially trained personnel and longer periods of observation, the use of hospital facilities increased, and hospitals became centres for curative therapy, for teaching and for MEDICAL EDUCATION and research.

In 1945 the federal government submitted recommendations for changes to the health-care system in Canada to the Dominion Provincial Conference on Reconstruction. The recommendations proposed a series of grants and low-interest loans to the provinces to improve existing health services and construct new hospitals. Because the conference representatives failed to reach agreement, the proposals were left in abeyance, but in 1948 the plans were resurrected in the National Health Grant Program. Funds granted to the provinces were to be used to construct new general and mental hospitals, to strengthen public health services, and to develop programs for specific diseases, eg, tuberculosis and SEXUALLY TRANSMITTED DISEASES, and for specific patients, eg, crippled children.

In 1958, following the lead of Saskatchewan, the federal government passed the Hospital Insurance and Diagnostic Services Act, which empowered it to negotiate agreements with each province to share the cost of provincially administered insurance programs providing for the payment of the basic cost of acute treatment, and for convalescent and chronic care in approved hospital facilities. These hospitals were guaranteed reimbursement for services rendered. By 1961, all provinces were providing federally assisted hospital insurance to their residents (*see* HEALTH POLICY).

In 1961 the federal government established the Royal Commission on Health Services to investigate the health-services system and to recommend measures to "ensure that the best possible health care is available to all Canadians." The commission's final report (1964) became the cornerstone of Canada's health-care system.

Both the Health Grant Program and the Hospital Insurance Act encouraged a reliance on hospital care and diagnostic service — the most expensive elements of any health-care delivery system. In response to these rising health-care costs and the royal commission recommendations, the federal government passed the Medical Care Act in 1967 empowering it to share the cost of medical insurance plans in each province. Within 3 years, all provinces had such plans; the combination of national hospital and medical insurance is called medicare.

In 1966 the federal government established the Health Resources Fund under which $500 million was granted to the provinces to plan, build and renovate facilities to be used to train health professionals or conduct research. The money was distributed over a 14-year period ending in 1980; $400 million of this fund was used to build new facilities or renovate old ones. The remaining funds were used to replace outdated equipment. The bulk of the $500 million was spent on teaching hospitals, all of which are general hospitals. Some of the money was spent on medical schools, but because of the intimate relationship between such schools and teaching hospitals, it is difficult to determine precise amounts.

In the 1970s the federal and provincial governments re-evaluated their health-care funding arrangements. It was felt that the federal matching of provincial spending on hospital and medical care encouraged an overreliance on these expensive components of health care. The federal government wished to place some controls on health-care expenditures and to give provincial governments an incentive to be efficient and the latitude to meet their needs. These considerations led to the 1977 Federal-Provincial Established Programs Financing Act (EPF). Through a combination of cash grants and tax transfers, the federal government still pays for at least 50% of the cost of provincially administered hospital and medical insurance plans, but does not automatically match provincial expenditures. In response, provinces have introduced innovations, eg, home-care, day surgery, and outpatient care. All indications are that the federal government's strategy has halted the rise in hospital expenditures, though total health expenditures continue to grow.

A new Canada Health Act, which combines the 2 previous Acts (hospital insurance and medical insurance), went into effect in April 1984.

Resources Health and hospital costs accounted for 8.44% of Canada's GROSS NATIONAL PRODUCT (GNP) in 1982, the most recent statistics available to Feb 1985. In the same year, all hospitals accounted for 40% of health expenditures or $12 billion (3.4% of GNP). Hospitals spend an average of 75% of their budgets on wages and salaries and employ approximately 450 000 people. In addition to the employees, approximately 48 000 volunteers devote 3.2 million person hours and millions of dollars' worth of free labour to hospitals annually.

Most hospitals are given an annual inflation-adjusted global budget by the provincial government. With these resources hospitals provide surgical suites, nursing care and a wide range of diagnostic, therapeutic and rehabilitative services. Hospitals feed and house the inpatients, offer numerous community, outpatient and emergency services, and provide training programs for health-care professionals. They also undertake research projects. Hospitals not only train new physicians, nurses and other health-care personnel, but they are committed to educating patients in the maintenance of health and in coping with disabilities.

In the 1982-83 fiscal year, general and allied hospitals provided a total of 48.4 million patient days (ie, the number of days spent in hospital by all patients for a given period) to patients who had 3.6 million hospital stays (this corresponds to 1958 patient days and 146 hospitals stays for every 1000 Canadians). This measure does not take into account the outpatient, research, and community services that hospitals provide, but it is a commonly used indicator of hospital services. The average cost per patient day in 1982-83 was $246.50. However, the cost of operating special intensive-care units can be as high as $5000 a day, although, because of medicare, Canadians do not have to pay these costs out of their own pockets.

Personnel in hospitals includes technologists, therapists and administrative staff. Although physicians powerfully influence the operation of hospitals, very few are hospital employees. Except in the rare cases of laboratory and emergency-room specialists, and some senior professional staff in teaching hospitals, physicians do not receive payment from hospitals, although only physicians can admit patients to a hospital (patients cannot admit themselves). Physicians have complete authority to order surgery, drugs, diagnostic and therapeutic service, and nursing services for their patients. They are also the only health-care professionals qualified to discharge a patient from hospital (patients can discharge themselves but usually do not do so). Nurses, on the other hand, are hospital employees and are responsible for delivering most of the patient care in hospitals. There are about 250 000 hospital-employed nursing personnel in Canada, 130 000 of whom are registered nurses.

Patients in hospital are usually described by their age and sex, or by their illness. By age and sex, the largest users of hospital services are the elderly (people over 65 make up about 10% of the population and are responsible for about 40% of Canada's patient days) and women in their child-bearing years. By illness, the major cause of hospital use is HEART DISEASE (9.5% of patient days). Fourteen broadly defined conditions account for 67.6% of patient days.

Future A number of factors are changing the way in which health-care services are being delivered, eg, population AGING, increase in chronic illness, advance in medical technology. Hospitals of the future will need to provide increasingly specialized technological care and yet meet an opposing demand for more personal, generalist care for patients with chronic conditions. It is expected that there will be a greater emphasis on community services and on outpatient and home care. JEAN-CLAUDE MARTIN

Hotel Accommodation for travellers in Canada derives from 2 traditions: the modest inn or roadhouse, and the urban hotel. In early settlements many households took in overnight guests; those with inn licences could charge for the service, a practice which formalized the roadside inn. Willard's Hotel (1795) and Cook's Tavern (1822), both from Williamsburg Township, Ont, and now at UPPER CANADA VILLAGE, were stopping places for commercial travellers and immigrants in coaches along the King's Hwy and on bateaux on the St Lawrence R. Symmes Inn (1831) at Aylmer, Qué, strategically located at a boat landing on the Ottawa R and immortalized by William Henry BARTLETT, boasted a table supplied "with the best the country affords." Not all roadhouses offered such amenities. An 1860s visitor at Hat Creek House, a ranch on the CARIBOO ROAD leading to BC's goldfields, complained that "the bunks were hard as a board . . . and the dark looking blankets had unwrapped too many sweaty, dusty travellers since last washed." Inns were often built to resemble large houses, but with the addition of 2 tiers of verandahs.

In the early 19th century, hotels in large Canadian cities were often planned on a lavish scale. Rasco's Hotel in Montréal, opened in 1836 and still standing today, is a 5-storey stone building that once accommodated 150 guests. Larger hotels designed in the most fashionable styles of the day achieved high levels of luxury. The Windsor Hotel in Montréal (architect G.H. Worthington, 1876-78), designed in the Second Empire style, was the most gracious in the city.

The railway age heralded a new era in hotels, one that blurred the distinction between the 2 traditions. The CPR built a series of "dining stations," with sleeping rooms, in the BC mountains to feed travellers and accommodate guests.



Neptune Inn at the Foot of Mountain Street Looking Up Toward Parliament House, Quebec, Lower Canada (1830), watercolour by J.P. Cockburn (*courtesy Public Archives of Canada/C-40368*).



Early photograph of the interior of the stylish Empress Hotel, Victoria, BC (*courtesy Provincial Archives of British Columbia/8208*).

Glacier House (architect T.C. Sorby, 1886), perched at the summit of the Selkirks, recalled a Swiss chalet. The original wood-framed Banff Springs Hotel (Bruce Price, 1886-88) was an elaborate resort hotel in the scenic Alberta Rockies. Together with the Château Frontenac in Québec City (Price, 1892-93), it began a tradition of château-style railway hotels that became a peculiarly Canadian architectural form. The CPR's Empress Hotel, Victoria (F.M. RATTENBURY, 1904-08), and the Grand Trunk Ry's Château Laurier, Ottawa (Ross and MacFarlane, 1908-12), are notable examples of the genre.

The contemporary descendants of roadside inns and urban hotels cater to both commercial travellers and tourists, and are often managed by international chains. The motel (or motor hotel), located along a highway or on the edge of the city, caters to the automobile traveller. Popularized in the US in the 1930s, the motel is typically one or 2 storeys high, with each room accessible from the parking lot. Many city hotels have become tall slab towers; they serve as convention centres, with large meeting rooms and internal shopping arcades. The Toronto Hilton (William Tabler and Campeau, 1975) has 967 guest rooms in 2 towers, one of which is topped by a revolving restaurant. Highway and city come together in Montréal's Hotel Bonaventure (Affleck, Desbarats, Dimakopoulos, Lebensold and Sise, 1967-68), in which a motellike series of rooms arranged around open landscaped courts is perched atop a monolithic trade and retail structure. *See also* ARCHITECTURE; ARCHITECTURE, DEVELOPMENT; TOURISM.

HAROLD D. KALMAN

The imposing Château Frontenac at Québec City (1892-93) helped begin a tradition of château-style hotels that became a peculiarly Canadian architectural form (*photo by Yves Tessier/Reflexion*).



Hôtel-Dieu, first HOSPITAL in NEW FRANCE and one of the first such institutions in America, was founded in 1639 by the duchesse d'Aiguillon to care for Indians around the colony of Québec. In Aug 1639 the first 3 nuns of the nursing order Religieuses hospitalières arrived in the colony. They soon established a hospital in nearby SILLERY to treat Indians fighting a smallpox EPIDEMIC. The hospital moved to the present site on Québec City's rue du Palais in 1644 when the IROQUOIS WARS threatened its security. Of the original building, only the foundation remains, and the oldest section of the present building dates from 1696. The Hôpital l'Hôtel-Dieu de Québec has provided medical care for almost 350 years. The second Hôtel-Dieu was founded in 1642 when Jeanne MANCE began to treat the sick in the newly founded colony of Ville-Marie [Montréal]. Granted land outside the fort in 1644, the Hôtel-Dieu de Montréal moved to its present site on Mont Sainte-Famille in 1861. It is now affiliated with UNIVERSITÉ DE MONTRÉAL. Other Hôtel-Dieu hospitals established by the Religieuses hospitalières include those at Tracadie (1868), Chatham (1869), Madawaska (1873), Arthabaska (1884), Campbellton and Windsor (1887) and Winooski, Vt (1894).

MARCEL CADOTTE

Reading: Michel Allard, *L'Hôtel-Dieu de Montréal (1642-1973)* (1973); H.R. Casgrain, *Histoire de l'Hôtel-Dieu de Québec* (1878).



Photograph of the Hôtel-Dieu, Québec City, taken *c*1870-80. Founded 1639, it was the first hospital in New France and has provided medical care by its nursing sisters for almost 350 years (*courtesy Public Archives of Canada/C-35634*).

Houde, Camillien, politician (b at Montréal 13 Aug 1889; d there 11 Sept 1958). In 1923 and 1928 he was elected to the Québec legislature as a Conservative, and in 1949 he was sent to the House of Commons by Montréal-Papineau; but from his election as mayor 2 Apr 1928 to his retirement 18 Sept 1954, Houde so incarnated his city that he was called "Mr Montréal." His mayoralty was suspended on 5 Aug 1940 when, after calling for defiance of registration for military service, he was arrested by the RCMP, interrogated and then taken to an Ontario internment camp. Like many nationalist Québecers of the period, he supported the ideology of Mussolini's Italy and Vichy France, while still remaining loyal to the British crown, which had made him a CBE in 1935. At least 50 000 Montréalers eagerly welcomed Houde after his release 18 Aug 1944. An early split with UNION NATIONALE chief Maurice DUPLESSIS was healed, and Houde dominated Montréal as Duplessis did Québec. An enormous man with a Cyranoesque nose, he dispensed patronage generously, winked at the city's brothels and blind pigs, and saw police corruption and political payoffs as facts of life. But his obsession was immortality, not money. The flamboyant style of his mayoralty is reflected in his crypt at Montréal's Côte-des-Neiges cemetery — an Italian marble replica of Napoleon's.

BRIAN MCKENNA

House usually refers to a building that serves as living quarters for one or several families. House forms and building styles have changed throughout history in response to socioeconomic forces as well as climatic conditions inherent to particular geographic locations. In effect, houses are like mirrors that reflect both the living conditions and the cultural heritage of their builders.

The earliest dwellings in Canada were built and inhabited by Indians and Inuit. Viewed superficially, these buildings appear primitive, but although simple, they were sophisticated adaptations to a particular lifestyle and habitat, and in greater harmony with nature than most houses are today. The simplest dwellings were built by food gatherers and hunters, nomadic people who roamed Canada's extensive grasslands, forests and the arctic barrens of the North. Their nomadic existence precluded the establishment of permanent settlements, so these migrating peoples built temporary shelters. Some were constructed of available building materials near the campsite, and others were made of materials easily transported from camp to camp.

Perhaps the most fascinating dwelling is the IGLOO, a snow house built by the INUIT living in the treeless tundra. These circular, dome-shaped structures had a raised sleeping platform facing the low entranceway. Working from the inside, the builder placed one snow block next to another in upward-spiraling rows, each block tipped slightly inward to narrow the circle until a dome structure resulted. The spiraling rows made scaffolding during construction unnecessary. Although snow may seem to be an unlikely building material for shelter, it has excellent insulating qualities. Insulation of the interior was often improved by lining walls and ceilings as well as the sleeping platform with caribou hides and seal skins. When the igloo began to melt in summer, it was abandoned and replaced by a seal-skin tent called *tupiq*, a portable dwelling like the TIPI, consisting of a framework of poles covered with seal skins (*see* NATIVE PEOPLE).

The tipi was an ingenious dwelling used by several tribes, but mostly associated with the Plains Indians, who followed the immense bison (buffalo) herds that roamed the plains. The skeletal structure of the tipi was composed of 3 or 4 poles tied together at the top and then erected; up to 20 additional poles were placed against the tripod or tetrapod thus formed. A tailored buffalo-hide cover was placed on this skeleton and was staked or weighted down with stones all around the bottom edge. A smoke hole was left on top at the intersection of the poles and could be closed or adjusted with the help of 2 flaps of the hide cover, each attached to a separate freestanding pole. The fire was built near the centre, below the smoke hole, and the bedsteads of the family members were placed on the ground around the walls of the tipi, except at the doorway, which always faced the rising sun. Dome- or beehive-shaped and tipilike structures were the basic forms of indigenous temporary shelters in Canada, and were used by many Indian tribes.

Birchbark tipi and Ojibwa Indians at Lake Winnipeg, Man, 1884 (*courtesy Geological Survey of Canada/595*).



The LONGHOUSE of the agricultural Indians of Canada's northeastern woodlands was a communal dwelling. The interior was subdivided into a number of bays, each allocated to a single family. Each bay had a low sleeping bench against the outside wall, and between the facing bays ran a wide corridor down the length of the building. These longhouses were not substantial, since after a few years of tilling without fertilization, the exhausted soil nearby produced scanty crops and the Indians abandoned their houses and moved on. A series of poles, arched to form a barrel-vault skeleton, supported the bark roof shingles and matting of the walls. Although each bay or cubicle was only about 2 m wide, the length of the longhouse would often exceed 20 m, from which we may conclude that it was not unusual for 20 families to live in one building.

More substantial dwellings were built by the coastal Indians of BC. Living in a temperate climate, with a plentiful supply of good building materials, the coastal Indian tribes built large communal houses, each inhabited by a number of families. Their rich environment allowed a settled existence, which is reflected in the permanence of their homes. These impressive structures were low-pitched, gable-ended, rectangular structures built of massive cedar posts and beams. Their interior arrangement, 2 facing rows of bays with sleeping platforms separated by a central corridor, was similar to the buildings of the eastern woodlands. Hearths were tended in the centre of the corridor, with the smoke escaping through apertures made when the roof planks were thrust aside by means of a pole. Most communal buildings had only a single entrance at one of the gable ends. The more leisured existence of the coastal Indians led to a significant art form of ornamentation of their dwellings and TOTEM POLES.

With the European settlement of the St Lawrence Valley in the 17th century, a new house form was introduced to Canada. The early French Canadian settlers created a building tradition reminiscent of French architectural styles but using Canadian building materials. Initially the farmhouses of the habitants were low, broad buildings constructed of wooden planks with a shingled high-pitched roof and gable verges. They were rectangular and usually divided into 2 rooms of unequal size, with a large masonry chimney rising from the cross wall. Timber was later replaced by fieldstone gathered from the clearing of the fields. Concurrently, other changes were introduced in response to the harsh climate: floor levels were raised well above grade and eaves became wider; the pitch of the gable verges became steeper until the hip was superseded by a gable; with the introduction of a second fireplace, chimneys were placed at the gable ends; a further extension of the eaves led to the typical curving bellcast roof covered with sheet metal. The verandah house with a gallery passage above snow level and wide eaves supported by a row of columns was a further evolution of the Québecois rural house.

The typical urban house in Québec had raised masonry gables with double chimneys and wall head corbels, and the roof structure was covered with sheet metal or tin tiles. These precautions were made necessary by the hazard of fire when houses were multistoreyed and had stone masonry walls with wooden floors and roofs. However, the use of wood planks for walls was also widespread in urban houses and, in later years, wood was often used in conjunction with an external cladding of brick. The early urban houses were attractive structures with well-



Second home built by Ivan Mihaychuk at Arbakka, Man, 1903 (*courtesy Public Archives of Canada/PAC-8788*).

proportioned windows and doors, having few ornaments but characterized by a simple elegance.

After the Conquest (1760), European traditions in rural house construction continued, not only with the application of the heritage brought from the British Isles, but also with an American colonial architectural influence transplanted into Canada with the influx of the LOYALISTS. Stone masonry walls were gradually replaced by red-brick masonry, but wood continued to be the dominant building material for rural houses. On the prairies, where wood was scarce, early settlers often built SOD HOUSES.

During the 19th century the most prevalent urban dwelling form in central and eastern Canada was the town house, in either attached or detached dwelling units. Reminiscent of the Georgian and Victorian town houses of Great Britain, the Canadian town house, like its American counterpart, was less formal. Since few households had servants, Canadian townhouse dwellers placed their kitchen and scullery on the first floor, rather than in the basement, along with the principal reception rooms. In the Canadian town house, the living room, the entrance vestibule and stair hall occupied the front end of the house, and the dining room, kitchen and scullery the rear; the living and dining rooms were often separated from each other by an archway, with or without recessed sliding doors, a double-parlour type of arrangement. The bedrooms were located on the upper floors, with the master bedroom facing the street. The width, size and appointment of the town house reflected the wealth of its occupants, but usually town houses were 2 storeys high, with the ground-floor level raised half a floor above sidewalk level. Tenements and apartment buildings also made their appearance in cities during the 19th century. Tenements were built as minimum-standard living accommodations for low-wage earners, and apartment buildings were more commodious, designed as rental flats for the middle-income group. Neither type constituted a large proportion of the Canadian urban-housing stock and consequently the dire housing conditions experienced in Great Britain and in many large American cities never existed in Canada.

Houses in St-Jean, Qué, showing typical roof lines (*photo © Hartill Art Associates*).





The double house, built *c* 1870 in London, Ont, displays classical elements (*photo © Hartill Art Associates*).

At the beginning of the 20th century, first the wealthy and later others moved to the outskirts of the cities to live in houses on large lots along treed avenues to escape increased air pollution, crime, overcrowding and noise; this desire for a healthier living environment eventually resulted in the proliferation of dormitory suburbs. Single-family suburban homes are usually 2-storey dwellings with a spatial organization not unlike that of town houses. The principal rooms invariably occupy the front, or street side, of the house overlooking the front lawn, and the secondary rooms are placed towards the rear yard.

The mixture of the garden-city home and new forms such as the bungalow — one of the most popular 20th-century dwelling types — can be seen in the urban landscape of Vancouver in the years 1886-1930. Vancouver's rate of home ownership ran as high as 80% in those years. Unpleasant memories of the industrial cities of Britain were still fresh, and the detached house became the ideal, appearing in surprising "imported" styles, such as Italianate and Queen Anne, as well as in simple frame houses and cottages. Within the suburbs, the most prevalent form was the California bungalow, a style which spread across N America. The bungalow bespoke a new lifestyle associated with the easier climate and informality of California. It featured indoor-outdoor rooms, deep verandahs and patios. Meanwhile, Vancouver's elite areas favoured fancier mansions and villas displaying a more pastoral imagery based on the lines of old English farmhouses or the use of half-timbered decoration in Tudor Revival mansions. These houses attempted to create an instant sense of history, of homes where generations had dwelt. This half-timbered motif was found elsewhere in Canada but was especially prevalent in Vancouver. Equal enthusiasm was shown for the simple English farmhouse, characterized by rough stucco surfaces and exaggerated rooflines. The appeal of the English Tudor cottage in Vancouver and Victoria was symbolic of the strong ties with the "Old Country," as was the California bungalow of BC's presence in the new. Only later, in recognition of an earlier heritage, did British Columbians recognize in the woodwork of the Northwest Coast Indians and in the coastal rain forests an alternate regional style, characterized by cedar siding and the shed roof.

In comparison with the traditional multistoreyed house, the single-level bungalow acquired increasing popularity across Canada and was used extensively in suburbs where land prices were more reasonable. Today, the suburban bungalow is usually built of wood with an external cladding of wood or masonry and gyprock on the inside. It is prevalent among every income group, as the modest home and as the luxurious rambling ranch house. The suburban sprawl has, however, resulted in increased distances between the city and new suburbs. To economize on land, and in response to the effects of the energy crisis on transportation, alternatives to the bungalow have been introduced, such as the split-level house, followed more recently by a return to 2 traditional house forms: the 2-storey, single-family home and the attached town house.

Along with the proliferation of single-family dwellings in the suburbs, multifamily residential accommodations in cities also underwent changes during this century. The apartment house attracted people who were not family oriented and who preferred to live in the city for proximity to work and entertainment. To spread more equitably the higher cost of urban land as well as to share the maintenance costs of amenities such as swimming pools, apartment houses evolved into large building complexes, including fitness and entertainment centres and sometimes retail space. Masonry load-bearing construction was replaced by steel or concrete structural frames, paralleling the development of office towers. With higher buildings, upper-storey apartments offered more dramatic views and the ultimate in urban luxury living became the penthouse apartment (*see* CONDOMINIUMS).

Contemporary condominium and mixed housing in the St Lawrence neighbourhood of Toronto (*photo © Hartill Art Associates*).



The principal shared features in 20th-century Canadian housing design are informality, functionalism and hygiene. Informality has been encouraged by the increasing unavailability of servants and with it the abandonment of inconvenient and redundant features of housing design, such as sculleries, butler's pantries and service corridors. The *en suite* arrangement of drawing and dining rooms has been replaced by a less formal, open plan, where the principal living spaces flow into each other. New socioeconomic realities place an emphasis on functionalism; functional houses are designed not so much to impress occasional visitors as to make living in them comfortable. Perhaps the design, size and location of the kitchen in modern houses best illustrate the new movement; the ill-equipped, dark kitchen relegated to an obscure corner of the old house has been replaced by a well-equipped, sunny and efficient space adjacent to the dining area, or often combined with it. Much greater attention is given to the layout of bedrooms and bathrooms so that reasonable privacy can be enjoyed by each member of the family. Healthful living conditions imply ample access to light and air, as well as good sanitary services. Large picture windows and glass walls in domestic architecture place a new focus on views and thereby a greater awareness of the outdoor environment. Areas such as terraces, patios and gardens are perceived as extensions, or outdoor rooms, of the house. Their connection with the interior, as well as their landscape treatment, have become important design features.

Until the 1970s the choice of housing accommodation in Canada was polarized between low-density, single-family suburban houses and high-density, multifamily urban apartment houses. With the emergence of demographic changes and a greater awareness of diminishing energy supplies, new dwelling forms are being developed that avoid both extremes. Medium-density and medium-rise urban dwellings that are well lit and ventilated, often having more than one exposure, have already made an appearance in large cities of Canada. Another emerging trend involves mixed zoning, whereby housing can be built in combination with commercial and office buildings. Occupying the upper floors of a building, this housing resembles penthouse accommodation with ample access to sun, air and view, away from street noises, but still close to the urban and cultural facilities of a lively city.

Demographic shifts and socioeconomic forces in this century have brought into existence a variety of specialized housing for the elderly, the handicapped, single persons, students, communards and others. The same common design criteria of informality, functionalism and hygiene also govern the layout of specialized housing.

The energy crisis which began in the early 1970s stirred the consciousness of many designers to conserve energy. The simplest approach was the use of passive solar energy, by means of an optimum orientation of the dwelling towards the sun. Another approach entailed the active collection of solar energy through solar panels and storage in some form of thermal mass until required. The obvious advantages inherent in subterranean structures led to the earth-shelter movement, which promised warmth, quiet and energy efficiency, but underground homes have yet to gain popularity. *See also* HOUSING AND HOUSING POLICY; ARCHITECTURE DEVELOPMENT.

NORBERT SCHOENAUER

Reading: A. Gowans, *Building Canada* (1966); M. Lessard and H. Marquis, *Encyclopédie de la maison québecoise* (1972); Norbert Schoenauer, *6,000 Years of Housing*, 3 vols (1981).

House Leader, nonofficial title of MP nominated by each party to serve as head strategist and tactician in the House of Commons. The government House leader, a Cabinet member with honorific title president of the Privy Council, negotiates among parties about the Commons timetable. In each party the House leader is responsible for the PARTY WHIP and manages matters ranging from office space to salary negotiations. House leaders meet weekly to discuss the government's timetable and choose speakers. They have sufficient power to hold their parties to the negotiated agreements.

ROBERT J. JACKSON

House of Commons, elected lower house of PARLIAMENT, some of whose members belong to the CABINET, others to the Opposition parties' shadow, or alternate government, and including backbenchers or private members (members who do not belong to the Cabinet and are not designated, on the Opposition side, as party critics) of the parties. There are sometimes a few Independents. The 282 members of the House (called Members of Parliament, or MPs) are elected in single-member constituency ELECTIONS or by-elections. Under the CONSTITUTION ACT, 1867, the Queen and the GOVERNOR GENERAL and the Queen's ministers and other public servants, not the House of Commons, govern Canada. The House, often incorrectly referred to as Parliament, is important constitutionally because no new statutes of any kind may be made except in response to bills that have been passed by it, and politically because, unlike the SENATE, it is an independent, elected body. Ministers are responsible to the House, not to the Senate.

Nonfinancial bills may be introduced in the Senate as well as in the House, but under the Constitution Act, 1867, both taxation bills and appropriation bills must have passed the House before going to the Senate. Although private members may introduce taxation bills, under the Act (s54), only the CROWN may initiate spending (supply) business; if the House could decide on its own to vote money for new purposes or to increase the amounts requested by the Crown, it would be well on the way to becoming the Government.

The House has important functions deriving from the Government's dependence on its cooperative support. Its constitutional function is to maintain a government for a reasonable time; to defeat one ministry after another in rapid succession would be anarchistic, a point which becomes highly relevant when no party wins a majority, as happened in 6 of the 10 elections between 1957 and 1980. The political function of the House is to foster government acceptable to the people, and it has the power to insist ministers account for their conduct and their bills and policies in their present portfolios. (In 1979 the CONSERVATIVE government proposed that Cabinet ministers, but not former ministers still in the House as backbenchers, be required to answer questions about activities that occurred during earlier portfolios). Some questions may be written down and placed on the Order Paper to receive a printed reply but during oral question period (45 minutes daily) ministers may be questioned directly (*see* PARLIAMENTARY PROCEDURES). Usually, leading Opposition speakers and selected backbenchers on the Opposition side of the House ask the questions. Dissatisfied questioners may indicate they will raise a matter on adjournment later in the day.

"Responsible" means both accountable and reasonable, conscientious or justifiable. Responsibility in the first sense helps ensure that ministers act responsibly in the second sense. The House could bring down a bad government by refusing to vote it money but if the system is working well this should rarely, if ever, happen. Elections were brought on by defeats in the House of minority governments in 1963, 1974 and 1979. In recent years the controversy over ministerial responsibility and growth of executive power (sometimes referred to as "Cabinet dictatorship") has generated considerable debate over the role and function of the House. The governments of Western democracies have changed fundamentally since the 19th century and, in Canada, Parliament serves increasingly as an auditor of executive government, examining their bills, policies and conduct. House COMMITTEES are particularly useful for these purposes. The basic difficulty is how to improve the House's effectiveness as auditor and critic without abandoning the principle that the government is responsible for policy.



Interior view of the House of Commons. The Speaker's chair is at the far end, with the public gallery above (*courtesy National Film Board/Photothèque*).

In a sense the House is part of a permanent election, so the role of the media in transmitting parliamentary debate and generating public opinion is very important. The decision of the House to publish its debates in the form of HANSARD and to use television were prompted in part by dissatisfaction with the news media.

The House is divided into the ministers and their supporters and those opposed to the government. Since 1921 there always has been at least one third party on the field, and occasionally 2 or more third parties. Since 1974 the election ballots have shown the candidates' party allegiances, if any. Independents usually are not successful. Members do leave their parties in the House in protest to sit as Independents, but rarely.

The Opposition is allotted up to 25 days in 3 supply periods to determine the subject of debate. Supply periods occur when the government is seeking passage of appropriation bills (*see* BUDGETARY PROCESS). The Opposition may also move adjournment of the House to discuss an urgent, unexpected matter. The SPEAKER may hold over such motions until the evening. The debate on the SPEECH FROM THE THRONE and the debate on the budget are general debates.

At the beginning of each Parliament the privileges of the House of Commons are confirmed by the governor general. At Westminster it was found that if the House was to participate effectively in parliaments it had to have certain privileges, certain exemptions from the ordinary law that were and are the special rights, not of individual members, but of the House. For a long time one of the foremost privileges at Westminster was that its members could not be imprisoned for debt. The foremost privilege of the Canadian House is the right of its members to speak freely — without being liable to prosecution in the courts — in proceedings of the House and its committees. This does not mean members can say anything they please; the privilege appertains to the House, which has a responsibility to control its members, to protect ordinary citizens from vilification. The House can forbid the publication of its debates and controls the taking of pictures and the making of notes in the galleries. The content of parliamentary papers, eg, Hansard, is privileged, but the decision of whether or not to broadcast proceedings has created difficulties: eg, does the freedom from legal penalties extend to broadcasters using the official tape? If so, might not the protection of ordinary citizens against libel be abridged?

MPs may be accused of contempt (which embraces breach of privilege and disrespect for the honour and dignity of the House) and for misleading the House not only in statements about their own conduct but possibly in ministerial answers to questions: eg, in 1982 the SPEAKER took under consideration a breach-of-privilege complaint against the minister of justice. A member of the public may be accused of contempt for publishing an attack on the Speaker, a charge against a member outside legal process, or a false or ridiculing account of proceedings in the House or in a committee. When a matter of privilege or contempt is raised in the House, the Speaker decides if there is a *prima facie* case; if so, the case is normally sent by the House to the Standing Committee on Privileges and Elections for investigation. The committee has the great power to send for persons and papers and may take sworn evidence. The House may admonish or censure offenders and is empowered to imprison them for the balance of the session. Genuine questions of privilege and contempt are serious but very rare; however, many members use points of privilege, which take precedence over most other business, to get the floor merely to voice complaints or make corrections.

All speeches in the House are addressed formally to the Speaker, although direct exchanges often break out in the heat of debate. Private members are referred to by the name of their constituencies — "the Honourable Member for Peace River" — and ministers by office — "the Honourable the Minister of Finance." The terms, "the Prime Minister" and "the Leader of the Opposition" are in order. The House does not permit members to use unparliamentary lan-

guage because it fosters bitterness and reflects on the honour of the House. Some expressions ruled unparliamentary recently include "sick animal," "pompous ass," "has not got the guts," "lies," "nazi" and "stinker."

The Speaker is the chief officer of the House. His or her election is the prime order of business when the House reassembles after an election. The Speaker, although usually a government MP, is responsible not to the government but to the House. The Speaker presides — deciding who is to have the floor, applying the rules of procedure, making rulings, putting the questions and managing the administration of the House and its permanent employees. There have been attempts to make the position permanent. The Deputy Speaker (House-elected) is usually proficient in the official language that is not the Speaker's first language and occupies the Speaker's chair if he or she is absent and chairs the committee of the whole. The Clerk, or Secretary of the House, who holds a deputy minister's rank, is not an MP but is appointed by the governor-in-council. He and one or more of the table officers are expert parliamentarians (procedure experts) and supply the Speaker with advice and information. The Clerk is also the Speaker's chief executive officer in staffing and servicing the House and is responsible to the Speaker for all the papers and the debates (Hansard), but is assisted in this work by expert branch officials.

When the first parliaments were held at Westminster, the king sent a royal sergeant-at-arms, bearing a royal mace, to attend upon the House of Commons, showing that the House was under the king's protection and was not to be threatened or molested. The sergeant-at-arms, who is appointed by the Crown, occupies a special chair in the centre aisle just inside the Bar; he leads the procession when the Speaker enters the chamber or proceeds to the Senate chamber for speeches from the throne, royal assents and prorogations. When the Speaker appears, representing the House, the mace (symbol of the authority of the House vested in the Speaker), borne by the sergeant-at-arms, is at his side.

The House of Commons normally meets in the Commons chamber at the west end of the Centre Block of the Parliament buildings. At Ottawa, unlike Westminster, every member has an assigned place in the chamber and must be in his place to speak and vote in the House (but not in committees of the whole House). There are 5 rows of desks down each of the long sides of the room; these 2 banks of desks face each other across a wide centre aisle. The Chair is at the north end of the centre aisle. This arrangement, far different from that in Paris or Washington, supposedly originated in the days when the English House met in St Stephen's Chapel, and it well suits the adversarial nature of our responsible government system. The main doors are at the south end of the centre aisle; on these the Gentleman Usher of the Black Rod raps when he comes to summon the Commons to the Senate chamber. There is a telescoping brass rail known as the Bar at the foot of the centre aisle, just inside the main doors, which can be extended across the aisle. One of its original functions at Westminster was to keep strangers from mingling and perhaps voting with the members. Occasionally, strangers have been summoned to appear at the Bar of the House to be questioned or censured.

The ministers and parliamentary secretaries are the only members of the government in the House; they receive salaries from the Crown in addition to their indemnities as members from the House. The government and its backbench supporters sit on the Speaker's right, facing east. The leader of one of the opposition parties — normally the largest — has the official role of leader of the Opposition, and in addition to his indemnity as a member receives a salary and various other benefits — including a residence, Stornoway. He generally assigns particular topics — finance, external affairs, transport, etc — to members of his team (the shadow Cabinet), but it cannot be presumed that the assignments would be the same if he became prime minister.

The prime minister occupies the 13th place in the front row on the west side; the leader of the Opposition sits directly opposite. The other ministers are grouped in a block of seats around the prime minister; the leader of the Opposition has his key followers around him. Former ministers — styled "the Honourable" as members of the Privy Council — are given seats in the front rows, at either the north or south end. The leader of each party, through the PARTY WHIP, fixes the party seating plan — invariably by class (year of first election) and alphabetically within classes. After each election, survivors from the previous House move closer to the centre aisle. There now are 296 places in chamber for 282 members. Third parties are placed down beyond the official Opposition.

At the end of most sittings the Speaker adjourns the House — about 10:30 PM on Monday, Tuesday and Thursday, for example — under the terms of a standing order of the House. Normally a sitting takes no more than one day but may extend beyond midnight and usually does when there is an emergency debate. The sitting of 4 May 1982 continued until about 7:00 PM the following day. In 1913, before there was a fixed time for adjournment, 2 sittings each extended throughout an entire week. A new record was set in 1982, during the "long-bell sitting," which began 2 March and did not end until 17 March. Special decisions of the House are necessary for the long adjournments for Christmas, Easter and the summer. Sessions of Parliament begin with a summons by the governor general and end with prorogation by him. Minority parliaments recently have lasted only one or 2 sessions. Between 1867 and 1938 the annual sessions lasted only a few months; now they normally run a full year, with 3 long adjournments. The main purpose of prorogation is to wipe clean the Order Paper. All business unfinished at the end of a session — unanswered questions and all orders relating to bills and motions — die on the Order Paper. The House controls its own adjournments, but the Crown controls both the length of a session and the life of a Parliament. JOHN B. STEWART

Reading: John B. Stewart, *The Canadian House of Commons: Procedure and Reform* (1977).

House Sparrow (*Passer domesticus*), small, granivorous and insectivorous songbird with conical bill and chunky body. Males have a grey crown, black bib, streaked-brown upperparts and greyish white underparts; females are grey-buff overall. They are English SPARROWS (not related to N American sparrows but rather to African weavers) and were introduced in 1850-1852, from Europe, in Brooklyn, NY, to control INSECT PESTS. Through subsequent introductions and dispersals, the species spread across N America, reaching Québec City (1854), Ontario (1870) and across Canada (mid-1880s). In eastern Canada, it is now common to 48° N. Farther N it occurs in isolated colonies. In the West, it is found N to Ft Simpson, NWT, and W to Vancouver I. House sparrows are permanent residents of cities and farms. They build bulky, domed nests, intricately woven of grasses on buildings, in natural cavities or in trees and shrubs. Two to 3 clutches of 3-7 eggs are laid from Apr to Aug. House sparrows nest singly or in small groups. Small flocks form in summer, reaching several hundred individuals in winter. The song is repetitive, metallic and unmusical. House sparrows are agricultural pests and fierce competitors of native birds. They are important for studies of rapid adaptation to new environments. J.C. BARLOW

Housework can be defined as all work performed within a household related to housekeeping functions, childcare and personal services to an adult. Until very recently, housework was not defined as work by most social scientists unless it was performed by a servant who was paid for it. It is only since feminist scholars have pointed out the extraordinary significance of housework for the functioning of the economy and for society that it has received any attention.

During this century, although housework has been industrialized (the products of housework can now be purchased, and services, eg, childcare, nursing the sick, cooking, cleaning, etc, can be bought), no less time than before is actually spent on unpaid housework. The nature of the work performed, however, and the conditions under which it is being performed have changed. Some neo-Marxists argue that, counter to previous assumptions, housework must be understood as productive work, but because it produces use value rather than exchange value, it has long been miscategorized as unproductive. One of its important functions includes the reproduction of society's labour power. Other analysts argue that Marxist analysis cannot suitably be applied to unpaid housework. Even today, economists tend to view housework as a noneconomic activity if no money changes hands. Neither have sociologists and historians given much thought to the subject, although recent work has revealed that unpaid housework does constitute an extremely important part of the overall amount of work performed within Canadian society; if calculated as part of the GROSS NATIONAL PRODUCT (GNP), it would increase it by about 33%. Housework has historically been, and continues to be, a predominantly female activity; although the majority of married women belong to the LABOUR FORCE (from 1941-81 the number of married women in the labour force increased from about 4.5% to 50.5%), time-budget studies reveal that women continue to do most of the housework even when they have a paying job. In 1924, for example, American housewives spent about 52 hours a week doing housework; by the 1960s it had increased to 55 hours. Until very recently, housework was commonly regarded as a natural part of the female role, and even though the majority of people now believe it should be shared between the spouses when both of them have paying jobs, this attitude has not been reflected in actual behaviour. Significantly, various provincial family law reform Acts, starting with the Ontario Act of 1978, have recognized unpaid housework as a contribution to the family's well-being, therefore entitling the performer of this work to some part of family assets upon divorce. M. EICHLER

Reading: M. Proulx, *Five Million Women, A Study of the Canadian Housewife*, Advisory Council on the Status of Women (1978).

Housing and Housing Policy Housing policies and programs are actions taken by governments to affect the quantity, quality and price of housing. The objectives of Canadian housing policies have been to ensure that dwellings of a decent standard are available to all Canadians at prices they can afford. Government assistance may be provided through grants and loans to developers or consumers. In 1981 there were 8.7 million dwelling units in Canada, of which 46% were single-family detached, 18% attached or row houses, and 36% apartments. Some 65% of this housing had been built since WWII. Construction had averaged only 39 000 units a year during the GREAT DEPRESSION and the war years,

but it increased rapidly after the war to meet the needs of the returning veterans, immigrants, and people moving from rural to urban centres. Annual additions to Canadian housing averaged 77 000 units in the 1950s, 155 000 in the 1960s, and 229 100 in the 1970s. The early 1980s saw a reduced demand for housing as a result of the economic recession and the fact that most of the postwar BABY BOOM had already entered the housing market (eg, only 133 940 units were built in 1982).

In Canada, all levels of government are involved in housing programs, though the constitutional authority for housing is vested in provincial governments. They, in turn, may delegate housing responsibility to regional and CITY governments. Local governments are usually responsible for enforcing adequate housing standards and for land-use planning that affects the location and type of housing (*see* URBAN AND REGIONAL PLANNING; ZONING). At the national level, a variety of economic and social concerns, all of which have an impact on the housing sector, caused the government of Canada to become involved in housing policy.

Canadian housing policies have addressed 2 tasks: to assist the housing market to produce enough housing to meet the needs of most Canadians (*see* DEVELOPMENT INDUSTRY) and to provide extra assistance to people whose housing needs cannot be adequately met through the normal housing market. Prior to 1970, government programs assisted just over one-third of all housing starts. Most of this assistance was directed to market housing, and less than 5% of all starts were specifically designed to house lower-income Canadians. After 1970 government programs continued to assist close to 40% of all housing starts, and an increasing proportion of the funds was directed toward lower-income households. In 1983, for example, housing for low-income Canadians represented 8% of housing starts.

Before 1970 Canadian housing programs were almost exclusively the preserve of the federal government. The first national housing legislation, the Dominion Housing Act of 1935, provided $20 million in loans and helped finance 4900 units over 3 years. The Federal Home Improvement Plan (1937) provided subsidized interest rates on rehabilitation loans to 66 900 homes. In 1938 the first National Housing Act was passed. These Acts served the dual purposes of providing housing and creating employment opportunities.

The federal government continued to be active in the housing market during WWII. A crown corporation, Wartime Housing Ltd, built 45 930 units at a cost of $253 million over 8 years, and assisted in the repair and modernization of existing houses. New programs stimulated the private housing market by providing mortgage money and favourable interest rates to encourage homeownership and the construction of limited dividend rental housing. In 1946 the assets of Wartime Housing Ltd were transferred to Central Mortgage and Housing Corporation (*see* CANADA MORTGAGE AND HOUSING CORPORATION).

A significant milestone in Canadian housing legislation occurred in 1954 when the federal government agreed to insure mortgage loans made by private investors against borrower default. The Bank Act was also amended to allow Canada's chartered banks to lend money for mortgages. These initiatives enabled the federal government to reduce its direct involvement in lending and to become an insurer of mortgages and a lender of last resort.

During the 1970s the federal government continued to assist the private housing market by insuring mortgages and by providing direct loans in smaller communities otherwise not well served by private lenders. Incentives were introduced to stimulate home ownership such as tax-exempt Registered Home-ownership Savings Plans, Assisted Homeownership Program, and changes to the Tax Act (1971) that excluded principal residences from capital gains tax. In the early 1980s the Canadian Home Stimulation Program provided grants to home buyers; the Canada Mortgage Renewal Plan assisted those who were experiencing difficulty renewing their mortgages at higher interest rates; and the Graduated Payment Mortgage Plan helped homeowners offset the rising costs of home ownership by lowering initial monthly mortgage payments. The federal government also assisted the construction of private rental housing through a combination of grants, preferential loans and taxation concessions, eg, Multiple Unit Residential Building deductions, the Assisted Rental Program and the Canada Rental Supply Plan. Some 40% of Canadians are renters, most of whom live in urban areas.



Habitat, Montréal, designed by Moshe Safdie for Expo 67 (*courtesy Canapress*).

The housing industry is supported by a continuing commitment from all levels of government to improve housing quality and community standards. The National Building Code and the National Fire Code encourage uniform building and safety standards across Canada. Municipalities inspect to ensure that standards are maintained and, through zoning bylaws, regulate what can be built and where. Municipalities are also responsible for planning and providing water, sewer, roads, parks, schools and other public services. In unincorporated or rural areas, regional districts or provincial governments regulate land use and provide services.

Government programs have assisted cities in improving the quality of housing and services. During the 1950s the federal government funded land assembly programs. In the 1960s cities received funds for urban renewal and municipal infrastructure. During the 1970s the federal government shifted funds into residential rehabilitation assistance, neighbourhood improvement and home insulation programs. Most cities used the neighbourhood improvement program to upgrade and preserve older neighbourhoods. Homeowners and landlords used the rehabilitation and home improvement funding to upgrade over 250 000 homes between 1974 and 1984.

The provision of housing for lower-income Canadians has been another continuing concern of governments. Social, public, community or nonmarket housing are terms used interchangeably to describe housing for people whose needs for adequate and affordable shelter cannot be met through market housing. Nonmarket units are built by governments and nonprofit or co-operative societies and are operated and assisted by government subsidies to ensure a continuing stock of affordable housing. The first Canadian social housing legislation was introduced in 1938 when the National Housing Act made provision for construction of low-rent housing. In 1949 the NHA was broadened to include federal-provincial programs (sometimes with city participation) to build publicly owned and provincially managed housing for low-income families, seniors and the disabled. From 1947 to 1983, 205 000 public housing units were built across Canada. Ontario has the largest share (43%), followed by Québec (22%), Alberta (7%), Manitoba (7%) and BC (6%). The location of public housing reflects the ability of provincial governments to participate in cost-shared programs and to a lesser extent, areas with traditionally low vacancy rates.

Between 1969 and 1974 the public housing program underwent extensive evaluation. A $200 million program in 1970 stimulated innovative solutions for housing low-income Canadians; the Ministry of State for Urban Affairs, 1971-78, initiated research and implemented policy, and included CMHC in its mandate. In 1974 the NHA was amended: existing public housing was to continue to provide accommodation for low-income households; rural and native programs were added; and new social housing was to be built by municipalities, nonprofit organizations and co-operatives. The legislation encouraged consumers to be more involved in the design and management of housing, and encouraged a mix of modest and lower-income households. Funding for social housing was provided mainly by the federal government, with some assistance from the provinces and cities. More than 185 000 units were provided between 1974 and 1983, to house families (50%), seniors (40%) and others (10%) (*see also* NATIVE PEOPLE, GOVERNMENT PROGRAMS).

During the 1970s provincial and city governments assumed a more active role in housing. Prior to 1970 Ontario had the most active pro-

vincial housing agency. By the mid-1970s all 10 provinces had created new or stronger housing departments and assumed more responsibility for policy development and for setting priorities for spending housing funds. Most provinces offer home-ownership grants and contribute to the cost of nonmarket housing. Some provinces assist renters by providing tax credits, shelter allowances, and through rent control. Amendments to the NHA in 1978 and negotiations surrounding the CONSTITUTION ACT, 1982 supported provincial housing activities and, in turn, senior governments encouraged cities to create municipal nonprofit corporations to build and manage social housing.

In 1984 government housing programs were again undergoing review. Governments examined the ongoing cost of housing subsidies and changing housing demand. The projected decline in demand for housing during the 1990s may result in fewer programs to encourage new construction and more emphasis on renovation and on programs which assist households to afford existing housing. More information on housing can be obtained from such bodies as Canada Mortgage and Housing Corporation, the Canadian Housing Design Council and the Canadian Home Builders Assn (*See also* REAL ESTATE). ANN MCAFEE

Reading: M. Dennis and S. Fish, *Programs in Search of a Policy: Low Income Housing in Canada* (1972); *Report of the Task Force on Housing and Urban Development* (1969); M.A. Goldberg, *The* Housing Problem (1983).

Houston, James Archibald, artist, author and filmmaker (b at Toronto 12 June 1921). Houston studied art in Toronto before serving in WWII. After studies in France (1947-48), he spent 14 years in the Canadian Arctic, serving as civil administrator at W Baffin, teaching the Inuit the techniques of printmaking, and popularizing their art in the US and southern Canada (*see* INUIT ART). From 1962 to 1972, he was with Steuben Glass of NY. Houston's first children's story, *Tikta'liktak: An Eskimo Legend* (1965) was named the Canadian Children's Book of the Year. *The White Archer* (1967) and *River Runners* (1979) won the same award. Houston has been active on many national and international boards, promoting native art. A fellow of the Royal Soc of Art, he holds several honorary doctorates.

Houston's children's books are of 3 types. Some, like *Tikta'liktak*, are expanded versions of legends he has been told by the Inuit. Others portray the growth to maturity of West Coast native youths. Three novels, *Frozen Fire* (1977), *River Runners* (1979) and *Black Diamonds* (1982), have modern settings. Houston has illustrated all these books himself. Houston's adult novels — *The White Dawn*, 1971; *Spirit Wrestler*, 1980; *Eagle Song*, 1983 — depict the powerful emotions involved in confrontation between traditional native cultures and Europeans. JON C. STOTT

Howard, John George, né John Corby, architect, surveyor, artist (b at Bengeo, Eng 27 July 1803; d at Toronto 3 Feb 1890). Immigrating from England in 1832, Howard enjoyed a successful career, primarily in Toronto, as an architect, surveyor and artist. He produced fine watercolours (many of which survive), was instrumental in organizing the Toronto Soc of Artists in 1834, and was drawing master at Upper Canada Coll from 1833 to 1856. He received many contracts for street improvements following the incorporation of the city of Toronto in 1834 and was city surveyor 1843-55. One of the busiest architects in the city, he was responsible for many private and public buildings. His most important commission was the provincial lunatic asylum (1845-49, demolished 1976), but he is best remembered for bequeathing his estate, High Park, and his home, Colborne Lodge, to the city. VICTOR L. RUSSELL

Howe, Clarence Decatur, engineer, politician (b at Waltham, Mass 15 Jan 1886; d at Montréal 31 Dec 1960). Howe was the most successful businessman-politician of his day, and provided a link between the Liberal Party and Canadian industry. Although he claimed relationship to the Nova Scotian Liberal statesman Joseph HOWE, C.D. Howe's Canadian connections were remote until he came N to Halifax with an engineering degree from the Massachusetts Institute of Technology to teach engineering at Dalhousie. Howe's years there (1908-13) were successful, if unexciting, and he readily abandoned academia in 1913 to work with the Canadian Board of Grain Commissioners designing wheat elevators across the Prairies. Howe found the job congenial and in 1916 formed his own engineering firm, specializing in grain elevators. Between 1916 and 1935 the C.D. Howe Co built elevators in Vancouver, Saskatoon, Churchill, Pt Arthur, Toronto and Prescott, as well as Buenos Aires, Argentina. Howe became the foremost grain-elevator builder of his day. His straightforward, blunt personality, and his ability to build elevators at a fixed price, commended him to his customers, especially in western Canada. But the 1930s Depression ended his business, and in 1935 he entered politics and Parliament as a Liberal, representing Pt Arthur (Thunder Bay, Ont). He was promptly made a member of Mackenzie KING's Cabinet, becoming minister of transport in 1936. In that capacity Howe helped create Trans-Canada Airlines (later Air Canada).

In 1940 Howe became minister of munitions and supply, with the task of running Canada's war-production program. He succeeded brilliantly, working beside a group of largely Conservative businessmen who came to appreciate his efficient and daring conduct of economic affairs. This stood him in good stead when in 1944 he was asked to preside over the new Dept of RECONSTRUCTION. He reconverted the Canadian economy to a free-enterprise system, with minimal government controls. During the 1950s Howe was concerned with developing certain sectors of the Canadian economy, such as steel, and with expanding Canada's trade, as minister of trade and commerce. In that capacity, in 1956, he sponsored a trans-Canada pipeline, with government aid to a private firm. The move stirred up a parliamentary storm, and Howe's increasingly short-tempered response to criticism helped undermine the government's position. In 1957 the Liberals were defeated, as was Howe. ROBERT BOTHWELL

Reading: R. Bothwell and W. Kilbourn, *C.D. Howe* (1979).



C.D. Howe, who made his fortune building grain elevators, went on to become a powerful Cabinet minister through the 1940s to 1956, when his short-tempered responses during the Pipeline Debate helped undermine his government's position (*courtesy Public Archives of Canada/C-472*).



Gordie Howe in action against Toronto Maple Leafs goalie Johnny Bower (*courtesy Canada's Sports Hall of Fame*).

Howe, Gordon, hockey player (b at Floral, Sask 31 Mar 1928). Gordie Howe's record of 32 outstanding seasons in hockey may be the most remarkable in professional sport. He played junior in Saskatoon and Galt, Ont, before turning pro with Omaha and joining Detroit Red Wings in 1946. His career started slowly with 7, 16 and 12 goals in his first 3 years and in his third year he suffered a severe head injury after colliding with Ted KENNEDY and crashing headlong into the boards. He won the ART ROSS TROPHY (leading scorer) 4 straight years 1950-54 and again in 1957 and 1963, the HART TROPHY (most valuable player) in 1952, 1953, 1957, 1958, 1960 and 1963 and was NHL all star 21 times. Howe retired from Detroit in 1971, but returned to hockey in 1973 to join his 2 sons, Mark and Marty, with the WHA Houston Aeros. He finished his career, at age 52, with Hartford Whalers of the NHL in 1980.

Gordie Howe was doubtless the finest athlete ever to play hockey. He possessed great physical strength, incredible stamina and speed, and his wrist shot was clocked at 183 km/h. His professional totals, including playoffs, are 2421 games, 1071 goals, 1518 assists and 2589 points. Though the NHL does not recognize his 6 WHL seasons, he holds the NHL records for most seasons (26), most games, including playoffs (1924), most goals (869), most assists (1141) and most points (2010). Howe dominated his sport as much by his intimidating strength as by his mastery of skills; he accumulated 2419 minutes in penalties. JAMES MARSH

Howe, Joseph, journalist, politician, premier and lt-gov of NS (b at Halifax 13 Dec 1804; d there 1 June 1873). Taking over the *Novascotian* in 1828, Howe quickly made it the leading provincial newspaper. Originally defending the political status quo, he gradually became convinced through personal experience that serious ills abounded throughout the government. Charged with criminal libel in 1835 for criticizing local government officials, he was acquitted in the province's most celebrated trial. He entered politics in 1836 and was primarily responsible for the election of a majority of Reformers (Liberals). A conservative Reformer, he entered a coalition with the Tories in 1840, hoping to achieve his aims step by step. Having failed, he prepared the way for the Reformers' success in the election of 1847. As a result, Nova Scotia secured RESPONSIBLE GOVERNMENT in Feb 1848, the first colony to do so, and Howe could boast that it had been done without "a blow struck or a pane of glass broken."

Seeking to rise above "the muddy pool of politics," he tried unsuccessfully to arrange the building of the Halifax to Québec Ry. As chief commissioner, he began the Nova Scotia Ry in



Despite his oratorical powers, Nova Scotian patriot Joseph Howe could not prevent his province's entry into Confederation and he later went on to serve in the federal Cabinet (*courtesy Public Archives of Canada/ C-22002*).

1854, however, and saw completion of the lines from Halifax to Windsor and Truro. Devoted to Britain, he recruited forces in the US in 1855 for the British Crimean War, one outcome of which was a rupture with the Catholics and the defeat of the Reformers in 1857. Following the Liberal victory of 1859, he was premier 1860-63 and imperial fishery commissioner 1863-66 under the RECIPROCITY Treaty of 1854. Between 1866 and 1868 he led the movement against CONFEDERATION on the grounds that it was being effected without popular consent and that it conflicted with his plans for the organization of the British Empire. Although overwhelmingly successful in the provincial elections of 1867, as a delegate to Britain in 1866-67 he could not prevent passage of the BNA Act or, a year later, secure its repeal. Having no further means of opposition he entered the federal Cabinet in Jan 1869. In a celebrated midwinter by-election in Hants his health was so impaired that he never fully recovered. As a federal minister, he played a prominent role in bringing Manitoba into the union. Becoming lieutenant-governor of Nova Scotia in 1873, he served only 3 weeks before his death.

Despite his failings, many consider Howe to have been the greatest of all Nova Scotians. The Nova Scotian patriot par excellence, he could use his oratorical powers to influence his compatriots as no other man has ever done. He sought, in his own words, to elevate them to "something more en[n]obling, exacting and inspiring, calculated to enlarge the borders of their intelligence, and increase the extent and area of their prosperity." J. MURRAY BECK

Howe Research Institute, a nonprofit organization established 1973 to conduct nonpartisan research and analysis of Canadian economic-policy issues. The staff is located in Montréal and Calgary and operations are conducted by Policy Research and Analysis, which publishes an annual *Policy Review and Outlook* surveying Canada's economic performance and policy options; Economic Reports, which publishes comprehensive studies about trends affecting the Canadian economy; and Institute Services, which publishes studies and statements prepared on behalf of the Canadian-American Committee and the British-North American Committee. GREGORY WIRICK

Hoyles, Sir Hugh William, politician, judge, prime minister of Newfoundland (b at St John's 17 Oct 1814; d at Halifax 1 Feb 1888). The son of Newman Hoyles, a wealthy merchant and politician, he was educated in St John's and Nova Scotia, and was called to the Newfoundland Bar in 1837. He participated in various political, social and religious organizations, and in 1848 was elected Conservative member of the House of Assembly for Fortune Bay; he sat in the House until 1859 and again 1860-65. Hoyles quickly became a major force within his party, and succeeded to its leadership in 1855. In the late 1850s and early 1860s long-standing tensions between the Island's Irish Roman Catholic and English Protestant inhabitants flared up in severe civil disorders. In Feb 1861 Gov Alexander Bannerman dismissed the Liberal administration of Catholic John Kent and called on Church of England member Hoyles to form a government. Hoyles was subsequently confirmed in office in a bitter, violence-marred election. His main concern as prime minister was to ease ethnic and religious tension. Although his efforts met with mixed results, his conciliatory actions helped prepare the ground for later accommodations. Hoyles resigned as prime minister in 1865 and subsequently served as chief justice of Newfoundland 1865-80. GEOFF BUDDEN

Hubert, Jean-François, Roman Catholic bishop (b at Québec City 23 Feb 1739; d there 17 Oct 1797). Educated at the SÉMINAIRE DE QUÉBEC and ordained a priest 1766, he became in Dec 1774 the first Canadian superior of the Séminaire, but he resigned in 1778 and joined the church's Illinois mission. Coadjutor bishop in 1786, in 1788 he became bishop of Québec, and in 1789 he successfully opposed establishment of a nonconfessional university at Québec. He supported the British government against revolutionary France in the 1790s and was allowed to bring refugee French priests to his diocese, which was suffering an acute shortage of clergy. Worn out by a momentous and active episcopacy, during which he favoured moderation and traditionalism, Hubert resigned Sept 1797 and died the next month. JAMES H. LAMBERT

Hudson, Henry, explorer (*fl* 1607-11). Little is known of him before the famous voyages of his last 4 years. He searched twice (1607, 1608) for a polar route to Asia via Norway and Russia, and in the service of the Dutch East India Co ascended the Hudson R in 1609. English patrons financed his search for a NORTHWEST PASSAGE in 1610. He sailed in the DISCOVERY to Iceland and entered HUDSON STR in early June, navigating his tiny vessel through fog and ice, passing through the narrow gap between Cape Wolstenholme and Cape Digges (named for his patrons). He descended the E shore into desolate JAMES BAY, tacking to and fro in a futile search for an opening to the Spice Islands. He beached the *Discovery* and spent a bleak winter, likely by the Rupert R. Resentment among his crew broke into mutiny in the spring when Hudson announced his intention to continue the search. The leaders, Henry Greene, Robert Juet and William Wilson, forced Hudson, his son and 7 others into a shallop and cut it adrift in the open sea. Robert Bylot piloted the *Discovery* home. Greene and Wilson were killed by natives at Cape Digges; Juet died of starvation. Four of the 9 survivors were tried for murder but acquitted — saved as much by mercantile interest in their knowledge of the Northwest as by the blame laid on the dead. Nothing is known of Hudson's fate. He did not discover Hudson Str — both Frobisher and Davis had noted its entrance — but in navigating its treacherous course he far outdistanced his predecessors and discovered a route to the continent's interior of inestimable value to England. However, his favouritism and weak leadership vitiated his accomplishment. The quaint, contentious account by Abacuk Pricket, a survivor, is the sole record of the voyage and mutiny. JAMES MARSH

Hudson Bay, 637 000 km^2, is an immense inland sea that penetrates deeply into northeastern Canada. It is virtually landlocked but is joined to the Arctic Ocean to the N by Foxe Channel and Fury and Hecla Str, and to the Atlantic Ocean on the E by HUDSON STR. Baffin I lies athwart the entrance to the bay, and Southampton, Coats and Mansel islands are lodged across the northern gap. The W coast is devoid of islands, but lying off the E is a string known as the Sleepers, Ottawa, Nastapoka and BELCHER groups. The maximum length of the bay is 1500 km and its greatest width 830 km. The bay, including Hudson Str, is fed by numerous rivers, large and small, including, from W to E, the KAZAN, THELON and DUBAWNT, flowing into the bay via Chesterfield Inlet; HAYES, NELSON and CHURCHILL on the W; WINISK and SEVERN in the SW; Grande, EASTMAIN, Nottaway, Moose and Abitibi, ALBANY, ATTAWAPISKAT and Nastapoca flowing into James Bay; and KOKSOAK flowing into Ungava Bay. The total area of the Hudson Bay drainage is about 4 million km^2 and the mean discharge of all the rivers flowing into it is 30 900 m^3/s — greater than those discharging into the Atlantic and Pacific oceans combined.

The bay lies in a huge saucer-shaped basin, fringed by uplands of the Canadian SHIELD. The basin was inundated by seawater after the retreat of GLACIATION some 7500 years ago. The bay is generally shallow, and the land is rising steadily at around 60 cm per 100 years because of isostatic uplift, exposing more and more of the coast. The surrounding Hudson Bay Lowland (*see* PHYSIOGRAPHIC REGIONS) is a low plain, locked in PERMAFROST and characterized by marshes, peat and innumerable ponds. Much of the hydroelectric potential of the area develops at the point where powerful rivers surge out of the Shield on to the lowlands. An almost unnatural feature of the E coast is the great, semicircular bight, centering on the Belcher Is, which it has been suggested was caused by a stupendous meteor strike. The W coast is generally without indentation, low and bleak up to Eskimo Pt, and increasingly broken and indented farther N, particularly at the great gashes of Chesterfield Inlet and Rankin Inlet. The shores are mostly covered with brushes, aspen, willow and dwarf birch growing among moss, lichen and grass. Cliffs of ancient sedimentary rocks are found at points on the E coast.

The climate of the region depends largely on the water surface. In Jan and Feb the bay is covered with pack ice, preventing any warming effect on the air, and temperatures are consequently very low. The ice begins to melt in May and rapidly disappears in June, when cloudiness and fog increase. The water temperature rises up to 10°C in July and Aug as a result of the influx of fresh water. During Oct and Nov the waters of the bay yield heat and moisture, bringing showers of rain and snow. Fog is most frequent in June, July and Aug, as warm air cools over the colder water. Winds are strong in all but the summer months and rise to 110 km/h and even 150 km/h in autumn. Hudson Bay contains great quantities of nutrient salts and small CRUSTACEANS occupy the open waters, providing food for molluscs, starfish, sea urchins, worms and other invertebrates. Cod, halibut, salmon and polar plaice are the most common fish. Walrus, dolphins and killer whales live in the northern regions and polar bears migrate S to hunt seals among the ice. Some 200 species of birds, including ducks, snow geese, gulls, swans, sandpipers, owls and crows gather on the coasts and islands.

Archaeological evidence has shown that the shores of the bay have been occupied for thousands of years. Many of the excavated campsites are far from the present, receding coastline. At the time of the appearance of Europeans, Algonquian groups inhabited the area around James Bay and Chipewyan groups the Churchill area, and Inuit groups were found on the N and E coasts. NORSE seafarers possibly found, and even colonized, the bay, but if so their discovery was forgotten. Martin FROBISHER mistakenly sailed into Hudson Str in 1578 but Henry HUDSON was the first European we know to have braved the dangers of the strait and sailed into the bay (1610). He was followed by BUTTON (1612), Bylot and Foxe (1631) and JAMES (1631) in a futile search for a passage to the Orient. The voyages were perilous, often disastrous; in 1619 only 3 members of Jens MUNK's expedition survived. The mutiny of Hudson's crew passed into exploration mythology. The journals of Luke Foxe found their way into Coleridge's harrowing tale, "The Rime of the Ancient Mariner." The W coast was not mapped until the 1820s and the first detailed investigation was carried out from 1929 to 1931.

The bay played a crucial role in the early development of Canada after it was realized that it provided a direct route to the fur resources of the Northwest. In 1668 DES GROSEILLIERS, in the service of the English, sailed into the bay and built a small post at the mouth of the Rupert R. In 1670 RADISSON founded what later became YORK FACTORY at the mouth of the Nelson R, and the trading rights to the entire watershed of the bay were granted to the HUDSON'S BAY CO. Posts were later built at the mouths of the Moose and Albany rivers and drew Indian traders from a vast area of the Shield, with the CREE playing an important middleman role. From 1682 to 1713, the French made a determined effort to rout the English from the bay. Temporary successes were achieved by de TROYES overland (1696) and IBERVILLE in several expeditions by sea. However, after the TREATY OF UTRECHT in 1713, the bay was firmly in the hands of the English, and after the HBC merger with the NORTH WEST CO in 1821, it became the primary route to the interior. On the transfer of RUPERT'S LAND to Canada in 1869, sovereignty over the bay and its watershed passed to Canada. Since that time it has ceased to play an important role as a transportation route and it has been sparsely populated. The primary occupants continue to be Indian and Inuit bands, living by fishing and hunting. The 2 largest settlements are CHURCHILL, Man (pop 1200), at the mouth of the Churchill R, and MOOSONEE, Ont (pop 1400). Both are connected by railway to the interior, but their potential as saltwater ports is more often talked about than exploited. The bay remains much as it has been designated for conservation purposes — a *mare clausum* ("closed sea").

JAMES MARSH

Hudson Bay Railway Two of western Canada's earliest railway charters, granted in 1880, authorized construction, with government help, of railways paralleling old water transportation routes to Hudson Bay. The projects were amalgamated in 1883 and the first 64 km built northward into the Manitoba interlake region. Financial problems and a political scandal led to the abandonment of the original mileage in 1888, and the subsequent absorption of the charter by the CANADIAN NORTHERN RAILWAY. The Canadian Northern, with government aid designated for the Hudson Bay Railway, built a new northwesterly line from Winnipeg to Hudson Bay Junction as part of its east-west system. The Canadian Northern refused to build north of Hudson Bay Junction without further massive government assistance.

In 1909 the federal government undertook rail construction north of Hudson Bay Junction and improvement of harbour facilities at the proposed terminus of Nelson. During WWI work was suspended, and in 1923 the project became a part of CANADIAN NATIONAL RAILWAYS. Construction advanced only slowly and at great expense, particularly when Nelson was abandoned and the line deflected to the more northerly port of CHURCHILL. The railway opened officially on 10 Sept 1929 as the Hudson Bay Railway. Total cost exceeded $45 million. Intended as a grain road, the railway was a disappointment until mineral discoveries around The Pas and Thompson, Man, generated larger traffic volumes.

T.D. REGEHR



Hudson Strait, arm of the sea connecting the Atlantic Ocean with HUDSON BAY and Foxe Channel and separating BAFFIN I from the Ungava Peninsula of Québec. The eastern gap is between Cape Chidley, at the northern tip of Labrador, and Resolution I. There are 250 km of open sea across UNGAVA BAY and the strait trends NW from Cape Hopes Advance to Cap de Nouvelle-France and then westerly to Cape Wolstenholme. Across the western gap is a group of 3 islands: Mill, Salisbury and Nottingham. The strait is never completely frozen over, and open water adds heat and moisture to the air, creating precipitation, cloud and fog. Resolution I is one of the foggiest places on Earth, with fog reported an average of one day in 2. The "insurance date of entry" into the strait is July 23, but ICEBREAKERS extend the sailing season.

Hudson Str provides access by sea to the heart of Canada and has been used commercially for 3 centuries, chiefly in connection with the FUR TRADE. Hudson's Bay Co vessels have used it since 1670. Navigation of the strait is not intricate; the route is wide and free from shoals. However, fog, current and the tidal stream made it tricky for early sailing vessels. The NORSE almost certainly knew the route. Martin FROBISHER mistakenly entered the strait in 1578, but Henry HUDSON — for whom it is named — was the first European known to have explored it and followed it into the bay.

JAMES MARSH

Hudson's Bay Company, chartered 2 May 1670, the oldest incorporated joint-stock merchandising company in the English-speaking world. Formerly headquartered in London, Eng; since 1970 its head offices have been located in Winnipeg. The HBC is the largest retailer in Canada, operating nearly 600 stores in 3 retail groups: The Bay, SIMPSONS LIMITED and Zeller's. It is a major wholesaler through Hudson's Bay Wholesale, and still one of the largest FUR-TRADE companies in the world. The HBC also has extensive interests in natural RESOURCES through major investment in Roxy Petroleum. It is actively involved in REAL-ESTATE development through Markborough Properties.

York Fort, Hudson's Bay (1821), watercolour by Peter Rindisbacher. The fort was long the main depot of the HBC (*courtesy Picture Division, Public Archives of Canada/ C-1918 2-1-18*).



Médard Chouart DES GROSEILLIERS and Pierre-Esprit RADISSON were the first to propose a trading company to reach the interior of the continent via HUDSON BAY. After failing to obtain French support on their terms, in 1665 they went to England and interested Prince Rupert, cousin of Charles II. Rupert persuaded the king and some merchants and noblemen to back the venture. The first ships, the *Eaglet* and the NONSUCH, were dispatched in 1668 and the royal charter was proclaimed on 2 May 1670. The "Governor and Company of Adventurers" were granted wide powers, including exclusive trading rights in the territory traversed by rivers flowing into Hudson Bay. This vast region was named RUPERT'S LAND.

Unlike most contemporary trading concerns, the HBC evolved as a joint-stock company with a centralized bureaucracy. At the annual General Court, shareholders elected a governor and committee to organize fur auctions, order trade goods, hire men and arrange for shipping. They appointed a governor to act on their behalf in the bay area. Each post was commanded by a chief factor (trader) and his council of officers. The London governor and committee set all the basic policies implemented in Rupert's Land, basing their decisions on annual reports, post journals and account books supplied by the officials on the bay.

Until 1763 the HBC struggled with the French for control of the fur trade of southern Rupert's Land. In the early years a series of naval and land battles took place on Hudson and James bays. In 1713, by the TREATY OF UTRECHT, France acknowledged England's claim to Hudson Bay. For the next 60 years the HBC erected posts only at the mouths of major rivers flowing into the bay, with the single exception of Henley House, a small outpost erected in 1743 on the Albany R, 200 km from the coast. After the TREATY OF PARIS (1763) the company's French rivals were replaced by a much more formidable opposition, the Montréal-based overland trade network taken over by the British. By 1774 HBC trade had been undercut enough that the governor and committee embarked on an aggressive policy of inland expansion beginning with the building of CUMBERLAND HOUSE on the lower Saskatchewan R. Intensive competition with the NORTH WEST COMPANY spilled beyond Rupert's Land into the Mackenzie drainage basin and the Pacific slope, combining economic conflict with occasional physical violence (*see* SEVEN OAKS INCIDENT). In 1821 a merger of the 2 parties was arranged, and the British Parliament confirmed and extended the company's monopoly privileges to include the North-West Territories.

The bringing together of different business traditions required changes in the administrative structure of the new company. BRITISH NORTH AMERICA was divided into trading departments which were then subdivided into districts. District managers met annually in departmental council meetings presided over by the governor in N America, a post held 1826-60 by Sir George SIMPSON. These councils passed regulations governing local trade, determined the deployment of men and posts and established the logistical requirements of the various districts. The officers had a vested interest in these concerns since they shared in the profits of the trade according to the terms set out in deed polls in 1821, 1834 and 1871. Council members theoretically had an equal voice and vote, but Simpson had considerable power, and the London governor and committee could overrule council decisions.

After 1821 a group of independent free traders among the Métis population at the RED RIVER COLONY opposed the company's monopoly rights, which had been renewed by Parliament for another 20 years in 1838. The issue culminated in the famous Sayer trial of 1849, in which Pierre-Guillaume Sayer was tried and convicted of trading with the Indians in violation of the company's legal privileges. Fearing a Métis riot, however, the court did not pass sentence. The decision effectively opened the trade of southern Rupert's Land to many small-scale competitors.

Although the company's primary concern remained the fur trade, it became increasingly involved in providing government for settlers in the Red River Valley and on Vancouver I. Between 1812 and 1834 the governors of ASSINIBOIA were agents of the SELKIRK estate, although they were overshadowed by the HBC. In 1834 the company resumed jurisdiction and, until transfer to Canada, provided the Selkirk colony's government. In 1849 Britain granted to the HBC the colony of Vancouver's I, which was to be developed as an agricultural settlement. In 1851 Chief Factor James DOUGLAS was appointed governor. In 1858, following the discovery of gold, the mainland colony of British Columbia, including most of present BC, was created out of NEW CALEDONIA. Douglas was required by the British government to resign his HBC commission before becoming governor of BC. In this way the company began to relinquish its colonial responsibilities.

In 1863 the International Financial Society bought controlling interest in the HBC, signalling a shift in the company's outlook: most of the new shareholders were less interested in the fur trade than in real estate speculation and economic development in the West. Negotiations conducted with the COLONIAL OFFICE and, after 1867, with the Canadian government eventually resulted in the sale of Rupert's Land to Canada in 1870. As part of the agreement the company received £300 000 and one-twentieth of the fertile areas to be opened for settlement. In addition, it retained title to the lands on which it had built trading establishments. The terms of the agreement strongly influenced company development after 1870. By retaining large landholdings on the prairies and the parcels adjacent to its posts, many of which were located in developing urban centres in the West and North, the HBC was able to become one of the most important developers in western Canada. Since the 1874 establishment of the Land Commissioner's Office, the company has continued to be a major real-estate developer, acquiring control of Markborough Properties in 1973.

Involvement in natural-resource development stemmed naturally out of the HBC's fur-trade and real-estate activities. In 1926 it co-founded Hudson's Bay Oil and Gas, and in 1973 acquired 35% of Siebens Oil and Gas. In 1979 it disposed of the latter and in 1980 bought controlling interest in Roxy Petroleum. In 1982 the HBOG investment was sold to Dome Petroleum.

As economic development in the PRAIRIE WEST accelerated after 1870, the company did an increasing amount of business with settlers. Initially most of this activity was carried on at its trading posts. Since it differed in many respects from the Indian trade, separate sales shop accounts were kept. From this modest beginning the HBC's retail and wholesale divisions eventually emerged, with outlets entirely separate from the fur trade. Expansion was augmented by the 1978 acquisition of controlling interest in the Simpsons and Zeller's retail chains. In 1983 HBC had some 279 Bay and northern stores, 23 Simpsons stores, 181 Zeller's stores and 58 wholesale branches. With 44 000 employees it had sales or operating revenue of $4.37 billion (ranking 13th in Canada) and assets of $980 million (ranking 87th). Since 1972 most of the Bay's senior officers have been located in Toronto, although official headquarters remain in Winnipeg.

ARTHUR J. RAY

Reading: E.E. Rich, *The History of the Hudson's Bay Company 1670-1870* (3 vols, 1960) and *The Fur Trade and the Northwest to 1857* (1967); Douglas Mackay, *The Honourable Company* (1966).

Hudson's Bay Record Society, est 1938 by the HUDSON'S BAY CO to publish selections from its extensive company records accumulated since 1670. The idea of forming such a society originated in the late 1920s, but it had to be abandoned during the Depression of the 1930s. Under an agreement with The CHAMPLAIN SOCIETY, 12 volumes appeared, 1938-49. Thereafter the publications became the sole responsibility of the London-based HBC. Since 1960 the volumes have been published biennially; they are available only to the approximately 1150 members. The society's headquarters was transferred to Winnipeg in 1974, and the following year Hartwell Bowsfield of York U became the first Canadian general editor. By 1983, 33 volumes of minutes, correspondence and journals of trade and exploration dating from 1671 to 1889 had been published. Of special interest is the 2-volume history of the HBC written by E.E. Rich of Cambridge U, the society's editor for the first 22 years.

SHIRLEE ANNE SMITH

Hughes, Edward John, painter (b at N Vancouver 17 Feb 1913). A realist landscape painter, he has produced work that is as unique an expression of BC's geography as is that of Emily CARR. He studied under F.H. VARLEY and Jock MACDONALD at Vancouver's School of Decorative and Applied Arts 1929-34. With colleagues from the art school, he established a commercial art firm which executed pencil portraits and designs for calendars and posters, and did several mural commissions. Hughes enlisted in the army in 1939 and was appointed a war artist in 1940, in that post producing about 1600 works. During these years, his style became more decorative and expressive, influenced by his study of Mexican artists and the French primitive painter Henri Rousseau. Hughes returned to Victoria after the war and tried unsuccessfully to make a living as a landscape painter. In 1951 he moved N to Shawnigan Lk and signed a contract with Max Stern of Dominion Gallery, Montréal.

Hughes's love of privacy has kept him in seclusion on Vancouver I. Though concentrating on scenes of southeastern Vancouver I, Hughes has produced paintings of the BC interior, Alberta and major Canadian cities. He usually includes people or evidence of a human presence in the landscape — ships, boats or buildings. *Dawson's Landing, River's Inlet* (1963) is typical of his mature style with its balanced composition and clear, strong colours. His drawings range from light landscape sketches to highly finished graphite studies and elegant pencil portraits.

JANE YOUNG

Reading: Jane Young, *E.J. Hughes 1931-1982:* (1983).

Hughes, James Laughlin, educator, author (b near Bowmanville, Ont 20 Feb 1846; d at Toronto 3 Jan 1935), elder brother of Sir Sam HUGHES. Educated at Toronto Normal School, he became principal of its associated Model School at age 24. In 1874 he was appointed inspector of public schools for Toronto, and later chief inspector, a position he held until his retirement in 1913. During these years Hughes adapted Toronto's public schools to the demands of an emerging urban-industrial order, increasing pupil attendance, improving the quality of instruction, introducing kindergartens and manual-training classes. In the 1890 provincial election he was defeated as the EQUAL RIGHTS candidate in Peel constituency. Throughout his life he was active in the Orange Lodge, the Methodist church and Toronto athletic organizations. He wrote a number of educational books, including *Froebel's Educational Laws* (1898) and *Dickens as an Educator* (1900), plus several volumes of poetry, including *Songs of Gladness and Growth* (1915) and *In Nature's Temple Shrines* (1921).

ROBERT M. STAMP

Hughes, Monica, née Irse, author (b at Liverpool, Eng 3 Nov 1925). After a childhood in Cairo, education in London and Edinburgh, and 2 years in Rhodesia [Zimbabwe], Hughes immigrated to Canada in 1952 and began writing professionally in 1971. Winner between 1980 and 1984 of 7 major Canadian awards for literature, she is best known for her young-adult science-fiction and contemporary novels. Underlying exciting plots are serious treatments of such Canadian themes as survival in hostile environments, exploitation of resources by multinationals, and the distinctive features of Canadian minorities. Hughes has portrayed contemporary Inuit, Cree, Blackfoot and Alberta Hutterite communities. Her heroes and heroines are always psychologically credible: whether in contemporary or exotic settings, they are realistic adolescents struggling towards maturity and social responsibility. GERALD J. RUBIO

Hughes, Sir Samuel, teacher, journalist, soldier, politician (b at Darlington, Canada W 8 Jan 1853; d at Lindsay, Ont 24 Aug 1921). A Conservative and an enthusiastic supporter of Sir John A. Macdonald's NATIONAL POLICY, Sam Hughes was elected to Parliament for Victoria North in 1892. Vain, colourful, charming and splenetic, Hughes made a 30-year public career of politics and militia service. A longtime proponent of the volunteer militia and the imperial connection, he helped force PM LAURIER to send Canadian troops to the SOUTH AFRICAN WAR in 1899. Hughes was dismissed from that war for military indiscipline and public exposure of incompetent British generalship. These experiences produced a Canadian nationalist slant to Hughes's imperialist leanings. By 1911, with years of solid caucus and parlimentary service — including 10 years as Opposition militia critic — and personal loyalty to R.L. BORDEN behind him, Hughes won the militia portfolio in Borden's new government. Hughes promoted citizen-soldiers over professionals (to the latter's detriment), and preached the social value of military training and national preparedness.

Early in WWI, Hughes was hailed as the genius of the war effort. Unfortunately, favouritism, confused civil-military functions, disrespect of Cabinet, administrative incompetence and scandals like the Ross rifle fiasco (*see* ARMAMENTS) forced Borden to fire Hughes in Nov 1916. He died in 1921, a reluctant and sometimes bitter Conservative-Unionist MP for Victoria-Haliburton. Although Hughes was a sincere Canadian and a successful constituency politician, his erratic talents never matched the demands of high office during total war.

RONALD G. HAYCOCK

Hughes, Stanley John, mycologist (b at Llanelly, Wales 17 Sept 1918). A naturalized Canadian, Hughes worked as an assistant mycologist, Commonwealth Mycological Institute, Kew, Eng (1945-52), and in 1952 joined Agriculture Canada in Ottawa as a research scientist. Hughes initiated a new era in the systematics of conidial fungi by focusing attention on the mechanisms of spore ontogeny. He has also contributed an elegant taxonomic analysis of the "sooty-mold" complex. He received the Jakob Eriksson Gold Medal, Swedish Academy of Science, 1969, and the George Lawson Medal, Canadian Botanical Assn, 1981. In 1975 he was president of the Mycological Soc of America, and from 1971 to 1983 VP of the Intl Mycological Assn.

K.A. PIROZYNSKI

Huguenots, a popular term used since 1560 to designate French Protestants, some of whom became involved in the Newfoundland fishery and Canadian fur trade, and in abortive colonization attempts in Canada (1541-42), Brazil (1555) and the Carolinas (1562-64). The Edict of Nantes (1598), granting limited toleration, enabled Pierre Chauvin and the Sieur de Monts to found bases at Tadoussac (1600) and PORT-ROYAL (1605), and Reformed pastors to serve fishermen and sailors. Missionary work was restricted to Roman CATHOLICS, however, and after 1627 in Canada and 1659 in ACADIA neither Protestant worship nor Protestant teaching was permitted. A trickle of Protestants came to Canada as merchants, soldiers, indentured servants and even FILLES DU ROI. Under British rule the term "French Protestant" came into use, and Huguenot immigration to Nova Scotia and recruitment of Channel Island pastors for Québec were encouraged.

In 1834 the independent Lausanne Missionary Society established a centre at Grande-Ligne, Lower Canada. In 1839 the French Canadian Missionary Society was organized in Montréal, and in 1846 a Bible college was established at Pointe-aux-Trembles, and the publication *Le Semeur canadien* was launched in 1853. The Montréal Presbyterian College, est 1867, assured the training of French Reformed clergy after 1880. In 1875 a synod was called to organize a national Reformed church, but the scheme was abandoned in 1877 in favour of independent local congregations. Although the Grande-Ligne missions joined the BAPTISTS, many French Protestants affiliated with the PRESBYTERIANS, eventually to become francophone congregations of the UNITED CHURCH OF CANADA. CORNELIUS J. JAENEN

Reading: Marc-André Bédard, *Les Protestants en Nouvelle-France* (1978); Cornelius J. Jaenen, *The Role of the Church in New France* (1976).



Federal government building complex at Hull, Qué. Ottawa, Ont, is located across the river (top of photo) (*photo by Jim Merrithew*).

Hull, Qué, City, pop 56 225 (1981c), inc 1875, is located on the N shore of the OTTAWA R, W of the Rivière Gatineau, across from OTTAWA. Part of the National Capital Region (NCR) and of the Communauté régionale de l'Outaouais (CRO), it is the hub of the AYLMER-Hull-GATINEAU urban area and the regional capital of western Québec, commonly called the *Outaouais*.

History Prior to the arrival of Philemon WRIGHT from Woburn, Mass, in 1800, Hull shared a common history with all the areas along the Ottawa R, which was the primary water route to the West. Explorers, missionaries, fur traders and the military of the French and English regimes used the portage paths that crossed Hull. One of these, the Second Chaudière Portage, situated in Brébeuf Park, still shows the crudely hewn stone steps built there by the VOYAGEURS. Hull was the first permanent town established on the Ottawa R. Wright and his associates were given ownership of large tracts of land in Hull and Templeton townships. The small agricultural community, called Wrightstown, quickly turned to the production of squared timber for the British market. The first lumber raft from the area, the "Colombo," reached Québec City in 1806, heralding the beginnings of the lumber industry in the Ottawa Valley.

Ezra Butler EDDY, a citizen of Vermont, settled in Hull in 1851 and built up his equity by manufacturing handmade matches, washboards and clothespins. In the 1870s he became one of the leading sawmill operators at the Chaudière Falls. His match and indurated fibreware production, as well as his pioneering efforts in pulp (1889) and paper manufacture (1890), made Hull one of the main centres of the pulp and paper industry. Axe factories, meat-packing establishments, textile firms and other related industries followed. This industrial development attracted numerous French Canadian workers to Hull and radically changed its ethnic and religious composition. From 1861 to 1871, Hull Township's French-speaking population increased tenfold (from 420 to 4461) while its English-speaking population grew by less than 20% (3291-3857). Today, 88% of Hull's citizens have French as their mother tongue, 7% English and 5% Portuguese and other languages. Some 97% are Roman Catholic.

On its incorporation in 1875, the town was renamed Hull after a city in Yorkshire, Eng.

Economy The Hull economy, essentially based on manufacturing in the 1940s, has changed radically. The majority of its labour force are now white-collar workers, with civil servants forming the largest bloc. The change began after WWII, with the closing of steel foundries and textile factories. The Trudeau government's decision to relocate a large number of federal civil servants in Hull has accelerated the rate of change. Linked to the economy of its sister city, Ottawa, and labouring under the weight of Québec's heavier regulations and taxes, Hull has had to fight hard to grow.

Cityscape The city of Hull covers somewhat more than 30 km^2; its core is an island linked to Ottawa by 4 bridges. It has been shaped by its original division into half lots by the Wrights, for rental purposes, and by the Great Fire of 1900, which destroyed two-thirds of the town. In the early 1960s it was a typical medium-size industrial Québec town, with 2-storey brick worker dwellings surrounding a few public

parks and buildings, linked together by its business section. As fire, demolition and renovation took their toll, the main public landmarks fell, the city core was changed radically and large developments — Place du Portage and Terrasses de la Chaudière — were built. The city extended into suburbia, with typical bungalows and shopping centres, and the old business section started to decline. Hull's population fell from 63 580 in 1971 to 56 225 in 1981, while that of its suburban sister cities (Gatineau and Aylmer) swelled from a combined 72 163 in 1981 to 101 683 in 1981.

Hull's cultural and social life is closely linked to that of Ottawa, Gatineau and Aylmer. It offers services that do not exist in the surrounding Québec municipalities, such as Université du Québec à Hull, the Conservatoire de musique de l'Outaouais, the Centre régional des Archives nationales du Québec, the Palais des Congrès convention centre and the Théâtre de l'Île. It is well served by radio, TV and newspaper, though some of these are based in Aylmer, Gatineau and Ottawa. Many Hull residents attend University of Ottawa, and Carleton and St-Paul universities. Two festivals highlight Hull's yearly calendar of events: the Festival international de la bicyclette (May) and Hull en août (August). The city is the gateway to Gatineau Park (administered by the NATIONAL CAPITAL COMMISSION), giving access to lakes, parks and 40 km of cycling paths. PIERRE-LOUIS LAPOINTE

Hull, Robert Marvin, hockey player (b at Pointe Anne, Ont 3 Jan 1939). He played junior hockey in Hespeler [Cambridge], Woodstock and St Catharines and joined Chicago Black Hawks in 1957. Though he scored only 31 goals in his first 2 seasons, Hull developed a fearsome slapshot (clocked at 187 km/h) and went on to become the highest-scoring left-winger in hockey history. His nickname "Golden Jet" aptly described him in motion, and his speed, power and drive epitomized the sport of hockey. He led Chicago to its first STANLEY CUP victory in 23 years (1960/61), dramatically equalled the record of 50 goals in a season (1961/62) and raised it to 54 (1965/66) and 58 (1968/69). He won the ART ROSS TROPHY 3 times, HART TROPHY twice and LADY BYNG TROPHY once, scoring 610 goals and 1170 points in 15 NHL seasons. In 1972 he accepted $1 million to jump from the NHL to the WINNIPEG JETS, giving immediate credibility to the fledgling WORLD HOCKEY ASSN. He continued his prolific scoring, with 77 goals in 78 games in 1974/75, adding 303 goals and 638 points to his totals. He attempted a comeback in 1980-81 with NY Rangers but was released in training camp. JAMES MARSH

Human Rights, claimed by individuals and groups, are considered so fundamental to human dignity that they receive special protection under the law and usually under the constitution of a country. They differ from CIVIL LIBERTIES, which refer to traditional Western values, eg, freedom of religion and expression, in that they are more substantive than procedural. The distinction was even more crucial in Canada before the entrenchment of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS; rights were defended by law, but liberties were merely tolerated and could be removed by government. After WWI, and more particularly after WWII, it became apparent that other needs basic to human dignity were not being met through civil-liberties legislation. To protect those who suffered discriminatory treatment from private persons, groups or governments or who suffered economic deprivation because of loss of health or job, legislatures would have to enact laws to forbid discrimination, to provide administrative assistance to victims of discrimination and to provide compensation for injury or loss of employment to the economically deprived. When these needs are recognized as fundamental by law or under a constitution, they are called human rights. A series of treaties after WWI imposed upon several European countries the obligation for the protection of racial, religious and national minorities and authorized the LEAGUE OF NATIONS to supervise the execution of these obligations. In 1948 the UNITED NATIONS General Assembly proclaimed the Universal Declaration of Human Rights as the "common standard of achievement for all peoples and all nations to the end that every individual and every organ of society, keeping this declaration constantly in mind, shall strive by teaching and education to promote respect for these rights and freedoms, and by progressive measures national and international, to secure their universal and effective recognition and observance." Included were the fundamental freedoms and legal rights (known internationally as civil and political liberties or rights), as well as those of equality, and economic, social and cultural rights. The declaration was accepted by unanimous vote, with the 6 members of the Soviet bloc, Saudi Arabia and the Union of S Africa abstaining. In 1966, the 1948 declaration became 2 binding covenants — the International Covenant on Civil and Political Rights and the International Covenant on Economic, Social and Cultural Rights. Canada ratified both covenants in 1976 (with the unanimous consent of the provinces) and they are now binding upon Canada in INTERNATIONAL LAW. Canada also ratified the Optional Protocol to the Civil and Political Rights Covenant, and every individual in Canada can now complain to the Human Rights Committee if a Canadian government is not meeting covenant requirements.

The human rights of equality have only recently been proclaimed in Canada. Before the British Emancipation Act of 1833, SLAVERY was practised in the colonies, and after Confederation discriminatory laws were enacted to discourage the immigration of nonwhites (*see* IMMIGRATION POLICY). Those who had already entered or continued to do so despite the restrictions, as well as native peoples, were subject to laws placing them in segregated schools, denying them the franchise, restricting their entry into professions and certain types of employment, restricting their areas of residence, prohibiting their consumption of alcohol and even denying them equal access to public facilities. In the 19th century, women and children were treated as chattels; property rights were restricted (*see* MURDOCH CASE), and the male head of the family could disinherit his wife and children in his will. Women could not vote in federal elections until WWI, and in all provincial elections until 1940. Women were not considered "persons" eligible for appointment to the Senate until 1932. By WWII most laws restricting rights of women and children were changed, but racist laws and those denying the franchise to native people were not altered until after the enactment of the CANADIAN BILL OF RIGHTS in 1960. The history of the Bill of Rights reveals how recently, in Canada, the concept of human rights has been expanded to include minority rights. The result of 2 petitions submitted to Parliament by the JEHOVAH'S WITNESSES, many of whom were arrested in Québec during the 1940s, the Bill was championed by John DIEFENBAKER, who had been a strong defender of the Witnesses during WWII. The Bill of Rights was not entrenched, however, and could be amended in Parliament by the normal legislative process. Moreover, it applied only to the federal jurisdiction.

Although Saskatchewan had had a Bill of Rights since 1947, fair-accommodation and fair-employment-practices Acts were enacted throughout Canada only after 1951, followed by equal-pay Acts for women. In the 1960s the provinces started to consolidate fair-practices statutes into comprehensive human-rights codes, administered and enforced by permanent human-rights commissions. By 1975 every province had done so. The federal Canadian Human Rights Act and Commission were created in 1977. Alberta, Saskatchewan and Québec also provide protection for the fundamental freedoms, and Saskatchewan and Alberta added limited legal-rights protections in their Human Rights Code and Bill of Rights. The Québec Charter of Rights and Freedoms (1975) provides for extensive legal-rights protections, and even proclaims certain economic and social rights.

The Constitution Act, 1982, not only provides for future amendment of all Constitution Acts to be made in Canada, but includes the Canadian Charter of Rights and Freedoms guaranteeing fundamental freedoms, democratic rights (of participation in elections), mobility rights (to and from and within Canada), legal rights, equality rights (including equal rights of men and women, and protection of the multicultural heritage of all Canadians), language rights (and minority-language education rights), as well as the right to enforce these. But although the Constitution is "the supreme law of the land" and "any law that is inconsistent with the provisions of the Constitution is, to the extent of the inconsistency, of no force or effect," the adoption of the Charter does not of itself guarantee human rights. Although its primary purpose is to restrain government action through judicial enforcement, the scope of civil liberties such as freedom of expression will not be known for some time. To what extent is censorship inconsistent with the Charter? Is obscenity a valid basis for restricting freedom of expression? When is it reasonable to limit freedom of assembly for reasons of public security or order? Are actions taken under the WAR MEASURES ACT a reasonable restriction on civil liberties? These questions can only be answered by the courts. However, because section 33 of the Charter permits any government to enact laws "notwithstanding the Charter," a majority government wanting to do so must be restrained through the combined action of individuals, public-interest groups, political parties, the media and members of the legislature.

Many human rights are better promoted through administrative agencies than through the courts. In addition to creating human-rights commissions, most Canadian jurisdictions have established the institution of the OMBUDSMAN, to which people can complain against unfair exercise of valid discretionary power, or failure to exercise it. To protect cultural rights, government funds have to be expended. This is particularly true with economic and social-welfare rights, which require positive government action rather than judicial restraint.

WALTER S. TARNOPOLSKY

Humane Societies are societies for the prevention of cruelty to animals (SPCA). Following a long struggle by Richard Martin, British landowner and parliamentarian, and others to secure legislation against cruelty to children and livestock, the first SPCA was begun in England in 1824. Although Martin was a founding member, the organization was formed by the Rev Arthur Broome, an Anglican clergyman, and Lewis Gompertz, a Jewish author. At Queen Victoria's command, the society became known as the Royal Society for the Prevention of Cruelty to Animals in 1840. The RSPCA was the forerunner of the Children's Aid Society.

The humane or animal-welfare movement was introduced to N America by Henry Bergh. Following a visit to the RSPCA, he organized the American SPCA in New York in 1866. In the same year the first law for the protection of animals was passed. The first humane society in Canada was the Canadian SPCA in Montréal (est

1869). Societies were soon established in Québec (1870), Ottawa (1871) and Toronto (1873). Humane societies now exist in major Canadian cities and in some 75 municipalities throughout the provinces. All are nonprofit, charitable organizations; most operate shelters, which take in lost and abandoned animals (mostly CATS and DOGS). They are often also responsible for municipal animal-control activities. Many operate under provincial SPCA or Animal Protection Acts, with authority to investigate complaints of cruelty to animals and to lay charges where necessary. Society inspectors may use the Cruelty to Animals Section of the Criminal Code of Canada. They may not carry firearms but may, with court permission, remove suffering animals from the possession of their owners.

As the number of SPCAs involved in animal-welfare work at the provincial and municipal levels increased, so did the need to respond collectively to problems of national scope, eg, transportation and slaughter of food animals. Thus, in the mid- to late-1950s Dr A.E. Cameron, a retired veterinary general of Canada, Lieutenant-Colonel Richard Taylor, president of the Ottawa Humane Society, Senator F.A. McGrand and K. Switzer, managing director of the Ottawa Humane Society, organized meetings to discuss formation of a national SPCA. The Canadian Federation of Humane Societies received its federal charter in 1957 and has its headquarters in Ottawa. It is an umbrella group for 38 autonomous member societies across Canada; most are SPCAs but other organizations concerned with specific animal-welfare issues are included. CFHS does not engage in the daily activities of shelter operations, but addresses issues that have broader implications. CFHS interacts with 10 federal government departments having jurisdiction, in some way, over national, international and interprovincial aspects of man's use of animals (*see* VETERINARY MEDICINE).

NEAL R. JOTHAM

Humber River, 153 km long, drainage basin 7680 km², is the principal river of western Newfoundland. Named for the English river, it rises in the LONG RANGE MOUNTAINS W of White Bay and flows SE and then SW to Deer Lk, where it is joined by a tributary draining 100 km long Grand Lk. The Humber flows SW from Deer Lk into Humber Arm at CORNER BROOK and on into the Bay of Islands, having fallen nearly 660 m from its sources. The river is rich in ATLANTIC SALMON and was, from the 1800s, a waterway for European trappers. Though its mouth had been charted by James COOK in the 1760s, there was little permanent settlement in the region until the mid-1800s. Flowing through great stands of timber, the Humber has been used by loggers since the late 1800s.

ROBERT D. PITT

Humboldt, Sask, Town, pop 4705 (1981c), inc 1907, is located at a CNR-CPR junction, 105 km E of Saskatoon. Founded on the arrival of the Canadian Northern Ry (1904), it assumed the name of a nearby Dominion Telegraph Line office named for German scientist Alexander von Humboldt. Its designation as a railway divisional point fostered growth, as did the establishment of St Peters Colony (50 townships) by German-American RC settlers (1903). Situated on the black soil of the aspen parkland in a relatively risk-free crop area, Humboldt became the colony's largest centre and is now the province's largest town. While certain early commercial enterprises such as wholesale grocers and a tannery have disappeared, others (eg, a flour mill) still operate, and the town continues to grow as a service centre. It is also a judicial and administrative centre of some consequence and in 1975 became the Prairie provinces' central testing station for agricultural equipment with the opening of the Prairie Agricultural Machinery Institute.

C.O. WHITE

Hummingbird, common name for New World family Trochilidae, which numbers 341 species. It is one of the largest BIRD families and contains the smallest known bird (bee hummingbird, 2 g). Males, in particular, come in an astonishing variety of sizes, shapes, colours and plumage. In flight, the wings of some beat so rapidly that they produce a humming sound (hence the name). They are the only birds able to hover in midair and fly backwards. Their energy comes from flower nectar; small insects supply protein for growth. The hummingbird has a very fast metabolism. Feeding on almost 1000 flowers daily, it consumes almost half its body weight in sugar. At night and in periods of bad weather, certain species fall into a semiconscious state to conserve energy. Four species nest in Canada, breeding as far W as Alberta. The ruby-throated hummingbird (*Archilochus colubris*) is the only species in eastern Canada. The black-chinned, small calliope and rufous hummingbirds (*A. alexandri, Stellula calliope, Selasphorus rufus,* respectively) nest only in western Canada, only the last in widespread areas. Canadian species nest in trees, laying 2 white eggs. Hummingbirds can be attracted into gardens if flowers with long corollas are grown or small flasks of sugar water are set out, and can be induced to perch on a person's finger while feeding.

JEAN-LUC DESGRANGES

Humorous Writing in English It is perhaps paradoxical that the first major work of Canadian humour — Thomas MCCULLOCH's "Letters of Mephibosheth Stepsure" (1821-23) — should have been written by a man whose other credits included *Popery Condemned* and *Calvinism.* There has always been a perception of something dour, grim and northern about our national literature; critics seeking our defining images have talked of "survival" in a "harsh and lovely land." Our stories are often of failures and victims, our heroes freeze in snowdrifts, and our marriages (like most of our shipping) end up on the rocks.

One major factor inhibiting the early growth of a humorous tradition in Canadian literature was that most writing in the 19th century was dominated by a colonial mentality which looked to the "high seriousness" of English romanticism for its model. A poet who takes himself solemnly (which is not quite the same thing as taking himself seriously) finds it difficult to devote a whole poem to anything as trivial as a joke. One mark of an immature writer, or indeed of a whole literature which has not yet attained self-confidence, is the straining after big, "serious" topics. Robertson DAVIES comments that as late as 1920 to 1935, "we were not sufficiently sure of ourselves in this country to realize that a humorist may be a serious literary artist." The Canadian inferiority complex (which even today leads to much unprofitable anguish over the need to supply a recipe for "the Canadian identity") did not allow a writer the luxury of making a fool of himself in public.

The Canadian tradition of humorous writing has generally been stronger in prose than in poetry. McCulloch's satirical letters, which began appearing in the Halifax weekly *Acadian Recorder* in 1821, have been described by Northrop FRYE as exhibiting a tone "quiet, observant, deeply conservative in a human sense, [which] has been the prevailing tone of Canadian humour ever since." McCulloch's use of a satirical persona — the "conventional, old-fashioned, homespun" farmer — places him in a classical tradition which reaches back to Addison and Swift, and forward to Davies's Samuel Marchbanks and John METCALF's James Wells in *General Ludd* (1980). Whereas McCulloch's style was dry, subtle and understated, his immediate successor, Thomas Chandler HALIBURTON, proclaimed similarly conservative social values through the brash, colloquial, overstated persona of Sam Slick, the Yankee Clockmaker. From his first appearance in *The* CLOCKMAKER (1836), Sam Slick proved immensely popular and ironically has influenced American humour as much as Canadian.

After these promising beginnings, however, Canada had to wait until 1910 for the appearance of its next major comic writer. That year *Literary Lapses* launched the national and international reputation of Stephen LEACOCK. Leacock's masterpiece, SUNSHINE SKETCHES OF A LITTLE TOWN (1912), was followed 2 years later by the finely satirical *Arcadian Adventures with the Idle Rich.* In Leacock's more than 30 books of humour there was much inferior work; Robertson Davies ascribes his failure to develop into a major comic novelist as due, at least in part, to his unwillingness to carry through the darker implications of his comedy. Critical debate on *Sunshine Sketches* continues to centre on the balance between its irony and its indulgence, and between Leacock's criticism of the townspeople and his nostalgic affection for them.

One of Leacock's more permanent legacies was the establishment of the Stephen Leacock Medal for Humour, of which a most worthy early recipient was Paul Hiebert's SARAH BINKS (1947). Hiebert offers a broad but telling pastiche of the academic biography, but the true genius of the book lies in the creation of what John Moss has called "some of the world's best bad poetry." The verses of the "sweet songstress of Saskatchewan" are fine parodies of Canadian poetry. *Sarah Binks* is a comic creation which derives from Canadian literature while simultaneously making a contribution to it. In this it has few rivals, though one may be George BOWERING's *A Short Sad Book* (1977).

As we move into the period of the full maturity and expansion of the Canadian novel, we find an increasing use of humour, in many forms. There is the good-natured humour of W.O. MITCHELL, a born teller of tall tales, as reflected in the conservative, traditional comic world of WHO HAS SEEN THE WIND (1947). A much sharper edge of satire is to be found in the work of Mordecai RICHLER, but even in a novel such as *The* APPRENTICESHIP OF DUDDY KRAVITZ (1959), the most memorable scenes are those — like the Bar Mitzvah movie or the epileptics' newsletter — in which the exuberance of comic exaggeration outstrips the strict necessities of satirical mordancy. A blacker, wilder, more fantastic strain of humour illuminates the novels of Leonard COHEN, especially BEAUTIFUL LOSERS (1966). And in novels such as Sheila Watson's *The* DOUBLE HOOK (1959) humour deepens into a more profound sense of comedy as a redemptive vision of life.

Recent Canadian comic novels have moved towards an exuberant, overstated comedy of exaggeration and fantasy. This is evident in Ray Smith's *Lord Nelson's Tavern* (1974) and in Leo Simpson's *The Peacock Papers* (1973), in which an angel announcing the end of the world regrets particularly the demise of the Hamilton Tiger-Cats. (Like Simpson, Robertson Davies, in *The Rebel Angels,* 1981, pays homage to the comic novels of Thomas Love Peacock.) The sharp satirical observation of Margaret ATWOOD's novels may not strike some readers as exaggerated at all. Robert KROETSCH, however, has elevated the Prairies' beer-parlour tall tale to mythic proportions in *The* STUDHORSE MAN (1969). In Kroetsch's *What the Crow Said* (1978) the exuberance of invention attests the influence of S American novelists such as Gabriel García Márquez. The same influence may be traced in the equally extravagant comedy of Vancouver I's Jack Hodgins, especially in *The Invention of the World* (1977). The full range of a comic voice following the possibilities of inventive licence to their limit may be heard in the short stories of Leon Rooke and in his novel, *Shakespeare's Dog* (1982).

Although much 19th-century Canadian po-

etry may strike the contemporary reader as unintentionally comic, as W.A. Deacon proved in his satirical *The Four Jameses* (1927), this period contains few and scattered examples of truly humorous verse. The first major Canadian poet for whom humour formed an essential and serious part of his vision was F.R. SCOTT. "The Canadian Authors Meet" (1927) remains a wickedly accurate deflation of literary pretension and colonial mediocrity. Unlike the prose satirists, Scott operated from left of the political centre; his poetry was only one aspect of a most distinguished career in Canadian cultural and political life. During the Depression, Scott's satire, like that of Dorothy LIVESAY, was aimed against the "efficiency" of an economic system which left so many unemployed and impoverished. In his *Trouvailles* (1967), Scott also used the "found" poem to great satiric effect.

Scott coedited with A.J.M. SMITH the first major anthology of Canadian "satire, invective and disrespectful verse," *The Blasted Pine* (1957). Although many of the poems in this collection are not necessarily funny, it was a milestone in the development of Canadian humour. Adopting a more eclectic editorial stance and insisting on the importance of "poetry" rather than "verse," Douglas Barbour and Stephen Scobie coedited the anthology *The Maple Laugh Forever* (1981).

Scott's tradition of acerbic classical wit has been notably carried on by George JOHNSTON and Francis Sparshott, but the majority of Canadian comic poems are more boisterous or fantastic in tone. Earle BIRNEY has twisted language into many ingenious and whimsical games, though his laughter often seems a thin disguise for his deeper pessimism. Irving LAYTON has used a loud and sometimes crude humour as part of his general assault on stuffy proprieties and life-denying restrictiveness. Most impressively, Al PURDY has created a kind of comic persona for himself, shambling, expansive and all-embracing, which provides the ideal medium for his wide range of poetic concerns.

Among younger poets, there is a similar use of the comic persona in Tom Wayman's creation of himself in the distanced third person of *Waiting for Wayman* (1973). The seemingly naïve idealism of bill BISSETT is accompanied by shrewd irony and a poker-faced relation of the modern world's sometimes lethal absurdities (as in "Th Emergency Ward"), and Frank DAVEY has also exploited an apparently neutral style of description, which allows the material to reveal its own satiric potential, in his "War Poems" and in *Capitalistic Affection!* (1982). Dennis Lee has written whimsical children's poems which shade, as the age of the intended audience grows, into pointed political satire. The influence of Atwood's bitter satirical treatment of sexual relations in *Power Politics* (1971) is continued and extended by younger women such as Sharon Thesen, in *Artemis Hates Romance* (1980), and Mary Howes, in *Lying in Bed* (1981).

For most Canadian poets, humour has now become one element in a wider and more complex view of the world. In his animal poems, Michael ONDAATJE juxtaposes the "strange case" of his beagle's sexual proclivities with the stranger horrors of the animal man; in his "Letters & Other Worlds," the absurd eccentricities of his parents' characters are inseparable from the tragedy of their lives. *The Martyrology* (1972 and continuing), by bp NICHOL, begins with a play on words: all words beginning in *st* are concealed saints' names (eg, *stand* is written as *St And*). On this is built a whole cosmology, a life-work-poem which stands at the centre of contemporary Canadian literature.

Humour in Canadian drama is less advanced than it is in either fiction or poetry, though comic elements were present in the complex poetic plays of James REANEY and in the multimedia extravaganzas of Wilfred WATSON. Recent works like *Billy Bishop Goes to War* (1978), by John Gray and Eric Peterson, and Linda Griffiths's *Maggie and Pierre* (1980) indicate a new willingness to get out on satirical limbs. Canada has a strong comic tradition in shorter dramatic forms, such as the review sketches of many years' *Spring Thaw*, and this tradition has found fertile ground in radio (*Royal Canadian Air Farce*) and television (*SCTV*). Indeed, second only to Leacock, the Canadian comedians who were best known internationally in the early 1980s were *SCTV*'s McKenzie brothers, whose precisely timed mockery of Canadian gullibility and boorishness ("Take off, eh?") harks back to the deepest roots of Canadian humour. Sam Slick was fully familiar with "hosers." STEPHEN SCOBIE

Humphrey, Jack Weldon, painter (b at Saint John, 12 Jan 1901; d there 23 Mar 1967). Humphrey was the most significant eastern Canadian painter of his generation. He studied under Charles Hawthorne at NY's National Academy of Design from 1924 to 1929 and with Hans Hofman in Munich in 1930. He later visited Europe, Mexico and New York, but his deepest sentimental attraction was to his birthplace, in spite of its isolation from artistic developments. Humphrey's paintings of the harbour, streets and workers of Saint John established his reputation as a regional artist and his work extended to numerous portraits of friends and the city's children. Making no concessions to fashion, Humphrey's tough, honest approach made him a respected member of Montréal's CONTEMPORARY ARTS SOCIETY and the Canadian Group of Painters. Returning from France in 1954, he developed abstract and nonobjective tendencies in gouache and oil landscapes, while his beautiful watercolours focused on the intimate details of nature. J. RUSSELL HARPER



Jack Humphrey, *Charlotte* (1939), oil on canvas (*courtesy Art Gallery of Ontario/gift from the Albert H. Robson Memorial Subscription Fund, 1940*).

Hungarians Compiling exact historical statistics on Hungarian immigration is complicated because until WWI immigration statistics did not differentiate between Magyar and non-Magyar Hungarian subjects. Today, "Hungarian" refers to Magyar-speaking peoples, but before 1914 the term might have included some SLOVAKS, CROATIANS, ROMANIANS and various other peoples.

Until the late 19th century, very few Hungarians came to Canada and even fewer stayed for more than a brief period. In the 1880s Hungarian immigrants to the US began migrating to Canada and, through the efforts of immigration agent Paul Oscar Esterhazy, they established colonies in what were to become Manitoba and later Saskatchewan. In time these pioneers were followed by about 100 000 other Hungarian immigrants. Today, there are about 140 000 Canadians of Hungarian descent. They constitute a culturally and socially diverse group whose members live throughout most of the country and can be found in all walks of life.

Origins Most Hungarians emigrated from Hungary, or from Czechoslovakia, Romania or Yugoslavia, countries with substantial Hungarian minorities. Throughout most of the past 11 centuries, Hungary occupied the entire Middle Danube Basin and was the home of Hungarians as well as a few other nationalities. Prior to WWI, uneven economic development, lack of agrarian reform, a nationality problem and other factors caused hundreds of thousands of Hungarians to emigrate. After the defeat of the Austro-Hungarian Empire, Hungary was dismembered. The resulting economic and social malaise drove still more Hungarians to emigrate, while Hungarians who had been transferred to neighbouring states often chose immigration to Canada over life in a hostile political environment. WWII and the imposition of a communist dictatorship forced more Hungarians into exile.

Migration and Settlement Hungarians came to Canada in 4 major waves. In the period before 1914 about 8000 immigrated; from 1925 to 1930 about 26 000; between 1948 and 1952 some 12 000 postwar displaced persons arrived, and between 1956 and 1957 about 37 000 Hungarian REFUGEES came to Canada after the collapse of the 1956 uprising against Soviet authority. Since then several hundred Hungarians have immigrated to Canada annually. Most of the pre-1914 settlers were peasants; in general disappointed transmigrants from the industrial slums of the US. The interwar arrivals were a somewhat more mixed lot socially, while many of the post-WWII immigrants were from Hungary's dispossessed middle and upper classes. Young adult males predominated in all but the last wave of immigrants.

The first groups of Hungarian immigrants settled mainly on prairie homesteads (Saskatchewan was sometimes called "Little Hungary" before 1914), but later immigrants established themselves in towns and cities. Whether in rural or urban areas they usually congregated in their own residential groups. From the 1920s onwards, more Hungarians settled in cities, especially in central Canada. The GREAT DEPRESSION interrupted these trends, but the shift to the cities, and especially to southern Ontario, resumed after WWII. Today, one out of every 2 people of Hungarian origin lives in Ontario, and 4 out of 5 live in a city, although residential concentrations have all but disappeared.

Economic Life Most of the early Hungarian immigrants worked as homesteaders, miners, navvies and loggers. The post-1945 immigrants tended to be more skilled and better educated. In times of prosperity most Hungarians did well, in times of recession they were particularly hard hit. During the Depression most of them lost their jobs, farms or businesses. Today, many are economically comfortable and a few have become rich.

Social and Cultural Life The majority of Hungarians are Roman Catholic; others are Jewish, and many belong to the United, Presbyterian and Lutheran churches, are dispersed among other Protestant denominations, or belong to the Greek Catholic Church. Many of the churches constitute social and cultural centres and provide instruction in the Hungarian language.

To smooth the effects of social isolation and to reduce economic instability, Hungarians have maintained various types of organizations since the establishment of their first settlements.

The Canadian Hungarian Federation, an umbrella organization of clubs, societies and churches, represents many Hungarian Canadi-

ans. The Hungarian School Board, an arm of the federation, promotes schooling in the Hungarian language. The Hungarian language is offered as a credit course in 2 Toronto high schools. Many local and professional organizations also exist. The Hungarian Canadian Cultural Centre in Toronto is the largest Hungarian community centre outside Hungary. Two Hungarian museums, one in Toronto and one in Oshawa, have been founded. Hungarians began publishing Hungarian-language newspapers before 1914. Today, Toronto is the centre of Hungarian publishing activity in Canada; publications include *Kanadai Magyarság (Canadian Hungarians)*, *Magyar Élet (Hungarian Life)* and many more specialized papers. The *Kanadai Magyar Munkás (Canadian Hungarian Worker)* has been the primary press organ of the Canadian Hungarian left since 1929.

Group Maintenance Adjustment to Canadian life tended to come first in the workplace and last in the family home. Hungarian women acquired greater influence as they gained more economic power. Hungarian customs and rites have gradually been abandoned, and the process of adjustment has often been followed by that of assimilation. Social and economic stratification among the immigrants has often hindered intra-ethnic unity and interaction and thereby hastened the loss of the immigrant cultural heritage.

Although maintenance of the native culture was encouraged at home and within the immigrant community's institutions, the adjustment to Canadian conditions has been promoted through the schooling of children in regular English- or French-language schools. Some of the most remarkable contributions of Hungarians to Canadian culture have been in fields in which the immigrant heritage is compatible with the Canadian environment, eg, in the arts, the sciences and music. N.F. DREISZIGER

Hungerford, Samuel James, railway executive (b near Bedford, Qué 16 July 1872; d at Farnham, Qué 7 Oct 1955). After beginning as an apprentice machinist for the Southeastern Ry in 1886 and holding various positions in the operating departments of the CPR, Hungerford joined the Canadian Northern Ry as superintendent of rolling stock in 1910. During the 1920s, as a VP of operation, maintenance and construction, he played an important role in the integration and expansion of the CNR. Appointed president of the CNR in 1934, Hungerford reduced operating expenditures and defended the company's autonomy amid demands for amalgamation with the CPR. He retired from the presidency in 1941. First president of TRANS-CANADA AIRLINES and president of National Ry Munitions Ltd, a crown corporation that produced guns and gun carriages in WWII, he was created CMG for his wartime services. J. LINDSEY

Reading: G.R. Stevens, *History of the Canadian National Railways* (1973).

Hunt, George, ethnographer, museum acquisitions collector (b at Ft Rupert, Vancouver I, BC 1854; d there Sept 1933). Most of our knowledge of traditional KWAKIUTL culture is based on Hunt's rich ethnographic notes and artifact collection. Son of an English HBC trader and a Tlingit mother, Hunt lived at Ft Rupert, a trading post and Kwakiutl settlement. He spoke Kwakiutl as his first language, married a high-ranking Kwakiutl woman and achieved a prestigious position in the native culture. Most of anthropologist Franz BOAS's Kwakiutl publications are based on Hunt's ethnographic notes; their collaboration extended for over 40 years until Hunt's death. Hunt greatly assisted most other leading Northwest Coast field-workers and artifact collectors of the day, even arranging and directing an ethnographic film for Edward S. Curtis. KATHLEEN MOONEY

Hunt, Henry, Kwakiutl artist (b at Fort Rupert, BC 16 Oct 1923). A principal carver at the BC Provincial Museum for nearly 20 years, Henry Hunt began his career apprenticed to his father-in-law, Mungo MARTIN, and Arthur Shaunnesy, another well-known Kwakiutl carver. From 1962 to 1974 he was chief carver at the BC Provincial Museum, the successor to Martin. There he trained his sons Tony, Stanley and Richard. He and his sons created the magnificent Mungo Martin memorial pole at Alert Bay (1971) and an impressive pole for the Totem Marina at Shuswap Lk. Hunt's masks, totem poles, ceremonial screens and serigraphs are found in major international museum collections. CAROL SHEEHAN

Hunt, Thomas Sterry, chemist, geologist (b at Norwich, Conn 5 Sept 1826; d at New York C, 12 Feb 1892). After studying at Yale under Benjamin Silliman Jr, Hunt joined the GEOLOGICAL SURVEY OF CANADA in 1846 as a chemist and mineralogist. While in this position, he taught at Laval 1856-62 and McGill 1862-68. In 1872 he left Canada to accept the geology chair at Massachusetts Institute of Technology. He officially retired in 1878, but continued to conduct research, remaining an important member of the scientific community. As a chemist and geologist with original and controversial ideas, Hunt was known for his contributions to defining the Laurentian and Huron geological systems. In 1859 he was elected fellow of the Royal Soc of London and was appointed president of both the American Institute of Mining Engineers (1877) and the American Chemical Soc (1880). Throughout his career, he maintained close ties with Canada. He helped found the RSC in 1882 and became its president in 1884. RAYMOND DUCHESNE



Thomas Sterry Hunt, chemist and geologist who helped define the Laurentian and Huron geological systems (*courtesy Public Archives of Canada/C-37794*).

Hunt, Tony, Kwakiutl artist (b at Alert Bay, BC 24 Aug 1942). He is a leader in the social and ceremonial life of Alert Bay, a master of traditional performance as well as of the visual arts, and has established an international reputation as a carver of Kwakiutl-style NORTHWEST COAST INDIAN ART, after studying with his illustrious grandfather, Mungo MARTIN, and his father, Henry HUNT. He was assistant carver (1962-72) at the BC Provincial Museum's Thunderbird Park. In 1970 he established the Arts of the Raven Gallery, overseeing an apprenticeship program for aspiring young native carvers. Among his major works



Tony Hunt, a Northwest Coast Indian artist known for his fine masks and totem poles (*courtesy Canapress*).

are TOTEM POLES in Victoria's BC Provincial Museum and Bastion Square. In 1982 he was commissioned to do a 4 tonne stone sculpture for the NATIONAL MUSEUM OF MAN, called "Raven Transforming into Man." CAROL SHEEHAN

Hunter, Thomas James, Tommy, singer (b at London, Ont 10 Mar 1937). Hunter and his weekly CBC-TV show have long been important in Canadian country music. He got his start on "Main Street Jamboree," on CHML Radio in Hamilton in 1953 and by 1956 was a rhythm guitarist on CBC-TV's "Country Hoedown," which in 1965 was replaced by the "Tommy Hunter Show." The show has become one of the longest running network variety shows in N America and has provided national exposure for Canadian country singers. Hunter won the Juno Award 1967 to 1969 as Canada's best male country singer. RICHARD GREEN

Hunters' Lodges, largest of the secret societies pledged to liberate the Canadian provinces from "British thraldom," founded in early 1838 in the northern US by Canadian rebels who had fled there after the REBELLIONS OF 1837. The movement quickly became American, with support from widely varied groups in the border states and membership estimated at 40 000-60 000. Abandoning plans to invade Upper Canada on 4 July 1838, the "patriot hunters" attempted numerous unsuccessful incursions in the following months. Rebels were soundly defeated at Napierville, Lacolle and Odelltown, LC, and at Prescott (in the "battle of the windmill") and Windsor, Upper Canada. They then undertook a series of border provocations calculated to drive Britain and the US to war, including burning the steamship *Sir Robert Peel* in the Thousand Is and blowing up the Brock monument at Queenstown, Upper Canada. On 25 Sept 1841, US Pres Tyler warned them to disband, and within a short time the lodges were a thing of the past. CURTIS FAHEY

Hunting is the purposeful pursuit to the death of wild ANIMALS by humans. People hunt for different purposes: subsistence, trade, WILDLIFE CONSERVATION AND MANAGEMENT, training, recreation and prestige. Subsistence hunters are dependent on wild animals for food and shelter or for cultural survival. Evidence suggests that the earliest humans, and their ancestors, hunted animals; some claim that the earliest tools were weapons. Subsistence hunters or their traces have been found on all continents except Antarctica, and from tropical to polar climatic zones. The varieties of technique and organization seem almost endless. Weapons have included the trap, gorge, noose, net, pitfall, deadfall, bolo, throwing-stick or boomerang, club, knife, spear, javelin, blowpipe, bow and arrow, and harpoon. Dogs and horses have often been employed in tracking and pursuit. There can be little doubt that Pleistocene (Ice Age) hunters exterminated some, perhaps many, species.

In Canada, hunting at will for food is possible for natives of groups that obtained that right

when they ceded lands under treaty, and for natives of other groups by virtue of acknowledged aboriginal title. Some spokesmen for native associations have claimed rights over the disposition of all game in Canada (*see* INDIAN ACT; LAND CLAIMS).

Presumably, commercial hunting began as trade developed: first, for surplus commodities, between communities of subsistence hunters; later for commodities to be traded on a wider scale. Besides ivory, from walrus and elephant, commercial products of the hunt include feathers, skins, furs and meat. Such products have been traded for millennia. Excessive harvesting has been a recurrent problem, becoming chronic in the last 200 years, with widespread affluence creating demands, which are filled by efficient means of hunting, transport and trade. Species bearing the most valuable products (eg, SEA OTTER) have suffered severe depletion. At present, several species are endangered by commercial hunting, particularly certain whales, sea turtles, rhinoceroses and elephants. Commercial hunting for feathers and plumes declined early in the 20th century with the imposition of strict import controls in Europe and N America. Fur animals have generally proved well able to sustain harvesting. The FUR TRADE, although subject to the swings of fashion, remains viable; its future depends perhaps on philosophical rather than resource issues. In many countries, the meat of hunted animals enters the market, where it competes with domestic meats, and returns money to landowners, collectives or hunting associations, to set against management costs. The culling of herds and the reduction of vertebrate pest populations are examples of hunting directed to husbandry or the protection of economically important resources.

Trophy hunting, a kind of recreational hunting, demands time, money and effort, and is essentially competitive in nature, the object of the trophy hunter being to get a large specimen. The measurements used for N American trophies are formally detailed by the Boone & Crockett Club, which appoints qualified judges, adjudicates conflicts, provides standards and, in particular, rules on questions of whether or not specimens were taken in "fair chase." A similar system exists for ranking trophies taken by archery.

Today, most hunting in Canada is recreational and motivated by the tangible as well as intangible rewards of success. Under the common law, game is public property until killed or crippled or "brought to bag," although in the case of game on private land the owners control access. Under administrative laws and regulations, competent jurisdictions set out rules governing hunters. These rules may include strictures on age and qualifications of applicants for hunting licences, as well as defining hunting zones, seasons and bag limits. The rules, largely designed to divide hunting opportunities among participants and reduce the risk of accidents, are enforced by provincial game officers and federal migratory bird convention enforcement officers, including members of the RCMP. They are under continuing review by local clubs making up provincial fish and game associations, which are loosely affiliated to the CANADIAN WILDLIFE FEDERATION.

Recreational hunting opportunities are found in all parts of Canada, except in preserves such as national PARKS and provincial WILDLIFE PRESERVES. All game resources are under provincial administration except migratory birds, which are managed by the Canadian Wildlife Service, with the co-operation of the provinces. Populations of WATERFOWL, which breed in agricultural parts of Canada, have declined in recent years, and the conservation of wetlands, although greatly assisted by governments and by the private agency Ducks Unlimited (Canada), needs continuous effort. Arctic-nesting geese, particularly Canada geese and snow geese, although subject to the vagaries of weather on their breeding grounds, have prospered in contrast to southern-nesting species. As human populations and demand on limited hunting opportunities increase, there must be international co-operation to ensure equitable sharing of these migratory resources.

Judging by the some 400 000 waterfowl licences sold each year in Canada, it can be estimated that perhaps 1 million Canadians hunt. Canada also attracts hunters from all over the world to enjoy its unique hunting opportunities. A stay at a goose camp in the coastal marshes of James Bay is unforgettable. The expected encounter with an excited, antlered bull makes a late Sept moose-calling hunt the experience of a lifetime. Superb landscapes await the hunter on a packhorse trip through mountain valleys, searching the heights for bighorn or Dall rams. For the hardy and daring, a spring hunt for grizzly or polar bear is sure to prove memorable. However, not all Canadians approve of recreational hunting. Some are opposed to it on ethical grounds, and some native Canadians are opposed to nonnative Canadians hunting because of violations to native treaty rights.

Canada possesses many upland game birds, from the rock and willow ptarmigan of the arctic TUNDRA to the sage and sharp-tailed grouse of the shortgrass PRAIRIES. They and the introduced gray partridge and ring-necked pheasant vary in numbers from year to year. There is a tendency for some species, particularly the ruffed grouse of the mixed forest and scrublands, to exhibit a cycle in numbers. These cycles may be related to similar rhythms shown by snowshoe-hare populations, and by their predators.

The most widely distributed big-game species of settled Canada is the white-tailed deer, formerly confined to the eastern provinces but now found as far west as the Okanagan Valley. The western mule deer is common in river valleys and rough terrain; in coastal BC, it is replaced by its relation, the black-tailed deer. The moose, adapted to deep snow with its long legs and typical of boreal and subalpine forests, is well distributed from coast to coast, and now prospers in Newfoundland, to which it was successfully introduced in 1904. Woodland caribou also frequent the boreal forest. Barren-ground caribou migrate seasonally between the barrens, where they calve early in June, and the northern coniferous forest, where they pass the snowiest parts of winter. They are hunted only by natives and residents of the northern territories. The George River herd of Ungava caribou is hunted both by residents and nonresidents. Of more localized interest are the pronghorn of the southern prairies, the mountain goat, bighorn, stone and Dall sheep of the western cordillera, and the muskox of the High Arctic. Other game species include black, grizzly and polar bears, grey wolf and cougar.

Roughly 4 million ducks and half a million geese are harvested annually in Canada, and close to half a million beaver, which are used for food as well as pelts. A survey of game harvests in 1976-77 found the native grouse harvest to be 3-4 million, of which most were the uniquely succulent ruffed grouse. Some 2 225 000 snowshoe hare were killed. Of some 200 000 hoofed mammals taken, 110 000 were white-tailed deer, 50 000 moose, 23 000 barren-ground caribou and 10 000 mule deer. Pronghorn, elk and woodland caribou were next, at around 2500 each, followed by mountain sheep and goat at about 1000 each. Some 8000 bears were taken, of which 7000 were black bear and the rest polar bear and grizzly.

A.H. MACPHERSON

Reading: M. Brander, *Hunting and Shooting, from the Earliest Times to the Present Day* (1971).

Huntsman, Archibald Gowanlock, marine biologist, administrator, editor, teacher (b at Tintern, Ont 23 Nov 1883; d at St Andrews, NB 8 Aug 1973). Huntsman was a provocative thinker and innovator who decisively influenced fisheries science in Canada. His professional career, characterized by keen intellect, verve and indefatigable effort, combined fisheries research with postgraduate teaching and was intimately linked 1904-53 with what later became the Fisheries Research Board of Canada. In serving 1934-53 as the board's scientist, curator, director, editor and consulting director, Huntsman helped shape the research philosophies, the staff of the biological and technological stations and their programs. As professor of marine biology at University of Toronto 1927-54, he taught most fisheries research scientists trained during the 1920s and 1930s. In his lifetime he was honoured frequently by scientific societies in Canada, the US and the UK and in 1952 was awarded the RSC Flavelle Medal.

L.M. DICKIE



Archibald Gowanlock Huntsman, marine biologist who greatly influenced Canadian fisheries science (*courtesy the Huntsman family*).

Huntsville, Ont, Town, pop 11 467 (1981c), inc 1900, is located 215 km N of Toronto on a short section of the Muskoka R connecting Vernon and Fairy lakes. Settlers took up land in the area after surveys of the township in 1862 and extension of the Muskoka road to the site in 1870. Capt George Hunt, for whom the town is named, first visited in 1868 and settled here in 1869. He was superintendent of the road, first postmaster and opened the first store. The railway arrived in 1885 and, with a population of 400, the village was incorporated the following year. The export of local white pine supported 6 sawmills in the town at one time. Huntsville still has a small lumber industry, but is sustained primarily by the year-round tourist trade, being within easy access to the Lake of Bays resort area to the SW and to ALGONQUIN PROVINCIAL PARK some 30 km NW. Madill Church, 6 km S, is one of the few remaining pioneer square-timber churches; it was built 1872-73 by Wesleyan Methodists.

JAMES MARSH



Huot, Charles, painter (b at Québec Ç 1855; d there 28 Jan 1930). The director of the École normale Laval in Québec organized a subscription fund to help him enrol in 1874 at Paris's École des beaux-arts; he spent much time there in the studio of painter Alexander Cabanel and won a silver medal. The French government bought his painting, *Le Bon Samaritain*, during the Universal Exposition of 1878. In 1898 he finally returned to Québec and produced works for numerous churches throughout the province. He won a contract to decorate Québec's parliament building, and produced 2 large historical murals, *Séance du Premier Parlement du Bas-Canada, le débat sur la langue* and *Le Conseil Souverain de 1663*; he also painted *Je me souviens* for the ceiling of the National Assembly, and *Je puise mais n'épuise* for the library's massive stained-glass window. He illustrated many books as well.

MICHEL CHAMPAGNE

Huron, a confederacy of 5 Iroquoian-speaking tribes who occupied northern Simcoe County, Ont, during the first half of the 17th century. The nickname "Huron" was given to them by the French and means "ruffian" or "boar's head," from the hairstyle of Huron men. Their own confederacy name was *Ouendat* (Wendat), commonly thought to mean "people of the island." The tribes of the confederacy were the Attignawantan ("bear people"), Attigneenongnahac ("cord makers"), Arendaronon ("rock people"), Tahontaenrat ("deer people") and Ataronchronon ("swamp people"). By the early 17th century the latter 3 tribes had migrated into Huron country from southern and eastern Ontario to join the other 2 tribes in a loose defensive alliance against their common enemy, the 5 IROQUOIS tribes of upper New York state.

Prior to 1600, the Huron numbered from 20 000 to 25 000, but between 1634 and 1640 they were reduced to about 9000 by a series of epidemic diseases, particularly the smallpox epidemic of 1639. The Huron lived in 18 to 25 villages, some with up to 3500 people. Their subsistence economy was based on corn, beans, SQUASH and fish. Hunting was of minor importance. At the time of French contact (1615-49), these efficient farmers occupied a territory of about 880 km², achieving an average population density of 23 people per km². Most villages were well fortified with palisades. Villages usually stood on a slight rise, adjacent to a permanent water supply and close to good farming soils. Every 10-15 years, when soils and firewood were exhausted, villages were moved. The Huron formed monogamous nuclear families; however the fundamental socioeconomic group was the matrilineal extended family, made up of a number of families whose female members traced common descent to a mother or grandmother, who was in charge of daily affairs. The extended family lived in LONGHOUSES, which were about 7 m wide and varied in length with the size of the family. Houses up to 90 m in length have been reported from archaeological work. Huron individuals belonged to one of 8 matrilineal clans. Clan members considered themselves cousins and were not permitted to marry each other. Village affairs were run by 2 councils, one in charge of civil affairs, the other of war. All men over 30 were members. In theory, matters were decided by consensus, but in reality the old men and elected chiefs of large families decided things because of their community standing and powers of oratory.

The Huron were experienced traders, with close relations to the PETUN, NEUTRAL, OTTAWA, Nipissing and ALGONQUIN bands of the Ottawa Valley. In 1609 they contacted the French under Samuel de CHAMPLAIN and concluded a military and trading alliance which drew the French into the Huron-Iroquois conflict (*see* IROQUOIS WARS). Recollet missionaries were sent to the Huron in 1615, followed by the Jesuits in 1635. By the 1620s the Huron had become the most important suppliers of furs to the French, with a trade network that encompassed most of Ontario and western Québec. The Iroquois defeated and dispersed the Huron in 1649. Many Huron joined the Iroquois; others fled westward with remnants of the Petun and now live on the Wyandot Reservation in Oklahoma. The largest surviving group settled near Québec City at Loretteville. *See also* NATIVE PEOPLE, EASTERN WOODLANDS and general articles under NATIVE PEOPLE.

C.E. HEIDENREICH

Huron, Lake, 59 570 km², elev 177 m, 332 km long, 294 km wide, max depth 229 m; total shoreline length, including islands, 6159 km. Lk Huron is the second largest of the GREAT LAKES and fifth-largest lake in the world. Samuel de CHAMPLAIN visited GEORGIAN BAY and Lk Huron with the French scout Étienne BRÛLÉ and a fleet of Indian canoes in 1615. Four interconnected bodies of water — the main lake, Saginaw Bay, the North Channel and Georgian Bay — form the lake. Major inflows are the Straits of Mackinac and the St Marys, Mississagi, Saginaw, FRENCH and Spanish rivers. Lk Huron discharges into Lk ERIE through the ST CLAIR R, Lk ST CLAIR and the DETROIT R. The longest suspension bridge in the world (Mackinac, 2625 m) spans the Straits of Mackinac between Lks Huron and Michigan.

Air masses from the Arctic, Pacific and Atlantic oceans and the Gulf of Mexico converge on the lake, which therefore experiences 4 distinct seasonal patterns and extremes of weather conditions. Its basin is composed of Precambrian SHIELD and Phanerozoic rocks and it was formed during the most recent ice age, with its present form developing only 2000-3000 years ago. The Canadian side of the basin is primarily covered with mixed forest consisting of red and white pine, hemlock, birch, maple, oak, beech, walnut and hickory.

The total Canadian population of the basin was less than one million in 1970, but a 50% increase is expected by the year 2020. The northern basin is an isolated, underdeveloped hinterland, with a few settlements engaged in the exploitation of forest and mineral resources. Southern settlement is founded on lumbering and agriculture. Important industries include mining, pulp and paper, food processing, chemical production, transport equipment and metal fabricating. SUDBURY, the centre of the mining and smelting industry, is the only major urban centre in the area. One of the world's largest nuclear power plants is located at Douglas Pt on the BRUCE PENINSULA. The lake supports commercial fishing (whitefish, perch, walleye, chub, carp; 6000 tonnes/year) and sportfishing (bass, perch, walleye, pike, rainbow trout).



The Canadian side of Lk Huron is renowned for the beauty of its scenery. The North Channel and Georgian Bay shorelines provided subject matter for several of the GROUP OF SEVEN painters. Excellent beaches extend from the Bruce Peninsula to SARNIA. The basin offers wide, unpolluted waters for swimming, boating, cottaging and camping.

M. MUNAWAR

Huron County Jail, Goderich, Ont (architect Thomas Young, 1839-42) adopts the panopticon system for prison design promulgated by British utilitarian philosopher Jeremy Bentham. Surviving in a remarkable state of preservation, this stone building features an octagonal central core, intended to ensure constant supervision of prisoners' activities, and radiating wings with wedge-shaped exercise yards for the proper separation of different types of offenders. The Toronto architect designed a similar octagonal jail for Simcoe County. Construction of this prison with its third-floor courtroom enabled Huron to qualify as a district separate from London, with Goderich as its seat.

CHRISTINA CAMERON

Huronia To all early travellers the territory occupied by the Huron was called *le pays des Hurons* ("the country of the Huron"). A resident in the HURON country described himself as being *aux Hurons* ("among the Huron"), or in *le pays des Hurons*. On 17th-century maps the Huron country is usually given as *Contree des Hurons, Pays* (or *pais*) *des Hurons*, or simply *Hurones* or *Hurons*. The name "Huronia" does not occur in any of the early 17th-century sources. The earliest reference in that form seems to be in a Jesuit vocabulary written in 1745, which refers to *la défunte huronie* ("the deceased or defunct Huronia"). The term came into common usage during the late 19th century. Today, it refers to the area occupied by the Huron during the period of direct French contact (1615-50) as well as a tourist area comprising the townships of Simcoe County, Ont, N of Barrie.

C.E. HEIDENREICH

Hurtubise, Jacques, painter (b at Montréal 28 Feb 1939). He studied at the École des beaux-arts of Montréal. A grant in 1960 enabled him to spend time in New York and become acquainted with the art of the abstract expressionists. Hurtubise's energy-filled canvases reflect a combination of his personal experience and the forces of nature. In the early 1960s he began using a hard-edge technique, producing a unified surface with well-defined edges. Geometric patterns and repeated motifs combine with controlled "splashes" of paint to produce an effect of a foreground that recedes into an emerging background. In 1967 his research into the effects of light led him to produce fluorescent canvases and later neon works. As of 1970, the principal structure of his works became the square. In 1977 he began to use shapes and chromatic contrasts on a neutral background to produce linear motifs, evoking abstract landscapes (*Takarakas*, 1979). His "spontaneous" works combine impulse and rigour.

LOUISE BEAUDRY

Hutchinson, Leonard, printmaker, painter (b at Manchester, Eng 1896; d at Thornhill, Ont 9 May 1980). He came to Canada in 1912 and settled in Hamilton. He studied with impressionist painter John S. Gordon at the Hamilton School of Art. Together with printmakers such as Toronto's Mary Wrinch, Hutchinson was part of a movement in the 1920s to revive the colour woodblock print. His work in this medium is especially remarkable for its delicate colorations. During the Depression, he also recorded workers' lives in powerful black-and-white woodblock prints, an expression of his sympathy for "the cause." He helped organize an artists' union in Hamilton in 1936, and was curator of the Hamilton Art Gallery.

JOAN MURRAY

Hutchison, Alexander Cowper, architect (b at Montréal 2 Apr 1838; d there 1 Jan 1922). One of Victorian Montréal's most prolific and prestigious architects, he epitomized the generation of native-born, self-taught men who shaped the city during the second half of the 19th century. Trained as a stonemason, he supervised the cut-stone work on Montréal's Christ Church Cathedral and the East Block of the Parliament Buildings, Ottawa, before establishing a private practice in Montréal shortly after 1865. The firm was known until 1890 as Hutchison and Steele, thereafter as Hutchison and Wood. Hutchison deserves credit for the careful detailing that characterizes all of the firm's output, including the Redpath Museum, testimony no doubt to his apprentice years as a craftsman-builder. Hutchison and Steele gained international reputation as ice-palace designers. JULIA GERSOVITZ

Hutchison, William Bruce, journalist, author (b at Prescott, Ont 5 June 1901). Hutchison grew up in the Kootenay region and in Victoria, BC, becoming a reporter for the Victoria *Times* in 1918. He travelled throughout Canada, the US and UK, gathering material for his columns on national and international affairs. He was associate editor 1944-50 of the *Winnipeg Free Press,* editor 1950-63 of the Victoria *Times,* and in 1963 was appointed editorial director of the *Vancouver Sun.* His many books include descriptions of Canada past and present, political histories of its prime ministers (eg, *The Incredible Canadian,* 1952, on W.L.M. KING) and studies of Canadian-American relations. Written with feeling and humour, all seek to define Canada's "fortunate but vulnerable" national identity. JEAN O'GRADY

Hutt, William, actor, director (b at Toronto 2 May 1920). From his novice days at Hart House Theatre, he has been a distinguished leading player in Canada, the US and England. After making his professional debut in 1947 in summer stock, he worked at Ottawa's Canadian Repertory Theatre. He joined the STRATFORD FESTIVAL in its inaugural 1953 season, and appeared in more than 60 Stratford productions, playing nearly every great role in the Shakespearean canon, including Lear, Hamlet, Macbeth, Prospero, Falstaff and Titus Andronicus. He toured N America with the Canadian Players and in Noël Coward's *Sail Away* (1961). In 1964 he created the lawyer in Edward Albee's *Tiny Alice* on Broadway. He was made a companion of the Order of Canada in 1969 and in 1975 won an ACTRA Award for his portrayal of Sir John A. MACDONALD in CBC's telecast of Pierre BERTON's *The National Dream.* In 1976 he was appointed an associate director of the Festival Stage Stratford, and artistic director of Theatre London (Ont), overseeing the rebuilding of the Grand Theatre. In 1983-84 he was featured in Robin Phillips's London season, and his Canadian movie *The Wars.* DAVID GARDNER

Hutterites are one of 3 major sectarian groups (the others are the Mennonites and the Amish) surviving today and the only group to insist rigorously on the communal form of existence. Hutterite history dates to 1528 when to escape religious persecution a group of about 200 Anabaptists established a communal society in Moravia (now a region in Czechoslovakia). Under the initial leadership of Jakob Hutter, they established the basic tenets of Hutterian beliefs which they have followed with little deviation to this day. These beliefs, based on early Christian teachings and a belief in a strict separation of church and state, include a form of communal living, communal ownership of property, nonviolence and opposition to war, and adult baptism. Also, they have retained the dress, the customs, the language and the simple austere life-style of their ancestors.



Hutterite colony near Cayley, Alta (*photo by Jim Merithew*).

Migration and Settlement Because of their beliefs, Hutterites were subjected to periodic persecution which invariably resulted in migration. They moved from Czechoslovakia to Hungary, Romania, Tsarist Russia, the US, and finally to Canada. They emigrated en masse to Canada in 1918 because of harrassment and persecution in the US that resulted from their refusal to participate in any type of military service. Initially, they settled in Manitoba and Alberta; later settlements were established in Saskatchewan and some were re-established in the US. The world Hutterite population is about 25 000 — more than 66% of whom live in Manitoba, Saskatchewan and Alberta, while the remainder are in the US.

Social and Cultural Life Hutterites believe that their society could be best preserved in a rural setting, and hence agriculture for them is a way of life sanctioned by religion. Their belief in communal living has led them to establish village-type settlements on each of their farms (or colonies, as they are known). In Manitoba the average size of a colony is about 1700 ha, but in Saskatchewan and Alberta, because of drier conditions, the colonies are each about 3200 ha. Despite these relatively large landholdings, each Hutterite family has less than 50% of the land of a typical single-family farm on the prairies. The average colony has about 14 families with a total population of about 90. When the population reaches 125 to 130, the settlements subdivide and form new colonies, on the average every 14 years. In 1982 there were 67 colonies in Manitoba, 37 in Saskatchewan and 99 in Alberta.

The Hutterite respect for the nuclear family is reflected in their provision of private apartments for each family in the row houses they traditionally build. Kindergarten facilities are provided for children from the age of 2½ years. The regular curriculum is studied in colony schools by all students until the eighth grade, after which about 50% of students proceed to grade 10 by means of correspondence courses. Following this a few Hutterites may proceed to take special diploma courses off the colonies such as animal nutrition or veterinary science, and some take teacher training. There are now several fully qualified Hutterite teachers.

The structure of Hutterite colonies remains unchanged, although the nature of the particular economic activity in which they are involved may vary. Each colony elects an executive council from the managers of various enterprises, and together with the colony minister, the executive deals with important matters that will be brought before the assembly (all baptized male members — in effect, men 20 years of age and older). Although women have an official subordinate status, their informal influence on colony life is significant. They hold managerial positions in the kitchen, kindergarten, the purchase of dry goods, and vegetable production.

Although there is co-operation among the colonies, each colony operates as an independent economic unit. The Hutterites practise a highly mechanized and efficient mixed-farming economy. Because of their well-managed, large-scale operations, when compared to the amount of land they own, the Hutterites produce more than their proportionate share of agricultural produce within the prairie economy. Until fairly recently, the basic nature of the Hutterite settlements had been misunderstood, especially in regard to the relatively small amount of land that they own, and their productivity and contribution to the economy had been unappreciated. This had resulted in the past in various restrictions and forms of discrimination against the Hutterites.

Group Maintenance The survival of the Hutterites and their unique way of life is largely the result of their ability to retain their basic and fundamental beliefs, while simultaneously adopting all the features of contemporary society essential for their economic and social well-being. This strategy of survival includes uncompromising adherence to their religious beliefs and customs, retention of their ancestral German dialect, insistence on their own colony schools and a sound agricultural economy. Although some young people leave the colonies, most of them usually return, hence assimilation is not a serious problem for the Hutterites. *See also* COMMUNAL PROPERTIES ACT CASE. JOHN RYAN

Reading: J.A. Hostetler, *Hutterite Society* (1974); John Ryan, *The Agricultural Economy of Manitoba Hutterite Colonies* (1977).

Hutton, Sir Edward Thomas Henry, soldier (b at Torquay, Eng 6 Dec 1848; d at Chertsey, Eng 4 Aug 1923). Hutton was general officer commanding the Dominion militia, 1898-1900, historically the most significant of the 8 British officers who held that appointment between 1880 and 1904. He conspired with the governor general, Lord MINTO, and the British colonial secretary, Joseph Chamberlain, to involve Can-

ada in the SOUTH AFRICAN WAR, quarrelled with government over the issue of political patronage in the militia, and was finally recalled to London at the Dominion government's request. He subsequently commanded Canadian troops in S Africa, 1900-01. BRERETON GREENHOUS

Hydro-Québec, a provincial CROWN CORPORATION, is Canada's largest ELECTRIC UTILITY and, judged by assets ($25 billion in 1983), Canada's largest corporation. More than 95% of its production is from renewable HYDROELECTRICITY. First created as a legal entity in 1944, Hydro-Québec did not become a major force until the early 1960s. René LÉVESQUE, then resources minister in the Liberal government of Jean Lesage, oversaw the nationalization of the province's larger private electrical utilities. In the late 1970s and early 1980s, Parti Québécois governments led by Lévesque further reorganized Hydro-Québec. The utility enjoys formidable economic advantages: once dams are in place, operating costs are very low; furthermore, it has a contract to buy power from the CHURCHILL FALLS project in Labrador at 1969 prices until the year 2041. Hydro-Québec can thus underbid ONTARIO HYDRO in the US export market, provide cheap power within Québec and still pay a dividend to the provincial government.

Québec's first hydroelectric-generating stations were built by private entrepreneurs at the end of the last century. In 1903 N America's first long high-voltage transmission line was placed in service. The 50 kV line ran 135 km from the Shawinigan powerhouse to Montréal. Although the new industry attracted many entrepreneurs, regional monopolies soon dominated the market. By the end of the 1930s, 8 companies served nearly all of the inhabited areas of Québec.

Responding to public criticism of poor service and high rates, the Québec government expropriated Montréal Light, Heat and Power Consolidated and its subsidiary, Beauharnois Light, Heat and Power Co, and empowered the Québec Hydro-Electric Commission to administer these 2 companies. Thus Hydro-Québec was born on 14 Apr 1944. Between 1944 and 1961 Hydro-Québec's installed generating capacity increased from 616 MW to 3488 MW.

On 1 May 1963 Hydro-Québec extended its activities to cover the whole province. It purchased the shares of nearly all remaining privately owned electrical utilities then operating in Québec and took over their debts. The total amount involved was $600 million. Hydro-Québec subsequently undertook construction of the Manic-Outardes hydroelectric complex. The project's Daniel Johnson dam is the world's largest arch-and-buttress dam; its Manic 2 is the largest hollow-joint gravity dam. In order to transmit the complex's annual production of about 30 billion kWh over a distance of nearly 700 km, Hydro-Québec had to innovate. It became the first utility in the world to transmit electricity at 735 kV. Since then, its research institute, created in 1967, has pursued intensive research in electric-power transmission. In the early 1970s Hydro-Québec embarked on the JAMES BAY PROJECT. ANDRÉ BOLDUC



Manic 3 dam on the Manicouagan R in northern Québec (*photo by J.A. Kraulis*).



Hydro-Québec LG2 electric-power generating site, showing spillway and dam (*photo by Jim Merrithew*).

Hydroelectricity is obtained from the ENERGY contained in falling water; it is a renewable, nonpolluting energy source and Canada's largest source of ELECTRIC-POWER GENERATION.

In N America in the 1850s the energy content of moving water was exploited through the use of small-capacity waterwheels and turbines for the direct drive of machinery, for example, in gristmills and sawmills. By the 1860s many hundreds of turbines, ranging up to 1000 HP capacity, were manufactured annually in the US and by the early 1870s the production of at least one Canadian factory was averaging about 20 machines per year. Hydroelectricity was introduced in the 1880s, soon after Thomas Edison invented and began manufacturing direct-current (DC) electric generators, which were initially belt driven by steam engines. It was not long before enterprising mill owners began to install generators of up to 10-12 kW capacity, with belt drives from existing mill turbines, to provide electric lighting in the mills and adjacent premises. The manifest advantages of electric lighting spawned a ready and increasing market for such service. Where waterpower was close at hand, turbines were installed for the express purpose of driving electric generators for lighting service, initially provided during evening hours only. By the late 1880s generation of electricity by waterpower had become well established. Early use of hydroelectric generation was limited by the capacity of the generating station, which was governed by the waterpower resource (streamflow and net height of fall), or by the electric-lighting load near the station. Beyond a few kilometres, the resistance loss inherent in the transmission of direct-current electricity became excessive. Copper conductors large enough to ensure satisfactory service over longer distances were prohibitively expensive. High-voltage alternating current (AC) transmission, made possible by the development of commercially viable transformers in the 1890s, permitted transmission of electric power over significant distances without excessive loss, and made possible the development of more remote hydroelectric sites. For example, in 1896 hydroelectric power was transmitted approximately 32 km from NIAGARA FALLS to Buffalo, NY, at 11 000 volts (then considered a phenomenally high level). The possibility of long-distance transmission encouraged great increases in the capacity of hydroelectric-generating equipment: by the early 1900s, 5000 HP directly coupled turbine-generator sets were being produced. For comparison, hydroelectric turbine-generator units of over 600 000 HP capacity are now in service. Beginning in the early 1900s, there was rapid growth in the development of hydroelectric-power sites and progressive increases in transmission-voltage levels. More remote sites were exploited and transmission lines were extended to supply the gradual but strong growth in demand for ELECTRIC POWER. In 1903 electric power was transmitted to Montréal from a hydro station at Shawinigan, Qué, via a 135 km long, 50 000-volt transmission line, the first high-voltage long-distance transmission line in N America; by 1910 ONTARIO HYDRO was transmitting hydroelectric power from Niagara Falls at 110 000 volts.

By 1900 a total of 133 000 kW of hydroelectric-generating capacity had been installed in Canada. Most of this capacity was in Québec and Ontario, where attractive hydroelectric-power sites were found reasonably near urban centres; there were some smaller developments in the Maritimes, Alberta and BC. In the next 10 years, major hydro-generating stations were established in all provinces except PEI and Saskatchewan and, in 1910, a hydro development was constructed by a gold-mining company in the Yukon. By the early 1950s, hydro facilities were serving both northern territories. Hydroelectric generation was not developed in Saskatchewan until the early 1960s, when the S Saskatchewan R Development provided control and regulation of the province's major river system.

Growth of hydroelectric generation in Canada continued at a modest rate until the mid-1920s, followed by 10 years of more intensive development, then at a much slower rate through WWII. After 1945, there was a sharp increase in hydro- and thermal-power installations to meet the progressive growth in demand. This growth, which in some provinces exceeded 10% annually, did not slacken until the mid-1970s, when the impact of the international energy crisis of 1973 on economic activity led to a decline in the annual growth rate of electric-power consumption.

In the years 1920 to 1950, hydroelectric stations accounted for over 90% of Canada's total generating capacity. Hydro's share of this capacity declined after 1950, dipping to under 60% in 1976. The decline occurred because fossil-fuel-fired thermal-generating stations then offered a cost-competitive alternative, and because few good hydro sites remained near major population centres and the cost of transmission substantially increased the cost of more remote facilities. However, the cost of competing sources of electricity, principally NUCLEAR POWER and thermal stations burning coal, oil and natural gas, has risen substantially since 1973, and hydro is expected to maintain its 55-60% share of Canadian electrical-generating capacity at least through the 1990s.

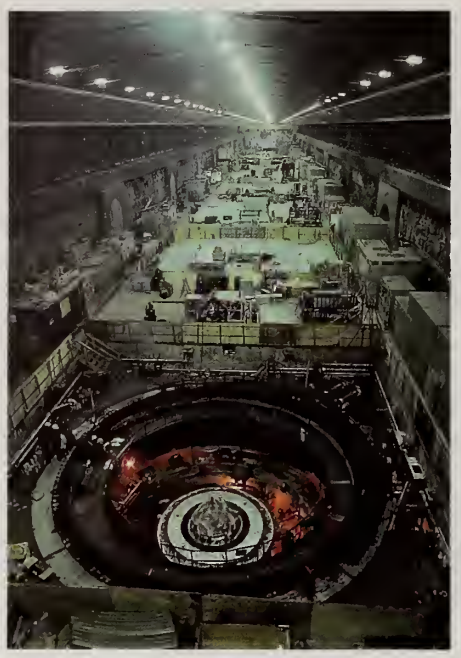
Because most hydroelectric installations have been sized to extract the maximum amount of energy available at the power site, based on historical data of average annual streamflow, many stations are able to operate at full output for 70-100% of the time; most other utility systems have annual load factors (rates of average to peak demand) of 50-60%. Consequently, in 1981 approximately 76% of the consumption and 69% of the production of electrical energy in Canada was generated by hydroelectric stations that contained only about 59% of Canada's total electrical-generating capacity.

Waterpower resources basically depend on topography and climate, and development of such energy sources is related to the magnitude and proximity of load centres and to the availability and price of competing energy sources such as coal. The development of hydroelectric power and its share of the total electrical production in Canada varies considerably from province to province. Practically all hydroelectric-power sites in Canada that are reasonably close to load centres have been developed, as have several of the more remote large-scale sites. However, a significant amount of hydroelectric potential remains untapped, chiefly in northern Québec, Manitoba and BC, and in Labrador and the YT. Although this potential is far from existing or foreseeable load centres, much of it may well be developed over the next 2 or 3 decades. The main drawbacks of conventional, large-scale hydroelectric power are the initial high capital cost, the long construction period and the environmental effects of flooding. These factors are offset by the long life and low operating costs of hydro facilities. Interest in smaller-scale or "micro-hydro" projects has revived recently.

Factors that influence the viability of technically feasible hydro sites are almost exclusively economic. Hence, development of such sites would require significant decline in construction and financing costs, greatly enhanced costs of competing energy supply from other sources, development of markets for large amounts of power within reasonable proximity of such remote sites, or prices that would support the cost of transmission to southern markets. Development of the 35 000-40 000 MW of theoretical capacity which is considered not technically feasible is restricted primarily by environmental constraints. Of the 100 000 MW of technically feasible potential, 10-15% is made up of comparatively small-scale sites of less than 50 MW capacity. Most large-scale sites would exceed 500 MW capacity; several would exceed 1000 MW, and at least 2 sites in each of Québec and BC are approximately 3000 MW capacity. The foregoing estimates are mostly preliminary assessments on the basis of map studies with minimal actual site inspection; more comprehensive studies and economic analysis will be required to confirm or reject many of these potential sites on technical or economic grounds.

These estimates of hydroelectric potential do not include the long-recognized but still undeveloped TIDAL POWER potential of the Bay of Fundy in NS, a major source of low-head hydro power adjacent to populated areas of NS and NB. Like river-based hydro, tidal power is a natural hydraulic source that can be converted directly to mechanical and electrical energy by means of a turbine. However, tidal power is very expensive to develop, and the cyclical nature of the energy makes it less useful than river-based hydro.

E.W. HUMPHRYS



Massive underground powerhouse at the James Bay Project (*photo by Mike Dobel/Masterfile*).

Potential Hydroelectric Power in Canada (in MW)
(Source: Dept of Energy, Mines and Resources, Dec 1981)

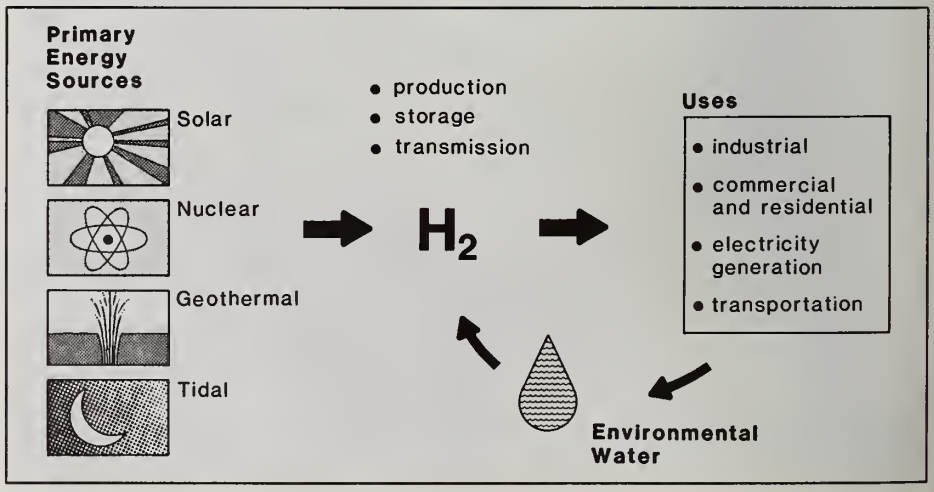
Province	*Installed and under construction Dec 1981*	*Theoretical undeveloped potential*	*Technically developable potential*	*Economically developable potential*
Nfld[1]	6 496	6 880	6 152	4 656
PEI[2]	–	–	–	–
NS	386	158	98	48
NB	900	620	556	460
Qué	26 800	43 820	34 410	20 500
Ont	7 180	7 735	6 115	2 035
Man	3 645	8 225	6 145	6 145
Sask	835	2 190	1 505	955
Alta	800	18 810	11 450	4 370
BC	10 900	29 110	25 535	17 285
YT	80	11 000	10 440	5 040
NWT	47	14 900	6 000	5 070
Canada	58 069	143 448	106 406	66 564

[1] Includes Labrador
[2] The few minor hydro sites in PEI of under 100 kW capacity total under 1 MW

Hydrogen (H), the simplest, lightest and most abundant chemical element, is the main fuel for the NUCLEAR FUSION reactions which power the sun. Intensive research is underway to harness fusion energy but hydrogen also shows considerable promise as a potential replacement for conventional fuels.

At normal temperatures and pressures, molecular hydrogen is a tasteless, odourless, colourless gas in which 2 atoms are combined as a diatomic molecule, H_2. It has substantial energy content, reacting readily with oxygen to give pure water and heat as the only products. Using hydrogen as a fuel eliminates the POLLUTION caused by burning conventional hydrocarbons. Hydrogen can be manufactured from a wide variety of renewable and nonrenewable energy sources; however, compared to other fuels, it is still very expensive and difficult to produce, store and transport. In Canada, most molecular hydrogen is produced by the reaction, at high temperature and pressure, of steam with methane (natural gas). Hydrogen also can be produced by applying energy (electricity, heat, solar energy, or some combination) to split water into hydrogen and oxygen. Hydrogen is now used in a wide variety of chemical processes and some scientists and energy planners expect it will become an important fuel for transportation and other applications.

The International Energy Agency maintains an active program of research and development on the production of hydrogen from water, to which Canada is a contributor. In its 1981 report "Energy Alternatives," the House of Commons' Special Committee on Alternative Energy and Oil Substitution recommended that Canada make major investments to establish a leading position in hydrogen technology and systems. In its Oct 1981 report, the Ontario government's Hydrogen Energy Task Force reached similar conclusions. These reports have been followed by formation of 3 organizations dedicated to advancing hydrogen technology. The new Hydrogen and Energy Storage Division of the NATIONAL RESEARCH COUNCIL OF CANADA is co-ordinating



rapidly expanding, federally funded research and development in this area. The Institute for Hydrogen Systems has been established in Toronto, with Ontario government support, and is initiating research programs in hydrogen-use technologies. The activities of the Montréal-based Hydrogen Industry Council (est 1982) reflect the interests of approximately 2 dozen industrial members.

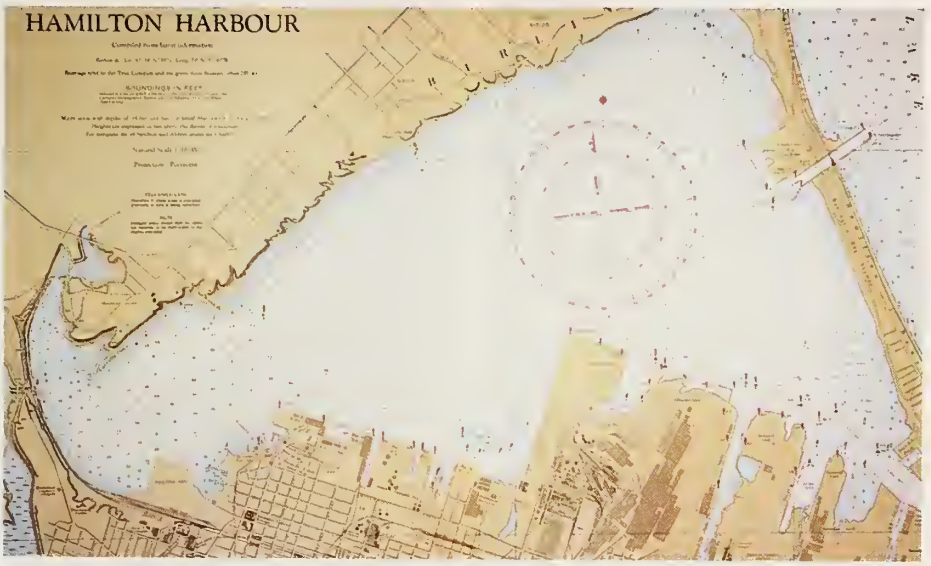
Applications Alberta and Saskatchewan have rich deposits of BITUMEN in oil sands and heavy oils, which could satisfy Canadian energy needs for generations. The key to producing pipeline-quality fuel from these resources is to increase their hydrogen-to-carbon ratio. In processing plants now in operation, this increase is achieved by coking to reduce the carbon content, but the trend in future could be towards hydrogen addition, to extend the hydrocarbon resource. Similarly, hydrogen could be used to produce methanol from BIOMASS: for example, with hydrogen addition, the dry wood required to produce 1000 t of methanol can be reduced from 2300 t to 900 t.

The substitution of hydrogen for gasoline and other hydrocarbon fuels is a long-term prospect, especially because of the requirements for on-board hydrogen storage. Liquid hydrogen is attractive as an aircraft fuel because its energy content per unit weight is 3 times that of conventional fuels. It is the fuel of the US Space Shuttle and is being considered for use in commercial aircraft. In small vehicles, however, the cost and weight of the cryogenic container for this very low-temperature liquid fuel is likely to be prohibitive.

Production After a decade of intensive work, direct electrolysis of liquid water remains the most viable technology for large-scale hydrogen production from nonfossil energy sources. Groups working in Belgium, Canada, the Federal Republic of Germany, France, Japan and the US have made advances which have sharply reduced capital costs and increased energy conversion efficiency to 85% and more. Canada is in the forefront of these developments. The experimental plant which was opened at Varennes, Qué, in June 1982, is the first commercial-scale demonstration of advanced hydrogen-production technology. RODNEY L. LEROY

Hydrography is the SCIENCE OF SURVEYING, charting and describing physical features of OCEANS, seas, RIVERS and LAKES. Originally, hydrography encompassed much of OCEANOGRAPHY, plus the general observation, measurement and description of scientific phenomena at sea, but since the voyages of HMS CHALLENGER (1872-76) there has been increasing specialization in the marine sciences. Oceanography has developed as a separate field and hydrography now concentrates on seafloor surveys, studies of tidal phenomena and provision of navigational charts and associated publications. These publications include TIDE and current tables, current atlases and sailing directions ("pilots"). European oceanographers sometimes refer to the measurement of the physical properties of WATER as hydrography.

Data collected in the field are considerably refined and condensed. Only a representative set including all critical information, such as the least depth over shoals, appears on the published chart. Typically, there is a scale reduction of 2-4 times from the field document to the chart. The chart also includes data from other sources, foreign surveys and charts, engineering drawings of wharves and structures, dredging plans, details of navigational aids (eg, LIGHTHOUSES, BUOYS), etc. Tidal data are analysed for astronomical influences and are used to predict future tides. An international depository of worldwide tidal information is held at the Marine Environmental Data Service (MEDS) in Ottawa. The charts are complemented by "Sailing Directions," providing a written description of information which cannot be shown clearly on the chart itself. These volumes are referenced to the chart and include information on courses, environmental conditions, dangerous hydrographic features (eg, shoals, strong currents) and port facilities. A volume on arctic Canada also includes the history of early exploration.



Modern hydrographic chart of Hamilton Harbour (1969). Such charts are frequently revised because they are essential for navigation (*courtesy Hydrographic Service, Dept of Fisheries and Oceans*). NOT TO BE USED FOR NAVIGATION.

Nautical surveying can be traced to medieval times, and a form of sailing directions is reputed to have been available much earlier. Major advances in marine CARTOGRAPHY took place in the 16th century in conjunction with the expansion in EXPLORATION. Early hydrographic surveys and charts resulted from private initiatives. The establishment of national hydrographic departments in France (1720) and Great Britain (1795) was important to Canada, as early surveys of the Canadian coast were conducted by these agencies, with contributions by the Spanish on the Pacific coast. On the Atlantic coast the surveys of Joseph Frederick Wallet DESBARRES and Captain James COOK were particularly notable. Cook's surveys of the St Lawrence R contributed to the success of the British navy in bringing Wolfe's troops to Québec in 1759. In the Arctic, early hydrographic knowledge was gained from the explorations for the British navy of William Edward PARRY and John FRANKLIN, and from those who came in search of Franklin in the latter part of the 19th century (*see* FRANKLIN SEARCH). In 1883, following the loss of the steamship *Asia* in Georgian Bay, the first Canadian survey, the Georgian Bay Survey, was formed under Staff Commander J.G. Boulton, RN. In 1904 the Canadian government formed the Hydrographic Service, taking over completely from the British the charting of Canadian COASTAL WATERS. However, the task of completing the work is so great that today many charts still include data collected by British and French naval hydrographers.

Over the years the Canadian Hydrographic Service has evolved, and today operates from headquarters in Ottawa and regional offices in Sidney, BC; Burlington, Ont; Québec City; and Dartmouth, NS. The Canadian Hydrographic Service, headed by the Dominion hydrographer, is now part of the Department of Fisheries and Oceans. The service is responsible for conducting surveys of all navigable Canadian waters, including inland waterways. It maintains over 1000 navigational charts.

During recent years there has been a determined effort to develop expertise in hydrography in industry, and an increasing proportion of the work, particularly that required for offshore oil and natural-gas exploration, is now done outside government. Hydrography is now taught as a specialization of survey engineering U of New Brunswick. Hydrographic surveyors are usually graduates of technical survey courses or university MATHEMATICS OR ENGINEERING programs who receive special training, often from the CHS. Humber College (Toronto) offers a diploma program in hydrographic surveying.

Canada is a member of the International Hydrographic Organization (est 1921), which has its headquarters in Monaco. This organization works towards ensuring chart uniformity and chart exchange on a worldwide basis and, in collaboration with the Intergovernmental Oceanographic Commission, is responsible for the General Bathymetric Chart of the Oceans. Canada has been particularly active in contributing to this mission. A.J. KERR

Hydrology studies the behaviour of WATER: its origin, distribution and circulation; its physical and chemical properties; and its interaction with the physical and living ENVIRONMENT. Applied hydrology is primarily concerned with precipitation, with the occurrence and movement of frozen, impounded or flowing water (on or below the Earth's surface) and with evaporation. More specifically, hydrology generally refers to the study of water on or over land rather than in the OCEAN. Hydrology is concerned with gathering information to determine quantities and rates of movement of water. Quantitative measurements of rainfall, snowfall, the rate at which water penetrates into and moves through SOIL, streamflow, the rise and fall of LAKE and groundwater levels, and the evapotranspiration of water into the atmosphere are vital. The science also encompasses study of the physical laws governing the movement of water through the hydrologic cycle and the interaction of water with the rest of nature. Hydrology depends upon various mathematical techniques to define and describe empirical relationships between the movement of water and the conditions and forces influencing it.

History Practical application of hydrological principles preceded a thorough understanding. As early as 4000 BC the Sumerians developed a complicated, extensive irrigation system which lasted some 5000 years. Large-scale FLOOD-irrigation agriculture in the Nile Valley developed at least as early as 3400 BC. In China waterworks date from before 2000 BC. The earliest known hydrological measurements date to 3500-3000

BC, when nilometers were first used to measure the levels of the Nile. Primitive rain gauges existed in India as early as the 4th century BC.

A few early thinkers seem to have had an exceptional understanding of hydrology, but it was not until 1580 AD when Bernard Palissy, a French natural scientist, wrote that RIVERS and streams were sustained by RAIN and snow, that the scientific world possessed a realistic description of the hydrologic cycle. A century later, Pierre Perrault and Edmé Mariotté, French physicists, measured rainfall and runoff in the Seine River Basin and proved that rainfall was sufficient to account for river discharge. Soon afterward the English astronomer, Edmond Halley, measured evaporation and demonstrated that evaporation from the Mediterranean Sea could supply the rivers discharging into it. In the late 1600s and 1700s the Italians Giovanni Cassini, Bernardino Ramazzini and Antonio Vallisnieri pioneered the theory of artesian water pressure, and important advances took place in hydraulic theory and instrumentation. Advances in GEOLOGY near the end of the 18th century set the stage for progress in groundwater hydrology. In the latter half of the 19th century, pressure to develop water supplies in Europe forced an intensive study of the field.

In the New World, early emphasis was placed on the measurement of streamflow. In the US and Canada, government programs to measure streamflow and compile records began before the 1900s. A network of climatological observation stations was also started. Both have been continually expanding (*see* CLIMATOLOGY; WEATHER OBSERVATION). A statistical and empirical approach to analytical hydrology developed from continuous data collection. For example, using probability theory and the assumption that a record of rainfall or river flow is representative of the rainfall or flow that will occur in the future, hydrologists have derived methods for describing the likelihood of occurrence of hydrological events. Approximate relationships between snowmelt and temperature, rainfall rate, ground cover and runoff, DRAINAGE BASIN area and flood magnitude, permeability and groundwater yield, radiation and evapotranspiration, etc, have been defined and used in the solution of practical problems. Such techniques are continually refined to fit new data.

Education In 1948 the first Canadian university course titled "Hydrology" was established by R. H. Clark for engineering students at U Man. Thirty years later courses in various aspects of hydrology were being offered in over 40 universities across the country, generally by ENGINEERING and GEOGRAPHY departments. All CIVIL ENGINEERING students now receive some training in hydrology. While there are no faculties dedicated exclusively to hydrology, several universities have hydrological postgraduate programs. Enrolment in these courses varies from year to year; approximately 40 MSc and PhD students graduated annually from Canadian universities during the late 1970s and that figure will probably be higher even during the recession of the 1980s. Postgraduate courses tend to concentrate on the same topics (surface water, erosion, sedimentation, groundwater and soil and water) touched on more briefly at the undergraduate level. The widespread use of computers has made hydrological modelling an important field of graduate study.

Relationship to Other Fields Because of the interrelatedness of water and nearly every other aspect of the natural environment, the lines dividing hydrology from other fields of study are blurred. METEOROLOGY is concerned with precipitation and evapotranspiration, GEOMORPHOLOGY with runoff patterns, geology with groundwater flow, SOIL SCIENCE and soil mechanics with subsurface flow and PLANT physiology with transpiration. Supporting sciences, such as PHYSICS, MATHEMATICS and fluid mechanics, are necessary for detailed work.

Applications Hydrologists advise water managers in the use and manipulation of water. A few examples of projects and programs heavily dependent upon hydrological advice include allocating limited water supplies among various users; sizing structures (eg, spillways, bridges) designed to pass flood flows safely; planning water management or HYDROELECTRIC systems intended to make optimum use of available supplies; forecasting floods and low flows; designing and operating RESERVOIRS, dikes and floodways; designing EROSION-control structures; discovering, inventorying and allocating water from deep underground sources; applying hydrologic principles to soil-plant-water relationships to aid in the production of food and fibre; planning FORESTRY operations for water yield.

Societies and Journals Canadian hydrologists enjoy professional contacts and journalistic outlets through a variety of associations. The Associate Committee on Hydrology of the NATIONAL RESEARCH COUNCIL sponsors hydrological symposia at regular intervals. The journal of the Canadian Meteorological and Oceanographic Society is *Atmosphere-Ocean*. The Canadian Water Resources Association publishes the *Canadian Water Resources Journal*. The Canadian Society for Civil Engineering publishes through the *Canadian Journal of Civil Engineering*. The *Canadian Journal of Earth Sciences* serves the groundwater hydrologist. The American Geophysical Union's *Water Resources Research*, the Society of American Foresters' *Forest Science*, and various publications of the American Society of Civil Engineers and the National Water Well Association serve both American and Canadian needs. UNESCO's International Association of Hydrological Sciences, which produces the *Hydrological Sciences Journal*, provides a worldwide scientific community for the hydrologist. The year 1965 marked the beginning of UNESCO's International Hydrological Decade, designed to promote international research in scientific hydrology. Canada was a member of the co-ordinating council for 6 years.

R.K. DEEPROSE

Hymns The simple verse-songs of the early Christian church and the chorales and metrical psalms of the Reformation have been sung by Canadians since the 17th century. Prior to the 20th century, hymn singing was not only a method of propagating religious doctrine but also a popular social activity and a means of cultivating knowledge of music. A missionary working among natives near Québec recorded in 1676 that the natives had "much aptitude and inclination for singing the hymns of the church" that were rendered into their language. Annals of 17th-century New France abound in similar comments. The "Huron Carol" ("Jesous Ahatonhia"), attributed to Jean de BRÉBEUF, adapted a French folk melody to Huron words; it remains in popular use at Christmas.

The singing-school movement of 18th-century England and New England became transplanted 1760-1800 to NS, NB and the Canadas by immigrants and Loyalists. After 1800, tunebooks in Canada catered to the psalm and hymn styles of this movement. Significant publications were Stephen Humbert's *Union Harmony* (1801), notable for its emphasis on fuguing; A. Stevenson's *The Vocal Preceptor* (1811), the earliest Canadian example of engraved music; Mark Burnham's *Colonial Harmonist* (1832); Zebulon Estey's *New Brunswick Church Harmony* (1835); *The Harmonicon* (1836); Alexander Davidson's widely used *Sacred Harmony* (1838); Lemuel C. Everett's *The Canadian Warbler* (1863), adapted from a US collection, and one of the first tunebooks addressed specifically to children; George Linton's *The Vocalist* (1865 or 1867). During the same era several publications for Anglican worshippers appeared, notably George Jenkins's *A Selection from the Psalms of David* (1821); William Warren's *A Selection of Psalms and Hymns* (1835); James Paton Clarke's *The Canadian Church Psalmody* (1845). For francophone Protestants, hymn publications were Theodore Molt's *La Lyre sainte* (1844 or 1845) and *Chants évangéliques* (1862).

In the later 19th century, publication became more diversified; several books of hymn texts in native languages appeared, and the "gospel" style attracted popularity. Church authorities began making their own compilations, pioneer instances being *The Presbyterian Psalmody* (1851) and *Methodist Tune Book* (1881). The interdenominational *Canadian Hymnal* (1889) had wide popularity. A Canadian hymnologist, Stanley L. Osborne, remarks that the number of recognized Canadian composers writing hymns appears larger than the number of Canadian poets. Exceptionally productive, however, was David Willson (1778-1866), founder of the Children of Peace sect, whose published and unpublished hymn verses total over 1400. The sect's barrel organ, renovated and in working order at the temple-museum, Sharon, Ont, provides valuable evidence of how the early settings sounded. Despite denominational distinctions, a large common repertoire unites the publications noted. At the same time, all contain originally composed tunes.

In 20th-century Canadian hymnbooks, a notable selection of locally composed tunes continues. *The Canadian Baptist Church Hymnal* (London 1902), the *University Hymn Book* (Toronto 1912) and especially the *Methodist Hymn and Tune Book* (Toronto 1917) contain tunes by prominent musicians such as A.S. VOGT, Alfred Whitehead, W.H. Hewlett, H.C. Perrin and the youthful Ernest MACMILLAN. *The Presbyterian Book of Praise* (London 1904) and *The Hymnary of the United Church of Canada* (Toronto 1930) place less emphasis on locally written music, but set new levels of editorial accuracy. Alexander MacMillan (1864-1961), a major figure in Canadian hymnology, worked on both publications. A Toronto magistrate, James Edmund Jones (1866-1939), was partially responsible for the Anglican Church's *Book of Common Praise* (Oxford 1908), although the influence of the composer Healey WILLAN is strong in the 1938 edition. Of the handsome joint effort *The Hymn Book of the Anglican Church of Canada and the United Church of Canada* (Toronto 1971), Osborne, secretary of the joint committee, states that 10% of the tunes are by Canadians. Responding to revised congregational usages following the Second Vatican Council of the early 1960s were the *Livret des fidèles* (1966) and the *Catholic Book of Worship* (1972).

Whatever changes in taste and performance habits have affected hymn singing, Canadians still respond familiarly to a repertoire embracing "Our God's a fortress firm and sure" or "What a friend we have in Jesus," although an extensive number of Canadian compositions await the revival they deserve. Questions of taste and standards often concern hymnologists and editorial committees as much as the cultivation of a broad repertoire. In 1851 Presbyterians were exhorted to sing their hymns "without any grace notes or ornamental flourishes"; in 1908 Anglicans were allowed such beloved hymns as "Tell me the old, old story," with the reminder that these "would be out of place in many churches"; and in the *Encyclopedia of Music in Canada* (1981) Osborne judged that hymn singing in the 1970s showed immense improvement over that of the 1920s and 1930s. Recordings and radio broadcasts in the mid-20th century were a prevalent means of fostering hymn singing. An outstanding tradition is found in Winnipeg with the work of W.H. Anderson's Choristers and the CBC "Hymn Sing" directed by Eric Wild. *See* RELIGIOUS MUSIC.

JOHN BECKWITH

Ian and Sylvia, folk music duo composed of singer-songwriter **Ian Dawson Tyson** (b at Victoria 25 Sept 1933) and **Sylvia Fricker Tyson,** (b at Chatham, Ont 19 Sept 1940). An accident when he was 19 ended Ian's ambition to be a rodeo cowboy, but the guitar he obtained while recuperating opened up new opportunities. In 1959 he moved to Toronto, started to sing in coffeehouses, and met Sylvia Fricker. Sylvia had grown up in southern Ontario and been exposed to a wide repertoire of music. By 15 she knew she wanted to be a folksinger and, after finishing high school, moved to Toronto.

They soon became full-time professionals and, with their first recording (1961), among the leaders of the folk-music boom in N America. Their repertoire expanded to include their own songs — "Four Strong Winds," written by Ian, was an international hit in 1962, and Sylvia's "You Were on My Mind" was a hit for We Five in 1965 — songs by contemporaries such as Bob Dylan, Gordon LIGHTFOOT, and Joni MITCHELL, and songs taken from their knowledge of country and blues. They were among the first of the "folk" musicians to use electric guitars, strings and other instrumentation. By 1970 their music was a synthesis of country, rock and folk, and they had created a band, The Great Speckled Bird, to help achieve that sound.

In 1970 they started a CTV Network show, "Nashville North," subsequently known as "The Ian Tyson Show" with Sylvia as an occasional guest. As the 1970s began, Ian and Sylvia's professional and marital lives began to split. (They had been married in 1964.) Their last appearance together was in 1975.

In 1974 Sylvia began to host a CBC Radio show, "Touch the Earth." During its 5-year run, the show provided important exposure for Canadian folk artists and established Sylvia as an independent personality. In 1975 she recorded the first of 2 solo albums for Capitol Records and in 1978 established her own company, Salt Records, to handle her albums and recordings by other folk artists. She has done a CBC TV series and numerous TV specials.

After he took his TV show off the air in 1975, Ian tried unsuccessfully to establish himself in Nashville, Tenn. Following a tour of Canada in 1978, he devoted most of his time to his cattle ranch in Alberta, limiting his musical life to periodic club dates. In 1983 he returned to the recording scene with the critically acclaimed album *Old Corrals and Sagebrush,* and in 1984 followed it with the equally successful *Ian Tyson.*

RICHARD GREEN

Iberville et d'Ardillières, Pierre Le Moyne d', soldier, adventurer (bap at Ville Marie [Montréal] 20 July 1661; d probably at Havana, Cuba 9 July 1706), third and most famous of Charles Le Moyne's 12 sons. Iberville displayed his bravado on the expedition led by de TROYES against the English on James Bay, and was rewarded with the governorship of the conquered posts. He returned to the Bay in 1688, 1690 and 1694, raiding English posts and seizing furs. On 5 Sept 1697, his lone ship *Pélican* defeated 3 English warships near YORK FACTORY, sinking 2. Iberville's fierce courage and ruthlessness were forged in desperate colonial competition and savage border wars. In 1689, he took part in a brutal guerrilla attack on Corlaer, New England, in which some 60 settlers were massacred. In 1696-97, he led militia, Indians and French soldiers on a rampage across Newfoundland, burning, looting and killing some 200 men. In 1698-99, 1699-1700 and 1701-02, Iberville commanded expeditions to Louisiana, establishing Forts Maurepas, Mississippi, Louis (Old Mobile), collecting furs and negotiating with the Indians. His last campaign (1706), the plundering of the English colony of Nevis in the West Indies, was clouded by controversy. Iberville died that year, likely of yellow fever, but was convicted of various charges, and most of his estate was seized in reparation. His career was an uneasy mixture of commercial ambition and military zeal but, though his conquests were ephemeral and his actions often cruel, his daring roused the admiration of even his enemies. He was the first native Canadian to receive the CROIX DE SAINT LOUIS, for valour.

JAMES MARSH

Reading: Guy Frégault, *Iberville the Conqueror* (1944).

Ice is the solid phase of WATER. It is useful to think of it this way rather than as "frozen water" because water can achieve the solid phase through the freezing of liquid water or by direct deposition (sublimation) of water vapour, its gaseous phase. These different processes can produce distinct ice forms in the atmosphere or on or below the Earth's surface. The form taken by the solid phase of water is often important in determining its environmental and other roles. Snow is one distinctive form of ice; others include GLACIER ice, river ice, lake ice, SEA ICE, ground ice of various types, HAIL, CLOUD crystals, hoar and rime. Ice crystals are typically hexagonal, a direct result of an internal symmetry produced by the orderly packing of the 3-atom water molecules (H_2O) of which each crystal is composed. This crystal form is found at scales from microscopic, in cloud crystals considerably under 1 mm in diameter, to macroscopic, in crystals of over 10 cm diameter found in some glaciers.



Ex-voto painting commemorating d'Iberville's victories. As in most votive paintings, the saint is depicted in the upper portion while the event is shown in the lower part (*courtesy Basilique Ste-Anne-de-Beaupré*).

Snow is one type of solid precipitation originating in the atmosphere and falling to the surface of the Earth. At below -40°C, ice crystals may be initiated from water droplets in the atmosphere by a spontaneous change from the liquid to the solid phase of water. At much lower temperatures spontaneous change from gas to solid can occur. Above -40°C a nucleus (particle of ice or another appropriate substance) is normally required to trigger ice-formation nucleation. Tiny hexagonal crystals produced in these ways form cirrus clouds and the flickers of "diamond dust" often seen on cold, sunny days. Once in existence within clouds of supercooled water droplets, such ice crystals may grow into snow crystals through the deposition of water vapour because air has a lower capacity for holding water vapour in the presence of ice. The particular hexagonal form achieved by the growing crystal is determined by prevailing humidity and, especially, temperature conditions. When a crystal begins to fall through its cloud, further growth occurs by the accretion of supercooled cloud droplets, or riming. This is growth by freezing as distinct from vapour deposition. Graupel, heavily rimed snow, is an extreme product of this process. Rime, ice produced by the freezing of tiny, supercooled droplets, is not only important in the atmosphere, where it can cause aircraft to become iced up, but also on the Earth's surface. While falling, many snow crystals may combine to produce a snowflake.

In the warmer portions of the cloud, or outside the cloud en route to the surface, snow crystals may melt or evaporate (sublimate). Much of the rain which falls in Canada results from snow melting on its way to the surface. Hail, a type of solid precipitation characterized by layers of ice which are a record of alternate freezing and thawing in turbulent thunderclouds, is a good example of the involvement of the various changes of phase of water in the production of a distinctive ice form. Much of the cloud seeding in RAINMAKING or hail-suppression experiments is aimed at producing ice in water clouds.

The freezing of water droplets or the nucleation of water vapour, in the atmosphere and elsewhere, produce various distinctive ice crystals which may combine to form bulk ice composed of many crystals. On and below the Earth's surface such bulk ice, produced by the freezing of substantial amounts of water or by the densification of the snowpack, forms most of the ice present *(see* PERMAFROST; PERIGLACIAL LANDFORM).

Ice forms on freshwater bodies when surface temperatures fall slightly below freezing point. As the maximum density of water is achieved at close to 4°C, LAKE surface water cooled to that temperature becomes heavier than warm water below it and sinks. The warmer water, displaced from below, is cooled in its turn and also sinks. Thus, before ice can form on a lake, the entire water column has to cool to 4°C through overturning so that freezing temperatures can be achieved at the surface. When ice does form, much of the lake will still be at 4°C. In RIVERS, the turbulence of flow prevents freezing until the entire water column has been reduced to 0°C. On lakes, the initial random orientation of ice crystals on the water surface tends to be replaced, as the ice thickens, by vertically oriented 6-sided columns. This process forms a clear sheet of "black ice." The columns often become loose during spring breakup to form distinctive "candle" crystals. Flooding of snowpack lying on a lake produces slush which, on refreezing, forms a distinctive white ice composed of randomly oriented crystals.

Ice, particularly snow, is a major control of the flow regimes of Canadian rivers. Most rivers achieve peak annual flow in spring, as the accumulated precipitation of many months runs off in a period of days or weeks. In colder areas



The St Elias Mts of Kluane National Park contain the world's largest concentration of icefields and glaciers (*photo by Richard Harrington*).

most annual precipitation runs off at this time. The hydrological impact of the melt season is heightened because winter precipitation is less subject to evaporation than its summer counterpart and the ground over which snowmelt runs off is often frozen so that there is little loss through infiltration. Floods associated with ice jams are another feature of this snowmelt-breakup season. As groundwater reservoirs are replenished, rivers may be fed, through subsurface flow, by the products of snowmelt throughout the summer. Rivers flowing from the mountains, as in the case of some prairie rivers, may, of course, be snow- or glacier-fed all summer. The nature of winter precipitation also controls the low-flow phase of many of our rivers. Except in warmer southern areas, where high evaporation and evapotranspiration offset rainfall to produce late summer droughts, Canadian rivers tend to achieve minimum flows in late winter. At this time, they have been deprived of runoff for months, as precipitation has been held up in the snowpack. In the NORTH and in permafrost regions generally, flows can reach zero where rivers freeze to their beds. Naleds or "icings" are an ice form which may result in such situations. Even Niagara Falls is mainly ice at this time of year. Glacier-fed streams of the Arctic and the West behave somewhat differently. In them, the effect of spring snowmelt is extended to all the summer months by the melting of the glacier itself. In the West, some flow from beneath the glacier is normal throughout the winter; in the North, discharge stops completely in the cold season. In summer, glacier-fed streams may be subject to some particularly spectacular ice-damming effects where the glacier itself blocks a stream.

As a northern temperate region, the populated part of Canada has ice and snow in abundance, ensuring that most areas of the country have sufficient fresh water for society's needs. Snow provides other benefits, ie, to the winter recreation industry, as an insulator of the ground, etc. But there are also attendant climate hazards and adjustments which human beings must make (*see* CLIMATE AND MAN). Snow-removal costs exceed $1 billion per year in Canada; indirect costs (eg, increased fuel consumption, travel delays, etc) are even greater. The centres in Canada which receive most snow are Goose Bay, Nfld, with 409 cm; St John's, Nfld, 364 cm; Québec City, Qué, 336 cm; Kapuskasing, Ont, 322 cm; and Charlottetown, PEI, 305 cm. *See also* GLACIATION; PINGO; AVALANCHE.

W.P. ADAMS

Ice Age, the Pleistocene epoch of geologic time, during which periodic, extensive glacial activity occurred in many parts of the world. The Pleistocene is generally considered to encompass the time beginning 2-3 million years ago and ending 10 000 years before the present. *See* GLACIATION; GEOLOGICAL HISTORY.

N.W. RUTTER

Ice Cap, large mass of ICE that originates on land by compaction and recrystallization of snow. Ice caps flow outwards in several directions and submerge most or all features of underlying land. An ice mass constrained by bedrock to flow in one direction, usually along a valley, is called a GLACIER. This distinction is not sharp; for example, an ice cap surrounded by mountains may be drained by a series of valley glaciers. Ice caps and glaciers form where annual snowfall exceeds the amount lost by melting in summer. As a layer of snow is buried by subsequent falls, it is gradually transformed to ice. The ice flows outwards under gravity, carrying the overlying snow with it. At lower elevations, all of the previous winter's snow and some of the ice are removed by melting and runoff, and in some cases by calving of ICEBERGS into an ocean or lake. The surface profile of the ice mass does not change much from year to year, however, because the ice that flows out of the accumulation area approximately balances that lost from the lower reaches.

If snowfall increases or summers become colder, so that melting is reduced, the ice starts to thicken and, after some years, the ice front starts to advance. Conversely, a reduction in snowfall or an increase in summer warmth eventually produces a retreat. Interpretation of the record of advances and retreats is complicated because each ice mass has its own characteristic response time which depends on its size and speed.

Mountain ranges in western Canada contain many ice caps. The best known is the COLUMBIA ICEFIELD, a major tourist attraction on the Banff-Jasper hwy. It has an area of over 300 km^2 and is drained by several valley glaciers, including Athabasca Glacier. Its surface elevation varies from about 2600 to 3500 m, the large range being a reflection of the peaks and valleys in the bedrock underneath. The icefield's average thickness is probably no more than 100-150 m, although the thickness of parts of the outlet glaciers is more than double this. Velocities range from a few metres per year in the centre to about 100 m per year in Athabasca Glacier. About 4 m of ice is melted from the lower part of the glacier each summer. Present flow from the icefield does not quite compensate for this; thus, the glacier is retreating from the position it reached about 100 years ago, after a long period when the CLIMATE was colder than it is today.

The largest ice caps in Canada are on ELLESMERE I, where 3 have areas exceeding 20 000 km^2, and on AXEL HEIBERG, DEVON and BAFFIN islands. The ice in some of these caps is up to 1 km thick. Because both snowfall and melting in the Arctic are much less than in western Canada, the arctic ice caps are less active. Although few measurements have been made, velocities are probably only a few tens of metres per year.

The world's largest ice caps, covering Antarctica and Greenland, are usually called ice sheets. The Antarctic Ice Sheet has an area of over 12 million km^2 and a maximum thickness of about 4.5 km. If it were to melt, world sea level would rise as much as 75 m. The Greenland Ice Sheet has an area of 1.7 million km^2 and a maximum thickness of about 3.2 km. Glaciers in West Greenland produce icebergs hazardous to shipping and drilling rigs in the N Atlantic.

At the peak of the last ICE AGE some 18 000 years ago, an ice cap comparable in size to that of Antarctica covered almost all of Canada and the northern part of the US (*see* GLACIATION). The ice has left its mark on the landscape, eg, in the heavily eroded bedrock of the Canadian SHIELD. Much of the PRAIRIE is covered by deposits laid down in lakes that formed around the SW margin of the retreating ice cap. The land was depressed by the weight of ice and slowly recovered as the ice cap retreated. In parts of Canada, notably around Hudson Bay, the land is still rising (*see* COASTAL LANDFORM).

Taking samples from the central part of a polar ice cap by drilling through it provides a continuous record of past snowfalls. Annual layers can sometimes be distinguished; if not, the ice can be dated by other means. Chemical analyses of core samples from Greenland, Antarctica and arctic Canada have given detailed records of past climates, particularly temperatures, extending in some cases over as much as 100 000 years. Small amounts of other materials such as volcanic ash, wind-blown dust, pollen and, in recent snow, acids and fallout from nuclear tests have been found.

W.S.B. PATERSON

Ice Skating probably originated in Scandinavia over 2000 years ago as a means of transportation. It was also practised on the canals of Holland during the Middle Ages. Early references to skating in England date from the 17th century. The first skates were made from the shank or rib bones of elk, reindeer and other animals, and the word "skate" likely derives from the early German word *schake,* meaning shank. As a social and recreational pastime, skating was popular in Britain and France during the 18th century, and the world's first skating club was formed in Edinburgh in 1742.

In Canada, according to legends, the Iroquois Indians had skated, tying animal shin bones to their footwear with leather thongs; and in Acadia, French explorers were skating as early as 1604. Skating as a sport was introduced into Canada by British garrison officers in the 1840s, and quickly gained a strong following. It was thought especially appropriate for girls and women, and thus became an important social pastime. Canada led the world in the development of early skating rinks, and the first prepared outdoor commercial rink in the country was opened in Montréal in 1850. The first covered rink in the world was built in Québec City in 1852. The early rinks were built with natural ice; large sheds provided the skater with shelter from the wind and snow. The most famous of these early rinks was the Victoria Skating Rink in Montréal, built in 1862 and at that time the largest in the world. From this rink the game of ice hockey took its standard rink size. The first artificial rinks in Canada were built in Victoria and Vancouver, BC, during the winter of 1911-12, and artificial rinks are now found in most sizable communities. However, Canadians still skate for pleasure on frozen lakes, ponds and rivers. Ice skating is fundamental to the game of ice HOCKEY and competitively takes the form of FIGURE SKATING, SPEED SKATING and ice dancing.

The evolution of the skate to the modern steel blade or tube variety passed through several stages. Skates made entirely of iron were introduced in the 17th century. Steel skates, fastened with screws and clamps to the wearer's shoes, were first made in the 1850s. In 1861, John Forbes of Dartmouth, NS, developed the first spring-skate; adjusted with a single lever, it eliminated the need for screws and plates. Eventually, this style was replaced by the skate with blade permanently attached to the boot. In 1887 the Amateur Skating Assn of Canada was founded, in Montréal, for both speed and figure skating. In 1939 figure skaters formed the Canadian Figure Skating Assn.

BARBARA SCHRODT

Reading: Nigel Brown, *Ice Skating: A History* (1959).

Ice-Worm, common name for *Mesenchytraeus solifugus,* a dark-pigmented oligochaete worm (*see* ANNELIDA) up to 4 cm long, found in tangled masses in melting ice of GLACIERS in the Pacific Northwest; similar ice-worms are also reported from Greenland and the USSR. The woolly ice-worm of the High Arctic is a caterpillar of lepidopteran *Gynaephora,* which is tolerant of freezing and overwinters in exposed conditions. The term "ice-worm" is also applied to the primitive INSECT *Grylloblatta campodeiformis,* a slender,

wingless animal, creamy white in colour, sometimes found at edges of melting glaciers in the Canadian Rockies. Scott of the Antarctic referred to ice-worms on the underside of spring pack ice, but these were filamentous diatoms (*see* ALGAE). Ice-worms are part of Canadian folklore. An Inuit myth refers to Sikusi, "a woolly and mischievous ice-worm" and a notorious melter of igloos, which freed an Inuit from Tuktoyaktuk who was frozen in ice. Robert SERVICE wrote the legendary "Ballad of the Ice-worm Cocktail."

R.G.B. REID

Iceberg [Dan or Nor, *isberg*, "ice mountain"], a piece of ice that has become detached from its parent GLACIER by a process known as calving. The glacier may be flowing into a FJORD, or may be an ice shelf (floating glacier of large dimensions extending beyond the coastline). Icebergs thus created may melt or disintegrate, giving rise to smaller pieces called growlers and bergy bits. Icebergs calve from a parent glacier as a result of the manner in which the glacier enters the water or, subsequently, from tidal and wave action or as a result of EARTHQUAKE shocks. Less commonly, icebergs may suddenly emerge from below water level as a result of forces acting on part of a glacier protruding under the water. In such cases, the water has failed to melt underwater ice faster than the processes acting on ice above water level.

Appearance Most icebergs are white except along freshly calved ice cliffs, which tend to appear blue. Others may appear green, brown or black, or combinations of these colours. These icebergs have usually rolled over, exposing basal ice, or have emerged from below water level. The various colorations are caused by differences in density, air-bubble content and impurities. For example, black ice is of high density and bubble free; dark layers indicate the presence of rock materials derived from the base of the parent glacier. Occasionally, rocks may be found on the original upper surface of the iceberg. As the iceberg melts, these materials precipitate into marine or lake sediments, forming ice-rafted deposits.

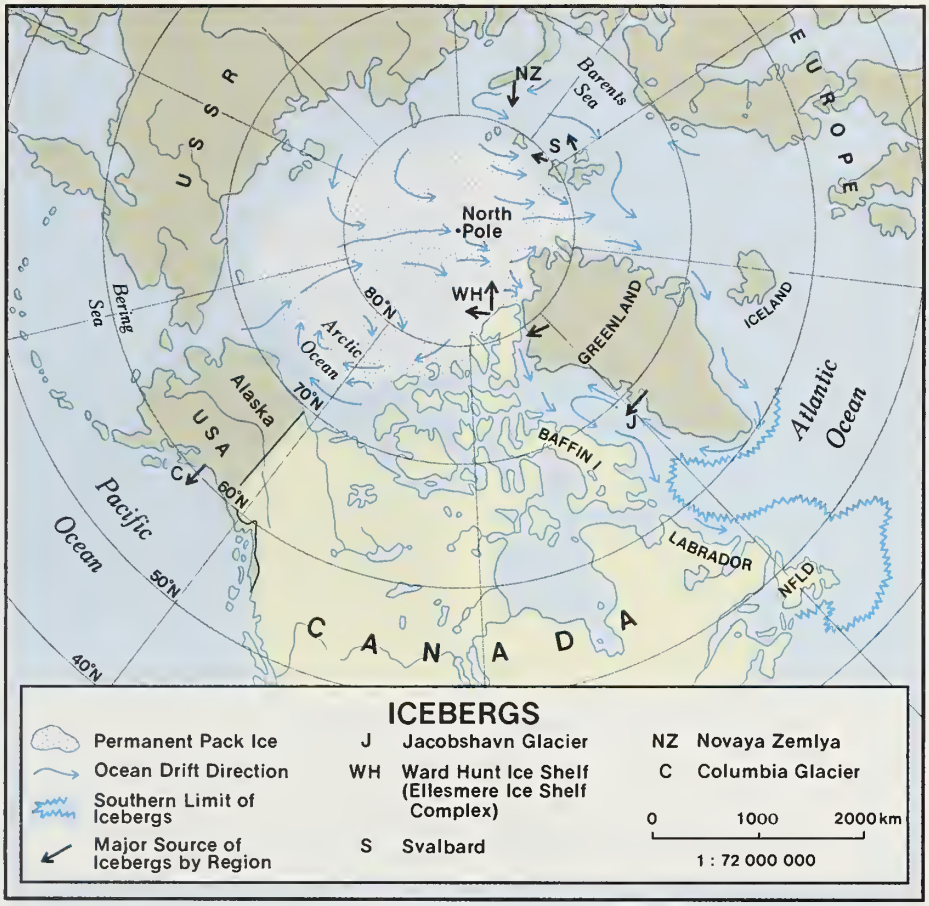
Occurrence and Dimensions Some icebergs are trapped in lakes; the vast majority occur in oceans. Flat-topped tabular bergs are sections of almost flat ice shelves. In the Antarctic they are commonly several tens of kilometres square and several hundred metres thick. One of the largest tabular bergs seen measured 160 km x 72 km. A typical height above waterline would be 35-45 m, implying a total ice thickness of 250-320 m, although greater thicknesses are possible. In the Arctic Ocean, the term ice island is applied to pieces of floating shelf ice that form principally on the N coast of ELLESMERE I. These thin tabular icebergs are 20-60 m thick, often up to 100 km² in area, and typically protrude 2-6 m above water. Irregularly shaped icebergs are more typical of coastal Greenland and northern Canada. Many irregular bergs originate in Greenland fjords containing fast-flowing outlet glaciers coming from the inland ice sheet. Because these glaciers usually terminate below the snowline and because they are often extremely broken up in their journey to the sea and then by tidal and wave action, they can give rise to very irregular bergs of almost pure ice, their spires occasionally reaching 100 m above sea level.

Dynamics and Stability The composition of antarctic tabular bergs gradually changes from snow on the top surface to ICE by about the waterline. This fact, combined with their tabular shape, makes them much more stable than typical arctic icebergs, which quickly tilt and finally roll on their voyage to destruction. Calving from an already tilted iceberg may shift the centre of gravity sufficiently to cause the iceberg to roll, posing a threat to ships. Icebergs are driven principally by ocean currents; wind stresses on exposed parts are generally insufficient to influence the motion significantly. Melting below sea level takes place continuously; above sea level, intermittently, according to location. Depending on the shape of the iceberg and rock content, the volume of ice submerged compared to the total ice volume is in the ratio of the density of the ice to that of seawater, or about 0.88 in arctic and 0.85 in antarctic icebergs. The above-water shape of an irregular iceberg does not necessarily provide information about its underwater geometry. This may be discovered through the use of airborne RADAR or side-scan SONAR from a ship. These studies and others (eg, towing tests and iceberg-stability investigations) are carried out at the Centre for Cold Ocean Resources Engineering (C-CORE), St John's, Nfld.

Because the ocean transmits wave energy, icebergs respond to wave action. Thus, in addition to drifting with ocean currents, icebergs are known to oscillate vertically and to roll with a periodic motion. Since icebergs possess natural periods of oscillation dependent on their density and their thickness, they may tune in to certain ocean waves. Waves possessing the right period will tend to cause resonance in the iceberg, with a consequent increase in the size of oscillation. This behaviour changes continually with the changing shape and thickness of the iceberg. An ideal, rectangular block iceberg with a mean thickness of 200 m would have a natural period of oscillation of about 26 seconds, which is in the range of common wave-swell periods. The thinner arctic ice islands have a much lower natural period of oscillation and, having horizontal dimensions much greater than their thickness, tend to absorb ocean waves as filtered travelling waves, which induce flexing of the ice. As the ice island thins by melting, this process may lead to its fracturing. Most Greenland bergs melt before reaching 40° N lat (roughly opposite Philadelphia, Pa), although occasionally some bergs reach almost 30° N. Satellite imagery has been used to track large bergs (*see* REMOTE SENSING).

Applications T3 and other arctic ice islands on which aircraft can land have been used intermittently by the US and USSR as mobile research platforms for about the last 30 years. Because many become trapped in Arctic Ocean current gyres, they survive for many years, melting and crumbling at the edges only slowly. In 1977 and 1980 conferences were held to investigate the technology involved in moving antarctic icebergs to places where water shortages are frequently acute, eg, Australia, California and Saudi Arabia. This controversial project has not yet materialized.

Hazards In the Northern Hemisphere icebergs present a threat to human activities. Off the coasts of Labrador and Newfoundland, recent PETROLEUM explorations necessitate the presence of drill platforms, which may be endangered by icebergs. In the vicinity of Valdez, Alaska, the Columbia Glacier is showing signs of disintegration in its terminal region. As a result, bergs will drift into Prince William Sound and pose a danger to oil tankers operating from the port of Valdez. US Geological Survey glaciologists have posted iceberg forecasts. Oil and



Iceberg in the Labrador Sea (*photo by John deVisser*).



gas operations in the Beaufort Sea and between the Queen Elizabeth Is are threatened by collisions between even small ice islands and platforms and bottom structures (eg, PIPELINES). The threat to shipping in the N Atlantic is now minimal, as a result of the establishment of the International Ice Patrol after the sinking of the *Titanic* (Apr 1912). G. HOLDSWORTH

Reading: G. Schultz, *Icebergs and Their Voyages* (1975).

Icebreakers Canada has had an icebreaker capability for over 100 years. Indeed, one of the promises of Confederation — a guaranteed year-round ferry service between Prince Edward Island and the mainland — resulted between 1876 and 1899 in the construction of 3 small icebreaking FERRIES. At the turn of the century Canada's first full icebreakers, the *Champlain* and *Montcalm*, were built to break up ice barriers and dams that caused annual flooding at narrow points along the St Lawrence R. Icebreakers were first used in the Canadian Arctic in the 1920s to deliver supplies and services to native and isolated settlements during the short summer season, and to back up claims of Canadian sovereignty over the NORTHWEST PASSAGE and Arctic Archipelago. In the 1930s the port of Churchill was opened for grain shipments and in 1957 the government undertook the annual supply of Distant Early Warning (DEW) line sites across the Arctic. Recent economic development in northern Canada, particularly the extraction of raw materials, has again increased the demand for icebreaker services.

Canada operates 22 of the world's estimated 100 icebreakers: 18 owned by the CANADIAN COAST GUARD (CCG) as part of Transport Canada and 4 by private oil companies. An icebreaker's chief function is to break, separate or divert ice in ice-covered waters, and the CCG icebreaker fleet has been designed and built for specified Canadian needs: to assist shipping in lakes, oceans and river mouths; keep channels open through the ST LAWRENCE SEAWAY system; and support government supply and economic development operations in the Arctic. The CCG icebreakers are classified as heavy (8 vessels), medium (7 vessels), and light (3 vessels). Canada's most powerful icebreaker, the *Louis S. St. Laurent* of 13 800 tons displacement (dwt), is smaller than the two 23 400 dwt nuclear-powered icebreakers of the Soviet Union's *Sibir* class. However, should the Canadian government give approval for construction of the "Polar 8" icebreaker, designed as a 35 000 dwt ship with 100 000 shaft horsepower (shp), it would be the world's largest icebreaker. One of the CCG's heavy icebreakers, the *John Cabot*, is also equipped for submarine cable laying and repair. The *Canmar Kigoriak* owned by DOME PETROLEUM LTD (7200 dwt), though presently used to convoy other kinds of marine units working in Arctic ice, such as drilling rigs, is basically an experimental icebreaker, the prototype for the gigantic 200 000 dwt icebreaker-tanker of the future.



Dome Petroleum's *Canmar Kigoriak*, which operates year-round in the Beaufort Sea, can maintain a speed of 3 knots through thick ice (*courtesy Dome Petroleum Limited*).



Gulf Canada's *Terry Fox*, a Canadian-built icebreaker classified as Arctic 4, is used in the Beaufort Sea (*photo by Ranson Photographers, Edmonton, for Gulf Canada*).

Canada, like all nations with icebreakers (Argentina, Finland, Sweden, Japan, W. Germany, US and USSR), operates many other kinds of ships built to function in ice conditions. These ice-strengthened marine units range from experimental cargo ships, such as the M.V. *Arctic*, to the mobile arctic caissons owned by large private companies involved in offshore oil drilling in the Beaufort Sea.

Heavy icebreakers in the CCG fleet generally operate in southern waters in the winter months and the Arctic during the summer. Though the *Louis S. St. Laurent* has worked in Hudson Bay in December, no serving Canadian icebreaker is able to penetrate Canadian Arctic water during the severe winter season from November to May. The proposed "Polar 8," which has the category of an Arctic 8 type ship, could operate year-round in Arctic waters. This Arctic numbers classification is part of the Canadian Arctic Shipping Pollution Prevention Regulations instituted in 1970. For example, an Arctic 3 icebreaker, which is the category assigned to the 3 "R" or *River* class of CCG heavy icebreakers, can maintain a speed of 3 knots through ice 0.9 metre (3 feet) thick in what is called "the continuous mode." This expression refers to the steady movement forward of the icebreaker through the water. An Arctic 7 icebreaker, which is the category given to the *Canmar Kigoriak*, can maintain a speed of 3 knots through ice 7 feet thick. The icebreakers owned by GULF CANADA LTD, the *Terry Fox* and *Kalvik*, are classified as Arctic 4. Under severe ice conditions Arctic 3 ships such as the CCG's "R" class and Gulf Canada's 2 Beaufort Sea Vessels have operated beyond their category up to Arctic 4 and 5, respectively.

Canada's future need for advanced icebreakers is not likely to be as large as that in the USSR. The composition of Canada's icebreaker fleet depends on the level of demand for their services in ice-covered waters. For example, the transportation of oil and gas from the Arctic by water would result in a considerable increase in the icebreaking capability in Canada.

JOHN D. HARBRON

Icelanders, coming by way of Greenland, were the first European visitors to what is now Canada. ERIC THE RED established a settlement in Greenland in 896 AD, the same year BJARNI HERJÓLFSSON made the first known sighting by Europeans of the NE coast of Canada. Archaeological excavations at L'ANSE AUX MEADOWS demonstrate that Norse settled in Newfoundland. KARLSEFNI's son Snorri was probably the first European born in what is now Canada.

Origins Iceland, an island settled in the 9th century AD by renegade NORWEGIAN chieftains and their followers, is warmed by the Gulf Stream and has a fairly moderate climate. Its uninhabitable interior is a volcanic mountain plateau of glaciers, lava fields and desert, but the treeless coast provides grazing land for sheep and cultivation. The Icelandic *Althing* (est 930 AD) is the oldest parliament in the world. The nation has the highest literacy rate in the world, with more books, periodicals and newspapers published per capita than anywhere else.

Through the centuries Icelanders suffered many natural calamities. By 1800 the national population was reduced to only 47 000 by disease, starvation and volcanic eruptions. In the 19th century, new disasters, including sheep epidemics, a deterioration in the climate and more volcanic eruptions, followed. The Danish government, which controlled Iceland at the time, offered to relocate the entire population to Denmark. The Icelanders declined, although small parties emigrated to Brazil and Wisconsin. The first Icelander to land on Canadian shores since his Norse ancestors was 22-year-old Sigtryggur Jonasson, who arrived in Québec City on 12 Sept 1872.

Migration In 1873 about 150 more Icelanders arrived in Québec, encouraged by Jonasson. They were given free transportation to Ontario by the Canadian government, as well as offers of free land. Rosseau, in the Muskoka district, was selected as a site, but government employment, which had been promised until the land was cleared, was not adequate, and most settlers soon left, leaving behind a small permanent settlement. A second party arrived in 1874, settling in Kinmount, Ont. A Nova Scotian immigration officer induced a large number to relocate at what the Icelanders called Markland, NS, near Halifax, with offers of land, household appliances and financial aid. The land was not arable, however.

Settlement Patterns In 1875, 235 Icelanders travelled N by flatboat on the Red R from Winnipeg, Man, to the W shore of Lk WINNIPEG. There they had been promised an Icelandic reserve in what was then an unorganized part of the North-West Territories. This reserve, established by an order-in-council, became New Iceland, a unique political structure in Canadian history. In 1876, 1200 others joined the first group. Fifty immigrants had remained in Winnipeg the first year, and 200 the second, creating the basis for the first permanent urban Icelandic settlement in Canada.

In New Iceland the settlers created their own laws, maintained their own schools, and generally managed their own affairs. A series of natural disasters, including floods and a smallpox epidemic 1876-77, decimated the population, until in 1878 a general exodus to Winnipeg and North Dakota began. By 1881 the population of the New Iceland area had declined to about 250. In 1881 as well the provincial boundaries were extended N, and New Iceland became part of Manitoba, though remaining, to this day, heavily Icelandic. The main settlement in New Iceland was GIMLI. Other rural areas of Manitoba settled by Icelanders include Lundar (on Lk Manitoba); Glenboro, in the SW region of the province; SELKIRK, N of Winnipeg; and Morden to the S.

Icelanders continued to immigrate to Winnipeg throughout the last 20 years of the 19th century. Later settlements were established in rural Saskatchewan and Alberta, but these were largely settled by families and individuals moving from Manitoba and from Icelandic settle-

ments in the US. Descendants of Icelanders now live across Canada.

Economic Life Most of the immigrants remained in farming, generally their profession at home. Agricultural settlement in Ontario and Nova Scotia proved unsuccessful and conditions in New Iceland were not much better. The freshwater fishery contributed to the economic viability of New Iceland.

The immigrants sent their children to universities whenever possible, which may have influenced the pattern of assimilation. Icelanders did not encounter much prejudice and there was a fairly high rate of intermarriage between Icelanders and the settled population. Typically, Icelanders entered the professions, particularly medicine, law and education.

Social Life and Community From the time New Iceland was settled, Icelanders have preserved elements of traditional Icelandic society, culture and language. Factionalism, however, has permeated almost all of the Icelanders' endeavours, and this is reflected in their many voluntary associations, most of which, in New Iceland, were organized around religious themes and topics. The most important association historically, the Icelandic National League of N America, was founded in 1919 to assist Icelanders to adapt to Canada and to preserve elements of Icelandic heritage. Chapters of the league were established in almost every traditional Icelandic settlement and in the cities to which children of the immigrants had relocated. Icelandic Canadian clubs now exist in many Canadian cities. In 1942 the Icelandic Canadian Club began publishing the first English-language Icelandic publication in N America, the *Icelandic Canadian* magazine.

The Icelandic associations have traditionally hosted events for social and educational reasons, the most important being the Icelandic Festival (*Islendingadagurinn*), held annually since 1932 in Gimli on August 2. Originally, the purpose was to commemorate the granting of a constitution to Iceland in 1874, but in time it has also become an event to honour the Icelandic pioneers in Canada.

Religion and Cultural Life The Lutheran Church (the state church in Iceland) has been the most prominent, and the Icelandic Evangelical Lutheran Synod of America held its first conference in Winnipeg in 1885. The Unitarian Church was the second-largest church among Icelanders, although it is not clear how this situation developed. The first Unitarian Church opened in 1892. Considerable political and theological rivalry existed between members of the 2 denominations in Winnipeg and this carried over into many of the smaller, rural communities. The United Church is now the second-largest denomination among Icelanders.

The first Icelandic newspaper in N America was *Framfari* (*The Progress*), published in New Iceland between 1877 and 1880. Between 1879 and 1910, 8 other publications originated in Gimli. In 1886 the Icelandic newspaper *Heimskringla* (*The World*) was founded. *Lögberg* (*The Tribune*) was founded in 1887, partly in opposition to *Heimskringla*. They were amalgamated in 1959 into *Lögberg-Heimskringla*.

Literature dating the sagas and the settlement of Iceland is probably the most unifying theme in Icelandic culture. The Icelanders in Canada have produced many poets and novelists writing in both English and Icelandic. Stephan G. STEPHANSSON is considered by many critics to be the foremost Icelandic poet of this century. Stephansson's contemporary, Guttormur J. Guttormsson, was born in New Iceland in 1878 and did not visit Iceland until 1939. He was best known, perhaps, for the poem *Sandy Bar*, a tribute to the Icelandic pioneers in New Iceland. Contemporary Icelandic writers include Laura Goodman Salverson, first editor of the *Icelandic Canadian* magazine and author of *The Viking Heart* and *Confessions of an Immigrant's Daughter*, and William Valgardson, author of *Bloodflowers* and other works.

Education In Iceland literacy has long been a requirement for marriage and everyone was expected to have an intimate knowledge of the early sagas. In New Iceland a request was made for provision of a school even before homes had been built. In Winnipeg, Icelandic was first taught at Wesley College (now University of Winnipeg) in 1901. In that same year the Manitoba Department of Education approved the teaching of Icelandic in provincial schools (when requested by parents) and University of Manitoba accepted it as a second language for incoming students. In 1951 the Chair in Icelandic Language and Literature was established at University of Manitoba. The Icelandic collection in U of Manitoba library now has a full-time curator and over 14 000 volumes.

Politics Icelanders are not identifiable with any particular political ideology or Canadian political party, although many have distinguished themselves in political service. In 1898 Sigtryggur Jonasson was elected to the Manitoba legislature to represent St Andrews. Thomas H. Johnson was appointed attorney general and minister of public works for Manitoba in 1915, becoming the first Icelandic Cabinet minister in Canada. J. MATTHIASSON

Reading: William Kristjanson, *The Icelandic People in Manitoba: A Manitoba Saga* (1965).

Igloo, or snowhouse, was a winter dwelling utilized by INUIT across the Arctic. Some Inuit spent most of the winter in semi-subterranean houses made of driftwood and whalebone and only used the igloo when travelling. Others relied on igloos for housing through the entire winter. The dome-shaped igloo was built spirally from within. The structure derived its strength from the key block, inserted at the apex of the roof. A series of these domes were constructed, connected by passageways, to house 15-20 people. Furniture consisted of cooking pots, oil lamps and low platforms. Temperatures inside the igloo were just below freezing or warmer. RENÉ R. GADACZ

Igloolik, NWT, Hamlet, pop 746 (1981c), is located on an island off the MELVILLE PENINSULA in the FOXE BASIN Lowlands, 1641 air km NE of YELLOWKNIFE. The area provides a unique record of unbroken INUIT habitation, with the oldest site established about 2000 BC. Sir Thomas BUTTON was the first *qallunaaq* ("white man") to visit the area, in 1613. Umik, a local Inuk, set up a mission at the site in the early 1920s where he preached his own brand of Christianity. A Roman Catholic mission was established in the area 10 years later and an HBC post in 1939. The community's residents still subsist today on hunting, fishing and sealing. ANNELIES POOL

Igloolik Sites, archaeological sites located on the islands at the northern end of FOXE BASIN, in the vicinity of the village of Igloolik. They appear to have been continuously occupied for the past 4000 years. Prehistoric hunters were attracted to the area by rich sea-mammal resources, principally seals and walrus. Isostatic uplift has resulted in a series of raised beaches, so that the archaeological remains of older beach occupations are at present found at greater elevations above sea level than are those of more recent occupations. This situation has allowed archaeologists to demonstrate an unmatched sequence of occupation and cultural development throughout the Paleoeskimo period between about 2000 BC and 1000 AD. The area was also occupied after 1000 AD by prehistoric THULE CULTURE Inuit, whose descendants continued to use the region through the historic period. *See also* ARCHAEOLOGY; PREHISTORY. ROBERT MCGHEE

Iglulik Inuit (or Igluligmiut) are known by the name of an important settlement site which translates as "it has houses." Iglulik country extends from Chesterfield Inlet on NW Hudson Bay northward along Melville Peninsula and across the northern third of Baffin I. Population estimates of about 500 were made in 1822 and in the 1920s. There were about 2500 Igluligmiut in 1980. A dialect of Inuktitut is spoken and main contacts in traditional times were with the BAFFIN ISLAND INUIT in the NW and the NETSILIK in the southern part of the area. Intermarriage with those groups has occurred since the late 19th century. Important Igluligmiut habitation sites have been used since as early as 1700 BC. First European contact dates from the early 19th century. Explorers PARRY, RAE and HALL all travelled in Iglulik country. From 1860 to 1910 a number of US and Scottish whalers wintered in the area and were the first forces of change. After 1920 trade in white-fox furs and the influence of missionaries and police brought more change. The reports of the Danish Fifth Thule Expedition, 1921-24, are the main source of information on Igluligmiut traditional culture. The oral traditions, religion, social and material culture differ only in details from that of neighbouring groups. However, occurrence of superior marine resources, especially walrus and several species of whales, made possible a high level of subsistence.

In recent years settlement has concentrated around Repulse Bay, Pond Inlet and Igloolik, which were formerly centres of trade. After 1972 Igloolik became the site of extensive scientific research with the studies of the International Biological Program. Later, a permanent research station was established. In 1974 a silver, lead and zinc mine was opened at Nanisivik in northern Baffin I, providing employment for a number of Igluligmiut. *See also* NATIVE PEOPLE: ARCTIC.

Ignatieff, George, diplomat (b at St Petersburg [Leningrad, USSR] 16 Dec 1913). Ignatieff joined the Dept of External Affairs in 1940 and developed an expertise in East-West relations, particularly at the UN, where his service included terms as Canadian ambassador 1966-69 and president of the Security Council 1968-69. He was also ambassador to Yugoslavia 1956-58 and permanent representative to NATO 1963-66. After retirement he spoke eloquently on behalf of disarmament causes, and he was named disarmament ambassador by PM John TURNER. He was provost of Trinity Coll, U of T, 1972-79 and chancellor of U of T from 1980. ANNE HILLMER

Igneous Rock, one of 3 ROCK classes, the others being sedimentary and metamorphic rocks. Igneous rocks are the product of the solidification of magma, molten rock generated by partial melting caused by heat and pressure in the deeper parts of the Earth's crust or in the upper mantle. Igneous activity has been present throughout the Earth's GEOLOGICAL HISTORY, and igneous rocks occur throughout the geological column in Canada (*see* GEOLOGICAL REGIONS). However, because internal temperatures were higher in the early stages of the Earth's history, the rate of magma production has probably declined over time. Granites and basalts are well represented in the old rocks of the Precambrian SHIELD regions of Canada and in the younger, flanking mountainous regions of the Appalachians and the western CORDILLERA. Some of the best examples of the most recent volcanism in Canada can be found in BC: the Mt Garibaldi belt in the S; several centres in Wells Gray Provincial Park in central BC; and Mt Edziza and Level Mt in the N. Dates as young as 1340 years ago have been recorded for the latest activity at Mt Edziza and 220 years ago for a flow at Aiyansh, near Terrace, BC. Some of these volcanic centres, especially those associated with

mineral SPRINGS, are now under investigation as sources of GEOTHERMAL ENERGY. C.M. SCARFE

Île-à-la-Crosse, Sask, UP, pop 1035 (1981c), located on an expansion of the upper CHURCHILL R, called Lac Île-à-la-Crosse. The name may derive from the shape of the lake — supposedly resembling a bishop's staff — or from an island in the lake on which the Indians played lacrosse. The lake provides a connecting route from the Churchill R to Methye Portage and was thus a strategic spot in the FUR TRADE. Montréal-based trader Benjamin FROBISHER and others were active in the area in the 1770s and the HBC built a post on the lake in 1799. From here the Athabasca brigades headed NW. In 1846 Fathers Laflèche and Taché established a mission. Their episcopal "palace" was a crude log shelter smeared with mud. In 1860 Sisters Agnes, Pépin and Boucher founded a convent. A landing strip was cleared in the late 1940s as a base for BUSH FLYING. Today the community — the oldest in Saskatchewan — is a centre for trapping and fishing. JAMES MARSH

Ilsley, James Lorimer, jurist, politician (b at Somerset, NS 3 Jan 1894; d at Halifax, 14 Jan 1967). Educated at Acadia and Dalhousie, Ilsley practised law until his election to Parliament as a Liberal in 1926. Re-elected in 1930 and 1935, he became minister of national revenue in 1935 and minister of finance in 1940. He successfully managed the nation's finances through WWII. He believed that the Canadian federal system required renovation, but his proposals presented to a 1945-46 dominion-provincial conference on reconstruction were rejected by Ontario and Québec. Deeply disappointed, Ilsley became minister of justice in 1946, but retired to practise law in 1948. Appointed to the NS Supreme Court in 1949, he became chief justice in 1950. ROBERT BOTHWELL

I'm Alone, a rumrunner based in Lunenburg, NS, one of several hundred vessels that supplied illicit liquor to a PROHIBITION-bound US during the 1920s. In Mar 1929 a US Coast Guard cutter sighted it with engine trouble in the Gulf of Mexico. Coast guard vessels chased it out to sea and sank it with the loss of one crewman. Intense diplomatic negotiations followed. In 1935 the US apologized and paid damages to captain and crew. ERNEST R. FORBES

Immigrant Labour Canada, which is essentially a country of immigrants, has consistently required the importation of skilled and unskilled workers to assist its economic development. Prior to Confederation (1867) a vast number of immigrant workers, most of whom were from the British Isles, had already assumed an important role within the predominantly agricultural and extractive economies of the British N American colonies. Perhaps the most controversial of these immigrant workers were the IRISH, who flooded into N America during the 1840s and 1850s in a desperate search for a new life. Because of their propensity for hard work and their ethnic cohesiveness, they virtually monopolized certain jobs in the lumber camps, on the docks, and within a sprawling network of canal and railway camps which stretched from Lk Superior to the Atlantic Ocean.

Immigrant labour was also extensively used during the construction of the CPR, when thousands of British, American and European navvies resolutely pushed the ribbon of steel westward, while CHINESE navvies, many of them imported specifically for this purpose, performed the even grimmer task of building eastward through the BC mountain ranges.

The tendency to import labour became particularly pronounced after 1870, when Canada began actively participating in the transatlantic labour market. The rapid expansion of ocean and rail transportation made it possible for British and European workers to hunt for jobs in N America on a mass scale; according to one source about 900 000 unskilled and skilled workers (other than agriculturalists) arrived between 1907 and 1930. British artisans, with their industrial experience and specific skills, were in high demand, particularly in the rapidly expanding industries of central Canada and BC. Although Canada officially maintained that only agriculturalists were being imported, in practice thousands of the immigrants who came from central and southern Europe (1880-1930) became either full-time or part-time unskilled industrial workers because industrialists and farmers were able to link their economic interests in demanding an "open door" IMMIGRATION POLICY.



Slavic immigrants working on the Ontario and Rainy River Railway, 1908. In spite of the vital economic role of workers from eastern Europe, many Canadians demanded restriction of immigrants along ethnic and racial lines (*courtesy Public Archives of Canada/C-38828*).

Canada has remained a self-proclaimed homeland for immigrants seeking work, but the type of work available has often depended on ethnic background. "Preferred immigrants" (ie, British immigrants, AMERICAN immigrants of English "stock," and skilled workers from Western Europe) encountered less PREJUDICE AND DISCRIMINATION than did eastern and southern European immigrants, who as "foreigners" met with a decidedly mixed reception, the attitude of their hosts varying with time and economic circumstances. Asians and BLACKS fared even worse and many of them were only employed for the most grinding labour.

From 1945 onwards, however, with the advent of postwar prosperity and an improved attitude towards human rights, the status of non-British immigrant workers substantially changed. At the same time, 3 new waves of immigrant workers entered Canada: European displaced persons, many of whom were highly educated and soon left the unskilled labour market for professional and skilled jobs; immigrants from "preferred countries" (Britain, Germany, Netherlands, etc), who generally gravitated into prestigious jobs upon arrival in this country; and immigrant workers from the low-wage countries of southern Europe and, increasingly, the West Indies (*see* WEST INDIANS). It is this latter group of predominantly unskilled immigrants who have largely filled the low-paying, hazardous and itinerant or seasonal jobs that native Canadians would not accept. However, most of these jobs are no longer on the frontier, and now it is to urban factories, construction sites or service industries—most notably in Toronto and Montréal—that the vast majority of unskilled immigrant workers tend to gravitate. DONALD H. AVERY

Reading: Donald H. Avery, *Dangerous Foreigners* (1979).

Immigration, the movement of nationals of one country into another for the purpose of resettlement, is central to Canadian history, from the NATIVE PEOPLES, whose ancestors migrated across the Bering Strait from Asia, to the most recent arrivals. The story of Canadian immigration is not one of orderly population growth; it has been and remains both a catalyst to Canadian economic development and a mirror of Canadian attitudes and values; it has often been unashamedly and economically self-serving and ethnically or racially biased.

Throughout the 17th and much of the 18th century European colonial administrations, charged with overseeing what would become Canada, did not consider settlement a priority. French or British governments initially seemed unprepared to expend vast quantities of money or energy necessary to encourage settlement. Nor was migration to the New World popular in France or Britain. Adventurers, explorers and particularly traders acting for British or French interests feared the interference of settlers in the lucrative trade with the native people. However, policy eventually changed and colonial authorities carefully and slowly encouraged settlement in Canada, hoping that settlers would guarantee the sovereignty of colonial land claims, would Christianize the native peoples and exploit the natural resources, often on behalf of European investors. Settlements grew gradually and not without difficulty. New France's population at the time of the British CONQUEST (1759-60) was about 64 000. In NS a transplanted Scottish community was supplemented by German and Swiss settlers, and in the late 1700s Irish settlers reinforced Newfoundland's population.

Although the British victory brought an end to immigration from France, it did not instigate a tide of English-speaking immigrants. Except for a handful of British administrators, military personnel and merchants who filled the vacuum left by their departing French counterparts, few English-speaking settlers seemed interested in Canada. Indeed, it is doubtful whether settlers would have been welcomed by the new British administrators, who feared that an influx of English-speaking, Protestant settlers would complicate administration in a recently conquered Roman Catholic, French-speaking territory. Most British immigrants were far more inclined to seek out the more temperate climate and familiar social institutions of the British colonies to the south.

Many of Québec's new British rulers, content to leave the colony to languish as a quiet backwater of the Empire, were soon forced to accept many thousands of English-speaking, largely Protestant settlers displaced by the American Revolution. Known as United Empire LOYALISTS, they were largely political REFUGEES. Many of them migrated northward not by choice but by default, either because they did not wish to become citizens of the new American republic or because they feared retribution for their public support of the British. For these Loyalists, who eventually formed the core of the colony's ruling oligarchies, Canada was a land of second choice, as it would be for countless future immigrants who came because to remain at home was undesirable and entry elsewhere, often the US, was restricted. The Loyalist migration was neither uncontrolled nor unassisted, however. Imperial authorities and military personnel offered supplies to the new settlers and organized the distribution of land. Despite the hardships the settlers endured, their plight was undeniably made less severe by the intervention of government agents, a practice to be repeated in Canada many times.

Throughout the mid-19th century, the colonies, Canada West in particular, returned to a pattern of painfully slow and erratic economic growth. Officially encouraged immigration from England, Scotland and even the US gradually filled the better agricultural lands in the colony and bolstered new commercial or administrative towns. The new immigrants were generally of ethnic stock and outlook similar to that of the established community. But the great

Irish potato famine and to a lesser degree a series of abortive European rebellions in 1848 sent new waves of immigrants to N America. Of these tens of thousands, many were Irish settlers, whose arrival in Canada initiated major social and economic changes. In many respects the IRISH were Canada's first enormous wave of foreign immigrants. Although they generally spoke English, they did not mirror the social, cultural or religious values of the majority. Roman Catholic intruders in a Protestant domain, their loyalty to the Crown appeared suspect in a Canada where ardent loyalty was demanded as insurance against the threat of American republicanism. Furthermore, after escaping a life in which farm tenancy and capricious nature made agriculture synonymous with poverty and dependency, some of the famine-stricken Irish had little or no enthusiasm for farm life. Canadian cities and larger towns quickly developed Irish sections or wards. The Anglo-Protestant majority measured the Irish contribution economically and the Irish deficiencies socially, religiously and racially. On the one hand many of the Irish created a labour force ready and able to fill the seasonal employment demands of a newly expanded canal system, lumber industry and burgeoning railway network; on the other hand, because of their low income, their Catholicism, the seasonal separation from their families and differences in their way of life, they were a conspicuous minority group. They filled working-class neighbourhoods and inflated majority fears of social evils previously dismissed as peculiar to the US. For some years the Irish supplied the base of a working-class labour force necessary for the slow advance of communication, commerce and industry, but they remained an adjunct to, rather than a central component of, mainstream N American economic and social life — the basis of which was commerce and agricultural activity. Policy tied population increase to land settlement. Gradual commercial and industrial development usually serviced the agricultural sector, and, because many Irish were not farmers, Irish labourers were seen as rootless.

If agricultural roots and commitment were measured, in part, by land tenure, Canada underwent a shock when arable land began to disappear from the market. Without a large industrial base, with a relatively low death rate, a high birthrate and a small but continual inflow of immigration largely from the British Isles, the immediate post-Confederation era had its overpopulation problems. The US, with its seemingly boundless supply of free fertile land, attracted thousands of new immigrants and Anglo-Canadians, while French Canadians were drawn to jobs in the factories of New England. Canadian history has been compared to a journey through the Bible, beginning in Lamentations and ending in Exodus, but in the late 19th century Canada's future Prairie provinces were opened to settlement, although it was not until a market developed for the prairie agricultural output that serious settlement began. The demand for farm goods, especially hard wheat, coincided with the election of Wilfrid Laurier's government, which immediately encouraged the settlement of the West with large-scale immigration. Canada's new and aggressive minister of the interior, Clifford SIFTON, organized a revamped and far-reaching program and was prepared, if reluctantly, to admit agricultural settlers from places other than the British Isles, N Europe and the US, explaining, "A stalwart peasant in a sheepskin coat, born on the soil, whose forefathers have been farmers for ten generations, and a stout wife and a half-dozen children is good quality." The Sifton comment, however, no matter how often repeated, is not an accurate reflection of government policy. From 1896 to the 1930s, Canadians, their politicians and immigration officials were not receptive to peasants in sheepskin coats. Immigration policy did not involve just an aggressive peopling of the Prairies. It was enacted within the framework of the British Empire, in which Sifton, the Canadian government and most English-speaking Canadians believed. The traditional definition of ideal immigrants may have been modified but was not radically altered. Unabashedly colonial, the government defined immigrants who did not originate from the British Isles as foreign; and, unabashedly N American, excluded white, English-speaking immigrants from the US from this category. The ideal immigrants were still British or American independent farmers who would settle in the West. Sifton and the government may only have reflected their times, but Canadian immigration policy and public opinion were nevertheless racist.



Barnardo Boys embarking at Liverpool, 1905. Dr Barnardo is bidding farewell to the young men who are being sent to learn farming in Manitoba. In the 1890s several thousand children per year were shipped to Canada to be boarded until the age of 11 or 12 (*courtesy Barnardo Photo Library*).

Pressed to increase immigration by business and railroad interests with visions of an insatiable world demand for Canadian resources, Sifton and his immigration authorities balanced their ethnic anxieties against a frantic search for settlers. They listed ideal settlers in a descending preference. British and American agriculturalists were followed by French, Belgians, Dutch, Scandinavians, Swiss, Finns, Russians, Austro-Hungarians, Germans, Ukrainians and Poles. Close to the bottom of the list came those who were, in both the public and the government's minds, less assimilable and less desirable, eg, Italians, South Slavs, Greeks and Syrians. At the very bottom came Jews, Asians, gypsies and blacks.

In spite of government precautions, not all immigrants committed themselves to resource exploitation or agriculture. Like the Irish before them, many of the "foreign" immigrants, non-English speaking and largely non-Protestant, rejected a life of rural isolation, choosing to work in cities. Furthermore, many of these foreigners saw themselves as living in Canada or N America only temporarily, earning enough money to buy a piece of land at home, to assemble a dowry for a sister or to pay off a family debt. But the many who adopted N American definitions of success or who were unable to return home because of political upheavals established themselves in Canada, bringing wives and children to join them. If these Jews, Italians, Macedonians, Russians, Finns, Chinese, etc, had been content to play the role reluctantly left for them, if they had accepted rural isolation as the price of their admission into Canada, hostility toward them might have been minimal, but by making their way into Montréal, Winnipeg, Toronto, Hamilton and Vancouver and other centres they awakened the old ethnic and religious anxieties and prejudices previously reserved for the Irish. They had been allowed into Canada to satisfy the need for a cheap labour force or a pool of skilled craftsmen adaptable to factory and construction. They were prepared to accept seasonal labour in mining or lumbering (which forced them to drift back into cities during the off-season), but for many Canadians the sudden influx of strange peoples so recently subject to foreign czars, kaisers and gods seemed to threaten the very fabric of Protestant Canadian society. Some Canadians responded with a dignified tolerance. They recognized that these foreigners were here to stay, that their labour and skills were necessary, their living conditions subject to improvement and, perhaps most important, that their children would become integrated, given education and time. But in spite of the vital economic role these immigrants played in urban centres — laying streetcar tracks, labouring in the expanding textile factories and digging the sewer sytems — many Canadians demanded strict enforcement of immigration regulations and restriction of admission along ethnic or racial lines.

During WWI, anti-German hysteria erupted in Canada, directed largely against immigrants born in the now enemy countries or those who entered Canada as subjects of enemy monarchs, but also against foreigners who had been born in now allied countries or had come to Canada as subjects of allied monarchs. Despite Canadian military manpower needs, British and Canadian authorities alike felt that, where possible, foreigners belonged in foreign armies. Groups such as Italians, Serbians, Poles and some Jews were encouraged to return to the armies of their mother country or were recruited into specific British army units reserved for allied foreigners of various origins. Without national armies of their own to join, many Jews, Macedonians and Ukrainians volunteered for the Canadian Army.

Once in Canada many thousands of immigrants did find a place for themselves and their families, but Canadian immigration policy and administration, which bowed to economic necessity by allowing these southern and eastern



Galician immigrants entering Québec City, *c*1900-10 (*courtesy Public Archives of Canada/C-5611/John Woodruff*).

Europeans into Canada, could not bend enough to admit other would-be immigrants. Head taxes, landing taxes, bilateral restriction agreements and travel restrictions virtually prohibited the immigration of Asians. Canadian authorities refused to allow the settlement of female Asian immigrants, fearing this would encourage Asian men temporarily in Canada as railway or mine labourers to settle permanently and, perhaps more importantly, become the parents of yet another generation of the "yellow peril." In 1914 almost 400 East Indians aboard the immigrant ship KOMAGATA MARU languished in Vancouver harbour while Canadian authorities debated what to do with them. Canada's new navy, in action for the first time, escorted the ship from Canadian waters while many Vancouver residents cheered approvingly from shore. In 1910 and 1911 rumours spread that a group of blacks was preparing to migrate to central Alberta. Descendants of freed slaves, they were being pushed from their land in Oklahoma territory, where they had been granted holdings and hoped to build new lives. Public and political response in Alberta was immediate and predictable. Federal authorities initiated an ingeniously simple scheme. Nothing in the Immigration Act specifically barred black Americans but any immigrant could effectively be denied access to Canada for health reasons under the Act's medical provisions. The government merely instructed immigration inspectors and their medical aides along the American border to reject all blacks as unfit for admission on medical grounds. There was no appeal. Blacks were warned they should not waste their time and money by considering immigration to Canada.

As a result of the dramatic and devastating economic collapse caused by the GREAT DEPRESSION, the need for the government's selective encouragement of immigration faded. Immigration authorities worked not to stimulate admissions but to prevent them. By 1933 Hitler ruled Germany, and millions of political opponents and Jews might have survived if Canada or other countries had offered innocent victims a home. Although many Canadians responded to the refugees with a mixture of sympathy for their desperate plight and embarrassment at the lack of government aid, others, including the federal Cabinet, many in the diplomatic corps and, of course, immigration policymakers, reacted with alarm to any pressure to accept Jews or political refugees escaping Germany. As a result, few refugees were able to break Canadian immigration restrictions.

In the postwar years, perhaps in response to new winds of antidiscrimination blowing across the Western World, perhaps in response to pressure from an earlier generation of well-integrated immigrants to Canada and their increasingly middle-class children, the government gradually removed many of the racial or ethnic barriers in immigration policy. Furthermore, if immigration was still primarily an economic policy, it now reflected the new urban industrial reality; an economic boom had generated a demand for labour. To satisfy it, tens of thousands of displaced persons and eastern or southern Europeans who would previously have been labelled undesirable were admitted. Canada also responded to the plight of refugees by admitting many Hungarian, Czechoslovakian, Ugandan, Chilean and Southeast Asian refugees (although Canada was generally able to attract the younger, healthier and better-educated candidates).

By the early 1970s, because of improved transportation, growing recognition of Canada as a land of opportunity, increased difficulty in immigrating into the US and a seeming liberalization of both Canada's attitudes and its immigration policy, Canada became a major magnet for immigrants, including many from the Third World. In the late 1970s more non-Europeans entered Canada than did Europeans. If Canadian policy was less discriminatory, it was no less tied to economic need. The economic slowdown of the late 1970s was quickly reflected in a decrease in immigration, except for those sponsored by persons already settled in Canada and therefore guaranteed economic support. *See also* IMMIGRATION POLICY.

HAROLD TROPER

Reading: H. Cowen, *British Emigration to British North America* (1961); E.C. Guillet, *The Great Migration* (1963); F. Hawkins, *Canada and Immigration* (1972); R. Hurney and Harold Troper, *Immigrants: A Portrait of the Urban Experience* (1975); Harold Troper, *Only Farmers Need Apply* (1972).

Immigration Policy Canada's IMMIGRATION policy is the most explicit part of what might be described as a POPULATION policy. In a liberal democratic state such as Canada only the prevailing rates of immigration and not those of mortality, fertility and EMIGRATION can be effectively regulated. By regulating the means of selection and controlling the number of entrants, the government seeks to fulfil a variety of national objectives.

According to the 1870-71 census, Canada's total population was 3.6 million. In addition to native peoples (about 136 000 in 1851) the 2 largest groups were the French (1 million) and the British (2.1 million). Excepting the Germans (203 000), other groups (Dutch, American blacks, Swiss, Italians, Spanish, Portuguese) were much smaller. During the next 100 years, about 9.3 million people emigrated to Canada and, although many went on to the US or eventually returned to their native lands, by 1971 Canada's population had reached 21.5 million. During the 19th century, the movement of individuals and groups to Canada was largely unrestricted, although in 1885, under pressure from BC, an Act was passed restricting Chinese immigration through the imposition of a head tax, the first of a series of such measures directed at the Chinese and continuing until the late 1940s. Otherwise immigration policy was concerned mainly with quarantine stations, the responsibilities of transportation companies and the exclusion of criminals, paupers, the diseased and the destitute. But after the massive immigration between 1903 and 1913, WWI and subsequent political upheavals and economic problems, a much more restrictive "white Canada" immigration policy was implemented and remained unchanged until 1962, when Canada's present universal and nondiscriminatory policy was introduced.

Three different departments or agencies have been responsible for immigration policy in Canada since WWII — the Department of Citizenship and Immigration (1950-65), the Department of Manpower and Immigration (1966-77) and the Canada Employment and Immigration Commission (est 1977). Ontario since WWII, and Québec since the mid-1960s, have been particularly concerned with immigration. More than half the total number of immigrants in recent years have settled in Ontario. Québec created its own Department for Immigration (now called the Department of Cultural Communities and Immigration) in 1968. Its major concerns have been, first, to recruit as many French-speaking immigrants as possible (or immigrants with a good knowledge of French), and secondly, to ensure that immigrants who settle in Québec form part of the francophone community. Québec was the first province to have a special immigration agreement with the federal government (there are now agreements with several other provinces). The federal government is also involved in the difficult task of increasing the numbers of French-speaking immigrants to Canada.

During the 1970s, immigration and population policies were officially reviewed, and a Green Paper on Immigration Policy and a Report to Parliament (1975) by a Special Joint Committee of the Senate and the House of Commons were prepared. Almost all the committee's recommendations were accepted by the Liberal government and absorbed into a new Immigration Act (1976, proclaimed in 1978) which established for the first time the fundamental objectives of Canadian immigration policy. They include the promotion of Canada's demographic, economic, social and cultural goals; family reunion; nondiscrimination; the fulfilment of Canada's international obligations in relation to REFUGEES; and co-operation between all levels of government, as well as the voluntary sector, in promoting the adaptation of immigrants to Canadian society. The Act also establishes a new and flexible process for the development of immigration policy, involving close collaboration between the federal government and the provinces, and requires the minister to announce annually in Parliament future immigration levels. Among its many provisions

relating to security, the determination of refugee status, immigration regulations and other matters, the Act completely revises and modernizes control and enforcement procedures. The basic statute established the Immigration Appeal Board, created in 1967 as a fully independent body whose decisions cannot be overruled by government except in relation to security.

Since Confederation, under s95 of the CONSTITUTION ACT, 1867 (formerly BNA Act), immigration has been a joint responsibility of the federal government and the provinces, and since the Immigration Act the provinces' role in immigration policymaking and planning has increased. In 1982, a 3-year immigration-planning cycle was introduced, and the immigration levels for the next 3 years announced: 1982, 130 000-135 000; 1983, 134 000-144 000; 1984, 130 000-145 000. Immigration and refugee policies are planned and must be considered together. In keeping with Canada's international responsibilities as a signatory to the UN Convention relating to the status of refugees, refugees comprise about 10% of the annual flow of immigrants, although during major international emergencies, eg, the Indo-Chinese exodus of 1979-80, the figure rose to 25%. The relationship of economic policy to immigration is usually directly concerned with LABOUR MARKET requirements. From decade to decade, or even from year to year, the need for professional, skilled or unskilled persons fluctuates significantly. The pool of available labour in any country also alters over time because of the birthrate and the acceptance, for example, of women in the work force. For most of Canada's history, the government's tools for matching the requirements of the labour market with the flow of immigrants have not been particularly refined or effective.

The immigration regulations provide for the admission of 3 categories of immigrants: family class (close and more distant relatives), independent immigrants (admitted on the basis of skill and labour-market requirements) and refugees. When processing applicants, immigration officers are instructed to give priority to persons seeking family reunification and to refugees. Independent applicants without family but possessing desired skills are considered next. Many new arrivals, however, in the family or refugee categories have tended to be unskilled or else to possess talents inappropriate to the region or community where they have settled. The priority given to persons in the family class can therefore disrupt the labour market; the resulting economic insecurity can create disappointment and hostility among the immigrants or among Canadians who feel threatened by the newcomers.

Immigration policy also encourages the dispersal of immigrants across the country. In the decades following the resurgence of immigration after WWII, Montréal, Vancouver and especially Toronto received up to 66% of all immigrants entering Canada. Current policy has attempted to encourage immigrants to settle in smaller communities in the less-populated provinces.

Administrative arrangements and practices adopted by Employment and Immigration Canada and the Immigration Bureau of the Department of External Affairs significantly affect how policy is implemented and whether it achieves its purpose. Since 1967 the selection of applicants for admission has occurred without discrimination on the grounds of ethnicity or geographic region, but because immigration officers are not situated in many states of the Third World, persons in these countries are in effect excluded from Canada even if they are members of an admissible category, unless they are able and prepared to travel to a distant immigration office in another country. The number of applicants being processed at an overseas immigration post can also be easily regulated merely by the size of the staff assigned to this task. The discretionary powers of immigration officials in Canada and abroad necessarily influence the daily administration of immigration. Criticisms of these discretionary powers can become especially intense because there are no grounds for appeal against negative decisions of processing officials. Because these and other features of Canada's immigration practices can affect this country's relations with other governments (particularly if these governments perceive Canadian procedures or policies as inequitable), immigration policy is part of Canadian foreign policy, a fact acknowledged by the Canadian government in 1981, when much of the responsibility for the administration of immigration programs was transferred from Employment and Immigration Canada to the Immigration Bureau in the Department of External Affairs.

Among the lengthy list of organizations within Canadian society that expect a role in the formulation of immigration policy and regulations are church groups, employers, and ethnic organizations striving for family reunification and financial assistance for immigrant-adjustment programs. The government has had to acknowledge as well the existence of a not altogether latent sentiment among a portion of Canadian society favouring a reduction or even a halt in the selection of immigrants. The entry into Canada of a sizable number of nonwhite immigrants (about 33% of Canada's immigrants are from Europe, 33% from the Americas including the Caribbean, and 33% from Asia, Africa and elsewhere) has created what has been called a visible minority, one that has occasionally been the target of abuse and violence. While the government and interested voluntary associations have attempted to strengthen among the Canadian public a sense of tolerance and compassion for newcomers, the task is not easy. Immigration is an extremely emotional subject, especially when the fate of family members or economic security is involved.

Canada's immigration policy is nondiscriminatory regarding ethnicity; however, individuals suffering diseases likely to endanger public health, or those without any apparent means of financial support, or those known to be criminals or terrorists can be excluded. An undetermined number of persons in these undesired categories gain entry every year to Canada by practices and tactics contravening the spirit and letter of prevailing immigration legislation. Still others who may have been properly admitted to Canada, such as students and visitors on short-term visas, choose to remain beyond the time permitted by the Canadian authorities. The problem of illegal aliens, while not a new one,

Canadian Immigration: Policy and Change (1861-1976)
(Source: J.L. Elliott, ed, *Two Nations, Many Cultures* 1979)

Historical period	*Decade*	*Population at start of decade (000s)*	*Immigration as a percentage of average decade population*	*Migration (000s)*			*Immigration policy*	*Primary destination and type of immigrant*
				Immigration	*Estimated emigration*	*Net migration*		
Confederation to 1895	1861-1871	3 090	7.5	183	375	- 192	free entry (exception	eastern Canada settled by
	1871-1881	3 689	8.8	363	440	- 077	first BC "head tax"	immigrants from British
	1881-1891	4 325	19.7	903	1 109	- 206	on Chinese, 1885)	Isles, NW Europe and the US
The Sifton era to WWI	1891-1901	4 833	6.4	250	380	- 130	selective immigration,	Prairies settled by
1896-1914	1901-1911	5 371	28.0	1 550	740	810	objective: land settlement	farmers, many from central Europe
War and economic depression	1911-1921	7 207	20.2	1 400	1 090	310	restrictive measures	Urban settlement as well as rural.
(1914-1945)	1921-1931	8 788	12.6	1 203	974	229	Chinese Immigration	War refugees,
	1931-1941	10 377	1.4	150	242	- 092	Act, 1923	Jewish and displaced persons
							visas first issued, "sponsorship" begins	
Postwar era (1946-1961)	1941-1951	11 507	4.4	548	379	169	liberalization, 1952	Urban areas in central Canada,
	1951-1961	14 009[1]	9.6	1 543	462	1 081	Immigration Act, objective population increase to "absorptive capacity"	southern European immigration begins, many in manufacturing occupations
The current phase	1961-1971	18 238	7.2	1 429	705	724	"points system," 1967,	Urban settlement
	1971-1976	21 568	–	984	–	–	objective: universalistic criteria	continues. Third World immigration begins, many professional and technical workers

[1] Includes Newfoundland

has in recent years become more awkward for the Canadian government to resolve, especially as the total number of persons entering Canada at border crossings and airports has grown constantly. Once in Canada, illegal aliens may easily escape notice unless they try to acquire some public service which would bring them to the attention of government or the notice of officials.

The number of illegal aliens in Canada is obviously impossible to determine accurately. Estimates by police and immigration personnel range between as few as 50 000 to as many as 150 000. Where possible, without infringing upon traditional civil liberties, the government is endeavouring to close any remaining loopholes that have in the past facilitated the admission of persons not authorized under prevailing immigration legislation and regulations.

The practice of admitting to Canada highly skilled persons from less-developed countries continues to provoke some controversy. The governments of the less-developed countries, from which a growing number of immigrants to Canada originate, regard with apprehension the exodus of people they can ill afford to lose. While the view has been expressed within and beyond Canada that Canada should not encourage the outflow of trained humanity from "have not" regions, Canada, like other liberal democracies, stoutly defends the concept of freedom of movement for all persons. GERALD E. DIRKS

Immunology, branch of MEDICINE that studies the body's ability to defend itself from foreign substances, especially DISEASE-causing organisms, and seeks means of controlling that ability. Immunology had its origin perhaps 900 years ago, when the Chinese discovered how to vaccinate against smallpox. Although vaccination has an ancient history, it was only in the early 1960s that modern immunology began to unravel the mechanisms by which the body defends itself from the incredible variety of potentially lethal micro-organisms surrounding it. The subject has expanded into many fields of modern medicine and microbiology; eg, immune-system research has provided insights into the ways in which cells differentiate and function.

Students with a background in BIOCHEMISTRY, GENETICS, medicine or microbiology may receive advanced training in immunology at a number of centres across Canada, including the universities of British Columbia, Alberta, Manitoba, McMaster, Toronto, McGill and Laval. Research is carried on at the major teaching centres, and is funded primarily by the MEDICAL RESEARCH COUNCIL OF CANADA. Some funding also comes from the provinces, eg, the Alberta Heritage Savings Trust Fund for Medical Research provides substantial grants for work pursued in Alberta. In addition, research is ongoing and training is offered at the INSTITUT ARMAND-FRAPPIER. Although immunology research is very new in Canada, the field is showing increasing vigour. For example, the 1986 International Congress of Immunology will be held in Toronto. Canadian immunologists may belong to the Canadian Society of Immunology and to many international associations. Canadian research findings are published in various national and international journals.

Imperial Munitions Board, est Nov 1915 in Canada by the British Ministry of Munitions, with Canadian government approval. Headed by J.W. FLAVELLE, a prominent Toronto businessman, the board was responsible for letting contracts on behalf of the British government for the construction of war materials in Canada. It began to establish "national factories," which it owned outright, to produce munitions that private manufacturers were unable to turn out. Under IMB direction Canada produced a wide variety of war materiel including shells, ships, explosives and training planes. The IMB was dissolved in 1919. D.J. BERCUSON

Imperial Oil Limited, with head offices in Toronto, is an energy company incorporated in 1880 as the Imperial Oil Company. An American company, Standard Oil, bought a majority interest in 1898, and the present name was adopted in 1959. In 1978 Imperial Oil formed Esso Resources Canada Ltd to handle its resource operations. Active in all phases of the PETROLEUM INDUSTRY, Imperial Oil is the largest marketer and refiner of petroleum products and the largest producer of crude oil in Canada. It also manufactures and sells chemicals, fertilizers and building materials, and has mining exploration and development interests. Through Syncrude Canada Ltd, in which it holds a 25% interest, Imperial Oil is also participating in a plant producing synthetic crude oil from the Athabasca oil sands. In 1982 it had sales or operating revenue of $8.6 billion (ranking 3rd in Canada), assets of $7.5 billion (ranking 10th) and 15 476 employees. The company is 74% foreign owned, with Exxon Corp of New York holding 70% of the shares. DEBORAH C. SAWYER

Imperial Order of the Daughters of the Empire was founded in 1900 by Margaret Polson Murray of Montréal who envisioned an organization of women devoted to encouraging imperialism. Beginning with an educational mandate promoting Britain and British institutions through the schools, it became actively involved in both world wars in supporting Canada's efforts on behalf of Britain and the allies. Other areas of interest included immigration, child welfare, community health and social services. In recent years the IODE has concentrated more on community affairs, supporting Canadian educational, cultural and social developments. Although its membership has declined, it remains an active women's organization, with 14 500 members in 580 branches in 1984.
NANCY M. SHEEHAN

Imperial Preference (now usually "Commonwealth preference" or just "preferences"), an arrangement by which member-countries of the British Empire or COMMONWEALTH charge lower duties on goods from other Commonwealth countries (including the UK) than from "foreign" countries. Preferences may be given unilaterally, as by Britain to Canadian wheat and timber before 1846 or by Canada to a wide range of UK goods in 1897 and since, or by Britain to Empire goods in 1919; they may be the product of bilateral bargaining, as in the OTTAWA AGREEMENTS. By entering into the General Agreement on Tariffs and Trade in 1947, Canada and other Commonwealth countries agreed not to create any new preferences unless they were to go so far as to abolish all duties among themselves. In the late 1950s Britain suggested such an arrangement to Canada, but Canada declined. Upon entering the European Economic Community in 1973 Britain had to give up preferential concessions to the Commonwealth, but many Commonwealth members, including Canada, continued the preferential plan. IAN DRUMMOND

Imperial War Cabinet and Conferences, *see* COLONIAL AND IMPERIAL CONFERENCES.

Imperialism In the late 19th century various nations entered a phase of territorial expansion often called the second great era of imperialism. Britain, France, Germany, the US and others sought colonies for commercial, military and religious motives. This imperialism coincided with growing concern in Canada about its relationship to the British Empire. Britain was still responsible for EXTERNAL RELATIONS and funded defence for Canada and other Dominions. Such colonial vestiges were increasingly unacceptable, yet there were strong loyalties to Britain and a fear that total independence would lead to absorption by the US.

Thus Canadian imperialism was born. When British imperialists founded the Imperial Federation League in 1884, Canadian supporters established branches. They sought a way for Canada to develop beyond colonial status without separating from the empire. Led by G.M. GRANT, G.R. Parkin, G.T. DENISON and others, the movement mixed Christian idealism and anti-Americanism with an effort to have people accept the principle that the Dominions should participate in foreign policy at the imperial level.

Imperialist rhetoric late in the 19th century began to emphasize the potential of united strength. The appointment of ardent imperialist Joseph Chamberlain as colonial secretary in 1895 created a new impulse for action on specific problems. During the SOUTH AFRICAN WAR, aid to Britain was enthusiastically supported by Canadian imperialists but resisted by many elements in the population. PM Wilfrid LAURIER allowed a volunteer force, but the war served notice that imperialism had become controversial. Participation in the power of empire now also implied participation in imperial wars. From 1900 to 1914 a lively and often acrimonious debate was carried on between those who saw the imperial burden as Canada's burden and those who preferred autonomy.

WW1 brought imperialism to its most advanced stage and also led to its collapse in Canada. The Dominions insisted upon joint planning and policy formation, and meetings in 1917 implied postwar consultation on matters of shared interest among the self-governing parts of the empire. However, the toll of Canadian casualties in Europe was creating a reaction which led to a postwar spirit of N American isolationism. Throughout the 1920s the Mackenzie KING government worked to establish a separate Canadian presence in foreign affairs. The empire thereafter devolved into the much more loosely connected COMMONWEALTH. D.R. OWRAM

Impressment, authority of the state to "press" men into compulsory military service. It was employed occasionally in N America, eg, by Massachusetts, in forming the 1745 LOUISBOURG expedition. When Royal Navy ships lost too many men from disease and desertion, they applied for warrants to press men in American ports. Notorious in Britain, press gangs created exceptionally bad feelings in New England, where riots, the worst of them in Boston in 1747, occurred. Similar occasions later in Halifax and Québec were rare because pickings were slim. W.A.B. DOUGLAS

Improvement District, a municipal corporation whose powers are exercised by a trustee or board of trustees appointed by the provincial government. Unlike most municipalities, which are subject to the supervision of both the province and local electors, trustees are under provincial supervision only. Normally, improvement districts are established either in a sparsely settled but vast territory which requires MUNICIPAL GOVERNMENT and services because of new development or the residents' desire for local government or in new towns, which are more compact geographic entities designated for major development, usually a new resource industry. Once the new community is established, with basic services and a sizable population, it is often replaced by a conventional municipal corporation with a local council. FORT MCMURRAY, Alta, was designated as a new town because of local petroleum-resource development and now has an elected municipal government.
KATHERINE A. GRAHAM

Inco Ltd, with head offices in Toronto, is the world's leading producer of NICKEL. It also produces copper, precious metals and cobalt. When it was incorporated in 1916 as the International

Nickel Company of Canada Ltd, its capital stock was held by International Nickel Company of New Jersey. In 1928 a stock exchange for stock of the former parent company altered International Nickel's ownership. The company's present name was adopted in 1976.

Inco was at one time a diversified company with overseas operations. In 1981 it began to withdraw and consolidate, first pulling out of its battery and related products subsidiary, Inco Electro-Energy Corporation. It also sold Ray-O-Vac Corporation (a dry-cell battery operation) and Exide Corporation. This left it with 2 principal business activities: primary metals and alloy products. Inco currently mines ores in Ontario and Manitoba and smelts ores at various locations throughout Canada. It has a nickel refinery in Britain and through P.T. International Nickel Indonesia is constructing lateritic mining and processing facilities in Indonesia in partnership with 6 Japanese companies. In 1982 it had annual sales or operating revenue of $1.5 billion, converted from US dollars (ranking 57th in Canada), assets of $4.2 billion (ranking 19th) and 25 798 employees. Its shares are widely held; foreign ownership stands at 31%.

DEBORAH C. SAWYER

Income Distribution refers to the share of total income in society that goes to each fifth of the population, or, more generally, to how income is distributed among Canadian households. Annual income is usually chosen as the indicator of a household's ability to meet its needs, primarily because the necessary statistical data are easily accessible. Economic well-being, however, also depends on other important factors.

Determining Factors of Income Distribution In a capitalist economy such as Canada's, people derive their income from salaries if they are employed, from INTEREST if they have financial capital, from profits if they are entrepreneurs and from rent if they own property. The remuneration of production factors determines what is known as the distribution of "primary" income; wages and salaries alone account for roughly 85% of this income (*see also* CAPITAL AND WEALTH).

The interaction between supply and demand in each market determines the income of each individual and ultimately the distribution of primary income. For example, a hockey player's salary depends upon the supply and demand in the market for hockey players' services. Because a number of variables influence the supply of and demand for factors of production, the income generated is not the same for everyone, with the result that everyone does not receive the same share of primary income. The following variables influence this distribution: skills, education, professional training and experience, working hours, compensatory salary differences, institutional restrictions, discrimination, differences in property wealth (including inherited wealth), opportunity, and age and health. Primary-income distribution is also modified by government intervention. The government influences income distribution in various ways, eg, through TAXATION, TRANSFER PAYMENTS and the provision of social goods and services.

Income Distribution in Canada Statistics Canada annually conducts a survey of approximately 35 000 households, including families and single persons. According to Statistics Canada's classification, an "economic family unit" is a group of persons who share the same accommodation and who are related by blood, marriage or adoption. An "unattached individual" is a person living alone or with others who are not related. Family income includes salaries, wages, net income from self-employment, investment income (interest, dividends), retirement pensions, miscellaneous income such as scholarships and food allowances, as well as government transfer payments (welfare, old-age security, family allowance, unemployment insurance, etc). This concept of total income, therefore, corresponds to primary income before taxes and after transfer payments.

Once information about income has been gathered, families are classified by increasing levels of income, from the poorest to the richest. They are divided into 5 groups, known as "quintiles," each representing 20% of all families. The first (or lowest) quintile comprises the poorest families and the last (or highest) quintile includes the richest. The income of the families of each quintile is then calculated in proportion to the income of all families. The percentage of income going to each group in society can thus be measured. In 1982 families of the lowest quintile accounted for 6.3% of the total income, while those of the highest quintile earned 38.9%. Families of the first quintile had an annual income of less than $15 339 and those of the fifth quintile an income greater than $46 388 (*see* ELITES).

Other Statistics Canada figures reveal that families of the lowest quintile depend on government transfer payments for more than 50% of their income. This group is composed mainly of welfare recipients and the elderly (who receive the old-age security pension and guaranteed income supplements), as well as single-parent families. However, wages and salaries account for more than 90% of the income of families in the highest quintile, where there are often 2 breadwinners.

Income distribution, as measured by Statistics Canada, has been very stable over the past 30 years; ie, the share of income going to each quintile has varied only slightly. Such stability in income distribution is surprising because, during the same period, Canada experienced considerable economic growth and the average family income, corrected for INFLATION, nearly tripled. Moreover the WELFARE STATE, which came into existence during this time, brought a considerable increase in government transfer payments. Two factors are generally used to explain this stability. First, the differences in primary income have become more pronounced because of changes in life-style. Young adults and the elderly tend to live as independent households more often than they did a few decades ago, and the rise in the divorce rate has resulted in more single-parent families. Because these households generally have low incomes, the inequality of primary income has increased. Second, government transfer payments, a portion of which are earmarked for poorer people, narrow the disparities among total income.

Government intervention is not limited to transfer payments. The government also taxes income and provides social goods and services. The net redistributive impact of taxation and government expenditures is difficult to determine, but a number of hypotheses concerning those who carry the burden of taxation and those who benefit from government expenditures have been developed. Some observers claim that, using 1969 data, there is a slight shift in income distribution from the richest families to the poorest. The richest families, representing roughly 25% of family units, provided a net contribution of 6.2% of total income. The effect of government redistribution is certainly less than might be believed at first glance, however, because only some government programs are designed specifically for the poorest people; most consist of transfers within the middle class itself.

A number of adjustments are required to define the "real" distribution of income in Canada. First, Statistics Canada's concept of income underestimates income derived from transfer payments, particularly from unemployment insurance and welfare. Some income, such as income in kind (eg, accommodation in low-rental housing), capital gains and transfers between persons, is not included. Household production as well as income obtained from the UNDERGROUND ECONOMY are also omitted. In addition, since income varies with age, consideration should be given to income obtained throughout a person's life. Lastly, the size of the family should also be taken into consideration. These adjustments are difficult to make, and, as a result, the "real" distribution of income in Canada remains unknown.

Income Distribution of Families by Quintiles (%)
(Source: Statistics Canada)

Quintile	*1951*	*1961*	*1971*	*1982*
Lowest	6.1	6.6	5.6	6.3
Second	12.9	13.5	12.6	12.6
Middle	17.4	18.3	18.0	18.0
Fourth	22.4	23.4	23.7	24.1
Highest	41.1	38.4	40.0	38.9
Total	100.0	100.0	100.0	100.0

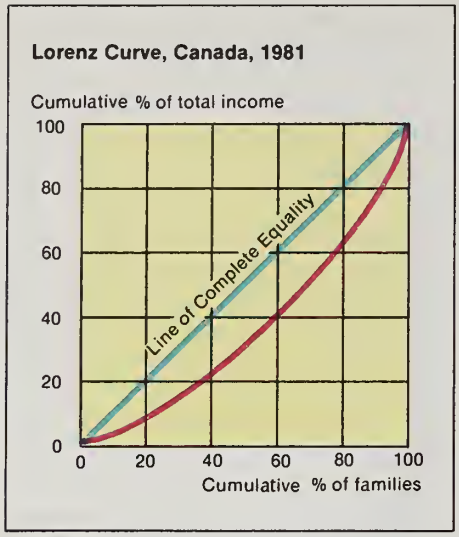
Poverty POVERTY, a complex social phenomenon, is not caused only by inadequate income, although this is certainly a major factor. The poor in Canada are defined as those whose standard of living is below a certain level (usually called the "poverty line") and those who have serious difficulties participating actively in the life of society. Defined in this way, poverty is a relative phenomenon that can be measured by income levels.

Statistics Canada establishes the poverty thresholds (more precisely known as "low-income thresholds") most commonly used in Canada. The thresholds are derived from a family expenditures survey conducted in 1978, which revealed that the average Canadian family spent 38.5% of its income on the basic needs of food, clothing and lodging. Statistics Canada then adds 20% to this share and considers that a family that must spend more than 58% of its income on basic needs is in financial difficulties. It then defines low-income thresholds and indexes them annually to reflect increases in the CONSUMER PRICE INDEX. For example, the low income thresholds of Canadian families living in large urban areas in 1983 were $9429 for single persons and $19 176 for families of 4 persons.

In 1982, 13.2% of Canadian families and 37.4% of unattached individuals (representing 16.1% of the population, or 3.9 million persons) were numbered as poor. Poverty is more common in the Atlantic provinces and Québec (*see* REGIONAL ECONOMICS), among young people and the elderly and in families (usually single-parent families) in which a woman is the head of the household.

Percentage of Low-Income Families and Unattached Individuals, 1982 (%)
(Source: Statistics Canada)

	Families	*Unattached Individuals*
Canadian average	13.2	37.4
By region		
Atlantic provinces	17.5	44.8
Québec	15.6	47.5
Ontario	11.4	32.6
Prairie provinces	12.0	32.7
British Columbia	12.7	34.4
By age of head of household		
24 years or less	28.4	42.8
25-34 years	15.5	18.0
35-44 years	12.3	23.8
45-54 years	10.2	31.9
55-64 years	11.6	40.2
65 years and over	11.0	56.2
By sex of head of household		
Male	9.7	31.3
Female	41.9	42.4



In deciding whether Canada's income distribution in 1982 was slightly or very unequal, it is necessary to apply an ethical standard. If the standard adopted is that of "equal sharing" of income, which would result in equal distribution, it is possible to measure and visualize the inequality using a Lorenz curve.

The vertical axis reveals the cumulative portion of the total income, and the horizontal axis reveals the cumulative portion of the population. If each family earns an identical income, 20% of families will enjoy 20% of the income, 40% of the families 40% of the income and so on. Income distribution will therefore be represented by the straight line of perfect equality. The curve located under the straight line represents income distribution in Canada in 1982. The farther the curve is from the straight line, the more unequal the distribution.

Canadian society is ambivalent in its support of the standard of "equal sharing," although numerous government income-security programs do attempt to compensate somewhat for the disparity in results. Moreover, the principle of "equal opportunity" probably corresponds, at least partly, to the moral philosophy of Canadian society. A number of government policies focusing on education for young people, for example, are based on this principle (*see* EDUCATIONAL OPPORTUNITY). But even if absolutely equal opportunity were achieved for children, certain income disparities would persist in their adult life because of wealth and other advantages, and because of different attitudes towards education, work and savings.

Guaranteed Annual Income Since the early 1960s, a universal solution to poverty and income disparities has been proposed regularly in N America: guaranteed annual (or minimum) income (known as "negative income tax" when incorporated into the tax system). It has 2 components. First, a guaranteed annual income level is determined, below which no family's income is allowed to fall. This income level is based on the needs of each family (by size) and could be the same as the poverty threshold. Such an income is theoretically now provided through welfare payments. Second, welfare payments are now taxed at $1 for each $1 earned, in addition to the welfare payments, but a guaranteed annual income would be reduced to a lower tax rate (eg, 50¢ for each $1 of earnings).

Many people share the view that income disparities could be narrowed considerably if the government had the political will to tax the rich more heavily and redistribute wealth to the poor (*see* TAXATION, ROYAL COMMISSION ON). However, any significant redistribution would imply a major rise in taxation for families with an income over $40 000, and it is highly unlikely that these families, considered middle class, would accept such a tax hike. PIERRE FRÉCHETTE

Reading: David P. Ross, *The Canadian Book on Income Distribution* (1980).

Inconnu, *see* WHITEFISH.

Indian, the term used by Europeans to identify aboriginal people of S, Central, and N America, is believed to have originated with Christopher Columbus, who thought he had reached Asia when, in fact, he had arrived in the Caribbean. The term persisted and has been used indiscriminately to refer to all aboriginal peoples on these continents except the INUIT of the Canadian Arctic and the Greenland and Alaska Eskimo. Under a 1939 court decision, the Inuit are classified as Indians for the purposes of the Constitution Act, 1867, although not for the INDIAN ACT.

In Canada, the legal definition of an Indian is contained in the Indian Act, legislation first passed in 1876, but stemming from similar pre-Confederation laws. People legally defined as Indians are known as status Indians. Nonstatus Indians are of Indian ancestry but, through intermarriage with whites or by abandoning their status rights, have lost their legal status while retaining their Indian identity. Among status Indians there are 2 groups: treaty Indians and registered Indians outside treaty areas. Treaty Indians are people who "took treaty." A treaty is an agreement between the Crown and a specific group of Indians who are held to have surrendered their land rights for specified benefits (*see* INDIAN TREATIES). Registered Indians are Indians in areas where treaties were never made or Indians with legal status in treaty areas who, for a variety of reasons, have not taken treaty. With the exception of specific promises contained in treaties, treaty Indians and registered Indians outside treaty receive identical benefits and privileges from the federal government (*see* ABORIGINAL RIGHTS; NATIVE PEOPLE, LAW). The status Indian population in Canada in 1981 was 323 782.

HARVEY MCCUE

Reading: P. Cumming and N. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); B. McCardle, *Indian History and Claims: A Research Handbook* (1982).

Indian Act, the principal federal statute dealing with INDIAN status, local government and the management of reserve land and communal monies. The present Act was passed in 1951, but its provisions are rooted in colonial law. The earliest Indian legislation was directed at regulating trade with the Indians and non-Indian settlement in Indian territories. Prior to Confederation, laws to protect Indian lands were enacted in Upper and Lower Canada and in NS, NB, PEI and BC. Indian status was a concept developed to determine entitlement to reside in Indian reserve communities; it remains a feature of the present Act (*see* NATIVE PEOPLE, LAW).

At Confederation, the Constitution assigned legislative jurisdiction over "Indians and lands reserved for the Indians" to Parliament. There are actually 2 distinct divisions of legislative power: civil rights and status of Indians, and reserve lands. The first federal Act was passed in 1868, based largely on the earlier legislation of the PROVINCE OF CANADA. In 1869 further legislation was passed reflecting a social policy of assimilation; Indian status was seen as a transitional measure, protecting Indians until they became settled on reserves and acquired European habits of agriculture. The new law provided for ENFRANCHISEMENT, then a voluntary relinquishment of Indian status, once this occurred.

The first "Indian Act" so called was enacted in 1876 and extensively amended over the years. Increasingly the Act suppressed Indian traditions such as the SUN DANCE and the POTLATCH, extending bureaucratic control over reserve residents. The current Act is an improvement over its predecessors, but Indian people are still subject to an unwarranted degree of discretionary control by non-Indian institutions. In 1983 a special committee of Parliament recommended that Indian governments take over the tasks of local government and regulation.

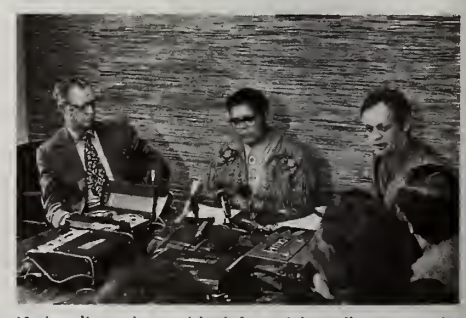
Much public attention has been focused on the statutory rule that an Indian woman loses Indian status by marrying a non-Indian man, particularly since the Supreme Court of Canada ruled in 1973 that this did not discriminate against women in a way that offended the Canadian Bill of Rights of 1960 even though Indian men retain status if they marry non-Indian women (*see* LAVELL, Jeannette).

In a 1969 statement on Indian policy, the federal government proposed putting an end to Indian status and repealing the Act. This "White Paper" provoked strong objections from Indians, who saw it as an attempt to sever their traditional relationship with government at a time when they were insisting on greater recognition of their traditional rights, settlement of LAND CLAIMS and power to manage their lands and affairs. The policy proposal was withdrawn, but the government did not amend the Act, even though it acknowledged its many shortcomings, (*see* ABORIGINAL RIGHTS; NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM). The Act remains an essentially 19th-century statute, giving the government broad discretionary powers to regulate life in INDIAN RESERVES and, to a lesser degree, off reserve. Constitutional recognition of aboriginal and treaty rights in 1982 may provide a new impetus for dramatic revisions to a statute that has long resisted change. *See also* NATIVE PEOPLE, GOVERNMENT POLICY.

WILLIAM B. HENDERSON

Reading: R. Bartlett, *The Indian Act of Canada* (1980); J. Leslie and R. Maguire, eds, *Historical Development of the Indian Act* (2nd ed, 1978); D. Smith, *Canadian Indians and the Law* (1973); S. Weaver, *Making Canadian Indian Policy* (1981).

Indian Affairs and Northern Development, Department of, est 1966 to replace the Department of Northern Affairs and National Resources. A 1968 reorganization created 3 program areas apart from support services and an engineering and architectural branch: Indian and Inuit Affairs, Northern Affairs and Parks Canada. Parks Canada became the responsibility of the minister of environment in 1979. An Office of Native Claims was established in 1974 to represent the government in claims negotiations with native groups. The Northern Affairs Program is responsible for a wide range of activities north of the 60th parallel, eg, management of all natural resources (except game), protection of the environment and government-sponsored economic development. The department, commonly called DIAND, is responsible for the administration of the resources and affairs of the NORTHWEST TERRITORIES and the YUKON TERRITORY. The department's 1984-85 budget was $2 billion.



Native discussions with (left to right) Alberta premier Harry Strom, Alberta Indian leader Harold Cardinal and Indian affairs minister Jean Chrétien, Dec 1970 (*courtesy Prov Archives of Alberta/Edmonton Journal*).

Indian Art The history of Indian art in Canada begins about 25 000 years ago with the migration of the Indians across BERINGIA. The development of native art is in many ways more complex than that of the relatively recent European settlers, and may be divided into 3 distinct periods: prehistoric art (25 000 BC to 16th-19th century AD), contact or "historic" art (16th-19th century) and contemporary native art (mid-20th century).

While historians of native art must rely to a large extent upon archaeological finds in the study of the prehistoric period, the work of ethnographers, ethnohistorians and historical archaeologists is of vital importance for knowledge of historic Indian art. Ethnographers have shown that a correct interpretation of the function and meaning of native artworks depends upon an understanding and appreciation of the ways of life, aesthetic values and principles of the peoples themselves. Ethnohistorians have examined early visual sources and written documents such as maps, paintings, captains' logs and accounts by explorers, traders and travellers, and from these documentary fragments have traced the history of native peoples from initial contact to the 20th century. Historical archaeologists have excavated postcontact sites, which give precise, chronological evidence of the interaction between native and European peoples, and also give evidence of the introduction of new materials, techniques and working methods to native artists and crafts people.

Prehistoric Art

Prehistoric art is the period of native art least known in Canada, and its terminal date varies from region to region across the country. While initial contact with the French in the Maritimes and St Lawrence Valley took place in the early 16th century, the Indians of the West Coast did not see Europeans until the late 18th century.

Discovery, knowledge and relative dating of prehistoric works of art depend upon meticulous excavation and careful interpretation. Recent important discoveries include the location in NW Ontario of what may be Canada's oldest artwork, a petroglyph site perhaps 5000 years old; a carving of a smiling human head, 5000-3000 BC, from the Coteau-du-Lac site on the St Lawrence R in SW Québec; and the verification that the spectacular art forms of coastal BC — most notably the totem poles — are not the product of European contact as formerly believed, but have a continuous on-site development dating back at least 2500 years. Since the wet, acidic soils of much of Canada's northland do not permit the survival of artworks in wood, fibre, hide or other perishable materials, much of Canada's prehistoric art has been lost. One major exception has been rock art: paintings in red ochre and carvings incised upon natural rock surfaces (*see* PICTOGRAPHS AND PETROGLYPHS).

Prehistoric art varies not only in genre, style, function, imagery and meaning from region to region but has undergone changes from period to period. These changes accelerated almost everywhere in Canada after about 1000 BC as a consequence of a variety of influential factors: the introduction of pottery, agriculture and settled village life from the Eastern Woodlands of the US and ultimately from Mexico, where New World civilizations developed independently from those of the Old World (*see* PREHISTORY).

There are several outstanding manifestations of prehistoric art in Canada. The Marpole culture, 500 BC-500 AD, which was centered on the Fraser R Delta and the surrounding Gulf Is of the southern BC coast, produced an abundant variety of stone and bone carvings (ceremonial bowls, effigies and utensils) that in many ways anticipate the style and iconography of postcontact NORTHWEST COAST INDIAN ART. Precontact Iroquoian culture, 900-1600 AD, in southern Ontario (the ancestors of the Huron, Petun, Neutral) produced a pottery of high technical quality and visually pleasing effects decorated with representational and geometric designs. Iroquoian art in the Upper St Lawrence Valley is noted for its clay and stone effigy pipes of fascinating shape and iconographic variety. Both pipe bowls and stems were carved or modelled in high relief or incised with human and zoomorphic images of lizards, turtles and birds, all important power animals in the iconography of Great Lakes religious art. These tiny masterpieces had a sacred function — the ritual smoking of tobacco in the context of Indian spiritual beliefs (*see* CALUMET).



Stone human-effigy pipe bowl, late Iroquoian, post-1500 AD, Simcoe County, Ont (*courtesy Royal Ontario Museum*).

Postcontact Art

Postcontact or "historic" art is well known, mainly because examples have been collected, sketched and written about by explorers, traders, missionaries, artists and scholars for over 300 years and are now deposited in museums throughout the world. The various regions into which native art is customarily divided are based upon the distribution and cultural character of native groups in the early contact period, about 1800 to 1850, but this emphasis on the "ethnographic present" has resulted in a frozen time perspective, an erroneously narrow view of the great time depth, and of the diversity and richness of native art history.

Native art in Canada may be divided into 7 regional subdivisions: Eastern Subarctic (eastern Canadian Shield); Western Subarctic (western Canadian Shield and Mackenzie drainage area); Southern Great Lakes and Upper St Lawrence Valley; Prairies (southern Manitoba, Saskatchewan and Alberta); Plateau (interior southern BC); Northwest Coast (BC coast); and Arctic (arctic coastline and offshore islands eastward to Newfoundland).

Eastern Subarctic The art of the eastern Subarctic is the most archaic in Canada, the majority of prehistoric and early contact rock-art sites being located in this region. The largely Algonquian-speaking peoples — the Ojibwa, Cree, Algonquin, Ottawa, Montagnais, the Naskapi of Ontario and Québec and the Micmac and Maliseet of the southern Maritimes — continued a nomadic way of life based on hunting and the gathering of wild foods.

The art of the MICMAC and MALISEET of NS and NB remained distinctive until well into the 20th century. The Micmac are noted for their moosehair embroidery and porcupine quillwork on birchbark and basketry containers, hide and textile clothing. Glass beads introduced by European traders were welcomed early by Micmac and other Indian women artists as substitutes for the more difficult quills and moosehair. The use of beads, their richness of colour and diversity of size and transparency, inevitably changed the aesthetic character of Micmac design. Micmac women's art in quills, moosehair and beads was largely 2-dimensional, secular in function and abstract in style, in contrast to that produced by men who worked in 3 dimensions with harder, more resistant materials such as wood and stone.

A well-known characteristic of Micmac design is the so-called "double-curve" motif, a bilaterally symmetrical arrangement of 2 opposing spirals or curves that is suggestive of plant forms. It appears as the basic, underlying pattern in much 2-dimensional design throughout the eastern Subarctic and becomes highly elaborate among the central Algonquians and Iroquoians of the Great Lakes area. Although this elaboration may have been influenced by young Indian girls taught needlework by Ursuline nuns, the pattern was rooted in an existing culture, for plants and their medicinal and magical properties played an important role in subarctic Indian belief and shamanistic herbal practice.

The art of the nomadic Naskapi is also remarkable for its 2-dimensional design. Especially noteworthy are caribou-hide coats incised and painted with linear geometric patterns and with the double-curve motif. Throughout the subarctic and Great Lakes areas, the colour red plays an important symbolic role, expressive of life's renewal and the continuity of the life-force in both animals and men.

The OJIBWA of subarctic Ontario and Manitoba are noted for a number of distinctive sacred art forms. The artwork of Ojibwa women was similar in technique, function and genre to much of that produced throughout the subarctic area: quillwork and beadwork on clothing, bark and basketry in both geometric and floral patterns. Ojibwa men, responsible for works of sacred, ceremonial function, produced an art that was largely symbolic, representational and documentary. Sacred art was intended to embody specific meanings, to portray spirit helpers and record ritual and mythological events and experiences. This division of artistic labour appears to have been the general pattern throughout native America: men producing public art for religious and ceremonial functions, women producing personal art, largely for the sake of sheer visual pleasure or "beauty," but often using motifs symbolizing spiritual and cosmological concepts such as the Four Quarters or the zigzag lightning of THUNDERBIRD. Ojibwa medicine men (or SHAMANS) were responsible for much of the rock art produced in Ontario and Manitoba, recording their visionary spirit encounters well into the 20th century. One of the most important forms of Ojibwa religious art in the historic period were the sacred birchbark records — rectangular pieces of bark measuring from several centimetres to over 3 m in length, which were incised in an almost imperceptible, fine-line technique with highly esoteric and symbolic images. These records served as documents of sacred lore or as memory aids for ritual, and the most detailed, extensive and valued were those produced by the MIDEWIWIN or Grand Medicine Society.

Least studied to date has been the art of the subarctic CREE. Aesthetic expression among the Cree is highlighted by exquisite quillwork and moosehair embroidery, noted for its perfection of technique and delicate colour harmonies. As nomadic hunters, living a precarious existence in a harsh climate from east of James Bay to northern Saskatchewan and Alberta, the Cree had to carry their goods on their person, so items



Man's summer jacket (*courtesy National Museums of Canada/National Museum of Man/K75-956*).

of clothing, especially their painted and embroidered coats, moccasins and mitts became a focus for personal aesthetic expression. Sacred art, eg, shamans' painted drums and ceremonial animal hides executed with symbolic motifs, are lesser known but equally important as aesthetic objects among both Cree and Ojibwa.

Western Subarctic What has been described for the Cree of the eastern Subarctic is largely applicable to the western Subarctic, a region of similar environmental conditions occupied by Athapaskan-speaking peoples. Although linguistically distinctive from the eastern subarctic Algonquians, the DENE NATION, as the Athapaskans prefer to be called, share a similar culture and art with their subarctic neighbours. Decoration of personal gear and clothing was the major form of artistic expression, as caribou and moose hide was embellished with porcupine quills, moosehair embroidery, beads and commercial threads in geometric and floral patterns. Compared to southerly groups such as the Ojibwa and Iroquois, the subarctic peoples revealed in their embroidery their delicate colour sense and exquisite precision in design.

Southern Great Lakes and Upper St Lawrence Valley From the late prehistoric to the early historic period, the Iroquoian-speaking peoples of this region — the HURON, NEUTRAL, PETUN, and later the IROQUOIS proper — underwent more rapid changes than the natives in any other region in Canada. Because they were farmers, living in relatively permanent villages, their political and social institutions found expression in suitable works of art. By the 19th century, however, many of the Indians had migrated westward, eastward, or were settled in reserves throughout the area. Art came to have a new purpose, as a commodity for sale to outsiders — to tourists and collectors of Indian "arts and crafts." In prehistoric times this region was already subject to outside influences. The Iroquois in particular had trade connections to the south with the highly complex and economically advanced "Mississippian" cultures of the Eastern Woodlands, which in turn were stimulated by Mexican cultural innovations (ceramic technology entered Canada from this source). In the early contact period they made alliances with Europeans through the FUR TRADE.

The history of art in this region is too complex to detail, except for a few highlights. While on the whole there is considerable homogeneity in quillwork and beadwork throughout the subarctic and Great Lakes area, Huron work is distinctive in the later historic period. Huron "personal art" favoured moosehair embroidery in floral motifs of exquisite beauty on black-dyed hide. The quality of trade goods, unmatched elsewhere in Canada, had peaked by 1830, long after the Huron had left western Ontario to settle at Lorette, Qué. Hide and yarn shoulder pouches and bags, executed with a wide variety of geometric, naturalistic and mythological motifs, were the predecessors of the more recent loom-woven and heavily beaded "Bandolier" bags of the western Great Lakes area. The most common motifs were Thunderbird and the Underwater Panther, finely rendered in quills, moosehair and beads. Typical as well were finger-woven sashes interwoven with white beads, burden straps of twined Indian hemp, wooden ball-headed clubs incised and carved in high relief and elaborately decorated knife sheaths. The noted Assomption Sash was a trade item, although, as with silverwork, the Indians adopted European techniques and designs. Even the splint baskets, prized by collectors as a typical Indian craft, employed a technique learned from Swedish settlers in the Delaware Valley.

The Iroquois proper, or Six Nations, did not settle in Canada until after the American Revolution. The most noteworthy art forms of the historic Iroquois are the False Faces, wooden masks with metal eyes and sometimes horsehair, which were carved by the men for use in curing ceremonies (*see* FALSE FACE SOCIETY). Strongly sculptural in character, with a variety of mouth types and painted in red or black or both, they are sacred objects believed to contain the life-force of the living tree. The masks represent mythological beings, the most notable being "Crooked Face," the one who challenged the Creator and had his nose broken. Other masks, plaited from dried cornhusks, were worn in agricultural ceremonies and represent a second group of earth-oriented supernaturals, those who taught mankind how to grow crops.

In addition to personal art (clothing) and sacred art (False Faces), the Iroquois produced another kind of art object of "political" function and meaning. WAMPUM strings and belts of several centimetres width and sometimes metres in length were made of purple and white shells traded in from the Atlantic Coast. In the absence of writing, yet with the high degree of political sophistication these Iroquoian-speaking peoples had achieved, these wampum belts with their symbolic motifs served as a visual record of particular treaties and events. As such, the wampum belt became a symbol of friendship and co-operation between political groups, both Indian and European.

Smoking bag (*courtesy National Museums of Canada/National Museum of Man/K75-950*).





Painted caribou skin (*courtesy National Museums of Canada/National Museum of Man/A77-1849*).

Prairies Prairie Indian culture, as it emerged in the 19th century, was a synthesis of native and white cultures, the product of post-contact European influences such as the horse and the gun which provided increased mobility and effectiveness in buffalo hunting. The art produced by the BLOOD, BLACKFOOT and ASSINIBOINE is similar to that of their eastern subarctic and western Great Lakes neighbours in techniques, materials and motifs, as westward migration, the consequence of new hunting opportunities, the fur trade and advancing colonization, brought eastern influences into prairie culture.

Art produced by prairie people was essentially 2-dimensional, in which painting on hides was the major genre. Large TIPIS that required the hides of up to 40 buffalo were their major architectural form. Among the Blackfoot of southern Alberta, tipis of important men were often lavishly painted with naturalistic and geometric motifs. Dream images depicted on rawhide shields rival contemporary surrealist paintings in visionary and aesthetic impact. As images of the warrior's personal guardian spirits, they were believed to protect him in warfare and help in the hunt. Painted buffalo robes were another major art form, with motifs ranging from the abstract, concentric "sunburst" pattern to representational images. Personal art was the focus of aesthetic attention, as deer-hide moccasins, jackets, dresses, leggings and shirts were embellished with porcupine quillwork and beads. Painted PARFLECHES, rawhide containers of various shapes and sizes, were unique to this area, and no 2 designs were exactly the same.

Plateau The plateau region of central BC is often ignored in surveys of Indian art but is unique in many ways. The interior SALISH left behind a major body of prehistoric pictographs. The Lillooet, Thompson, Okanagan and Shuswap of the historic period are noted for their finely crafted, watertight baskets made by the coiling technique and decorated with geometric motifs. Little research has been done on the art of the plateau peoples, on their blankets woven of mountain-goat wool, their clothing, or the religious beliefs that provide the context for art interpretation in many Indian cultures.

Northwest Coast and Arctic The historic art of the Northwest Coast and of the Arctic has been the subject of considerable attention in recent years, to a large extent because of the intrinsic importance of INUIT and Northwest Coast Indian art in the context of world art.

Indian art of the prehistoric and postcontact periods is "traditional" art. Even though native



Man Changing Into Thunderbird by Norval Morrisseau (*courtesy National Museums of Canada/National Museum of Man/S82-786*).

art was strongly affected by European materials, techniques and motifs during the historic period, it was still largely shaped by the context of Indian cultures. In contrast, contemporary native art, like contemporary art the world over, fulfils a new purpose: that of self-expression.

Contemporary Indian Art

Contemporary Indian art is so recent in origin that its directions are not clear and, contrary to appearances, its interpretation and aesthetic assessment are not complete. Many significant and fundamental questions — such as criteria for critical judgement — have not been systematically addressed. Three major centres of native art, however, clearly dominate the contemporary scene in Canada: Inuit art, West Coast Indian art, and the Woodlands art of eastern Canada. A scattered group of Indian artists work independently, in the context of mainstream Western art, and may be described as internationalist in scope and intent. The Woodlands school gained recognition in the 1970s with the rise to fame of Norval MORRISSEAU, an Ojibwa from northern Ontario. The majority of Woodland artists have been influenced by Morrisseau and are known as "Legend Painters" for their rendering of tales and mythological characters in their work. Other painters include Carl RAY, a Cree from northern Ontario, Daphne ODJIG and Blake DEBASSIGE from Manitoulin I, and Jackson BEARDY, an Ojibwa from Manitoba.

The internationalist artists tend to work alone, seeing themselves as independent of any "school," and are often highly trained in contemporary Western techniques of painting. They view themselves as "artists" above all who "happen to be Indian." Nevertheless, their paintings evoke in form and content an indisputable link with Indian sensibilities. Outstanding in this group are Alex JANVIER, a Chipewyan from northern Alberta; Arthur SHILLING from Orillia, Ont, well known for his portraits of Ojibwa; and Sarain STUMP, a Shoshone-Cree from the Prairies, painter of surrealistic-symbolic compositions. The Iroquois George Longfish from Oshweken, Ont, though he works essentially in an abstract expressionist manner, is able to communicate Indian spirituality through formal means alone. The portrayals of INDIAN RESERVE life by Allen SAPP are reminiscent of 19th-century realist works and typify the conservative trend among many Indian artists today. JOAN M. VASTOKAS

Reading: T.J. Brasser, *"Bo'jou, Neejee!": Profiles of Canadian Indian Art* (1976); C.F. Feest, *Native Arts of North America* (1980); Nancy-Lou Patterson, *Canadian Native Art* (1973).

Indian Head, Sask, Town, pop 1889 (1981c), inc 1902, is located in the heart of Saskatchewan's richest farming area, the Qu'Appelle Valley, 68 km E of Regina. Its first settlers moved into the district in 1882, a few months ahead of the CPR. Indian Head was so named for a low range of hills lying a few km to the SW of the townsite known to the natives as Indian Head. The town remains very prominent in the agricultural industry of the province. Not only is it a prime wheat-growing area, but it is also the site of a federal experimental farm and the Prairie Farm Rehabilitation Administration Tree Nursery. DON HERPERGER

Indian Pipe (*Monotropa uniflora*), a perennial PLANT, is the only native species of genus *Monotropa*, one of 8 genera of the wintergreen family (Pyrolaceae) found in Canada. The genus is sometimes raised to family level (Monotropaceae), or WINTERGREENS may be included in the heath family (Ericaceae). Indian pipe grows transcontinentally in shaded woodlands but is hard to find, not always appearing in the same place each year. Lacking chlorophyll, it cannot manufacture its own food and lives on partially decayed vegetation in soil, with the aid of a fungus (*see* MYCORRHIZAE). The plant is 10-20 cm tall. The nodding, one-flowered stalks are often clustered. The flower and stalk vaguely resemble a smoker's pipe, hence the common name. It is also called a corpse plant because of its shining, translucent white colour. If the plant is touched, the spot turns black. Indian pipe was used by the BLACKFOOT to heal wounds, and by various groups for convulsions and epileptic seizures. PATRICK SEYMOUR



Indian pipe (*Monotropa uniflora*), the only native species of the wintergreen family found in Canada (*photo by Tim Fitzharris*).

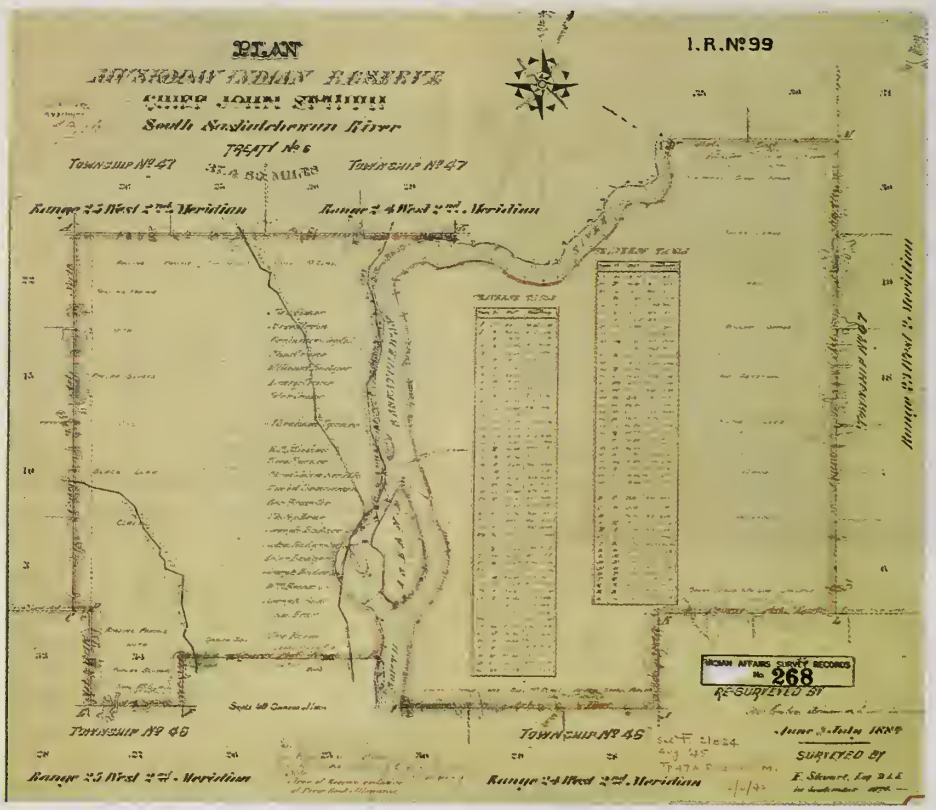
Indian Reserve The earliest Indian reserves in Canada appear to have been established on seigneurial holdings by Catholic missionary orders and private persons in New France. Later reserves were set aside by treaty and various forms of crown grant in the British Maritime colonies, Lower Canada and Upper Canada. After Confederation, reserves were formed either under the numbered treaties or by special arrangement with individual bands. The actual means by which reserves were created is not yet fully understood.

In Canada there were 2242 reserves in 1977, with a total area of about 25 954 km^2. Reserves are lands set aside for the exclusive use of status Indians. A BAND is the term used to describe a community of Indians residing on one or more reserves, but some Indian bands have no reserves. In 1981 there were 323 782 status Indians and 576 bands. In the NWT and the Yukon, where few reserves have been established, the bands have been gathered into communities known as settlements, on lands which are generally held by the Crown for their benefit but which do not have reserve status. There are reserves in most parts of southern Canada, but about 65% of the INDIAN population is on reserves in areas designated "rural" or "remote" (*see* NATIVE PEOPLE, DEMOGRAPHY). A majority of bands in Canada have fewer than 1000 members.

The INDIAN ACT stipulates that only status Indians may reside permanently on a reserve. By-laws enacted by individual band councils enable some persons who are not status Indians to reside on reserves until such time as they may be asked to leave. Many bands have leased or otherwise disposed of portions of their reserve lands to non-Indians for various purposes, including natural-resource exploitation, rights of way for transportation or transmission, farming, ranching and recreational land use. Although many Indians believe that reserves are legally their property, the Indian Act states that the title to reserves is vested in the Crown. This legal relationship with the federal government concerns Indians, who believe that the status of Indian lands is in jeopardy as long as legal title remains outside of Indian control. The Indian Act forbids the "surrender" and sale of reserve land by an Indian or a band to anyone other than the Crown. Individual Indians who occupy particular plots of land in a reserve cannot obtain an ordinary deed or title to the land, but may acquire certificates giving them varying degrees of protection from claims by other parties. This individual title or "location" may be transferred among members of the same band. Land in a reserve which is not assigned to individuals is held as common property for the benefit of the entire band.

Social conditions in most reserves reflect the historical and political neglect that Canada has shown towards people of Indian ancestry (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). The location of most reserves in isolated and remote areas has contributed to the high rate of unemployment among Indians, which remains at about 35% of the working-age population, rising to much higher levels on the remote reserves where traditional economies have been eroded. Of those Indians who are employed, 75% work on a reserve (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS).

In spite of these and other conditions which have contributed to a host of problems among people who reside on reserves, the reserves remain the physical and spiritual home for many Indians, especially in the southern regions. Indian reserves have often been called rural ghettos or retreats where Indians can escape the demands of modern society. People who perceive reserves in this way believe that without reserves Indians would be forced to assimilate into Canadian society and that with assimilation, many of the problems which affect reserve pop-



Plan of the Muskoday Indian reserve in Saskatchewan, 1884, one of several such plans showing land allocated as reserves (*courtesy Public Archives of Canada/NMC-8387*).

ulations today would vanish. This view ignores the political and legal status that reserves have in Canada and overlooks the fact that most Indians do not want to be assimilated. It also ignores the situation in the NWT, the Yukon and northern Québec, where status Indians who do not live on reserves still maintain a separate identity, language and culture.

To many Indians, reserves represent the last visible evidence that they were the original people of this country. The reserve nurtures a community of "Indianness" and reinforces spiritual unity among Indians. Despite the manifest poverty, ill health, poor housing and lack of services, the life-style on reserves, traditional values, kinship affiliations and the land itself all contribute to an Indian's identity and psychological well-being. The relative isolation of most reserves enables Indians to socialize their children to values important to their culture: reticence and noninterference, consensus decision making and nonverbal communication. Reserves, since they are set apart both physically and legally, help Indians to maintain an ethnic identity within Canada. HARVEY MCCUE

Reading: P. Cumming and N. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); W.B. Henderson, *Land Tenure in Indian Reserves* (1978).

Indian Summer, popular expression for a period of mild, summerlike weather which occurs in the autumn, usually after the first frost. The origins of the name are obscure, but it was in use in Canada early in the 19th century and even earlier in the US. The Toronto Meteorological Observatory (est 1839) recorded the date of certain periodic events, such as Indian summer, until 1871. Almost invariably, its records show that this phenomenon occurred in late Oct or the first half of Nov and lasted from a few days to about a week. Although it cannot be precisely defined, Indian summer continues to arrive most years just as thoughts of the summer past are fading into thoughts of the winter to come. MICHAEL J. NEWARK

Indian Trade Goods are items of European manufacture that were traded with the indigenous peoples of Canada for furs. For the initial stages of culture contact such goods were stray bits of metal (eg, an old iron axe or knife, a handful of nails) and pieces of rope and used clothing. During this period, most of the trade in furs was carried out by fishermen who had gone ashore to dry their catches. Although the volume of trade was small, the profits were relatively large because items of little value to a European could be traded for furs that commanded an excellent price in the home market. During the 16th century, however, the FUR TRADE gradually developed into a separate branch of commerce. Ships solely engaged in trade were sent to the eastern seaboard with cargoes of manufactured goods. At this stage, decisions had to be made about the type of trade goods that would be in greatest demand and produce most furs at the best prices.

From the beginning, one of the most important items of trade was the iron axe. Axes were imported into French Canada in such numbers that they were literally "harvested" in many parts of southern Ontario, forming the first cash crop of the settlers who were breaking the land. The axes were formed by bending a short length of bar iron around a mandrel to form a wedge-shaped eye, then welding the ends of the bar together and hammering it into a long heavy blade. A thin piece of steel was usually set into the blade so that the tool would take and hold a sharper edge. These early French felling axes are found throughout eastern Canada and are scattered across New York and Ohio and down the Mississippi drainage; however, they are concentrated in southern Ontario and western New York, the homeland of the Iroquoian-speaking peoples. Although generations of children were raised with the impression that the old trade axes were weapons, archaeological evidence suggests that they were used, primarily by women, for breaking up the dead limbs and brush that were used for firewood. They would, of course, have been used for many other purposes as well.

While the heavy French felling axe was quite acceptable to the sedentary Iroquoian peoples, it was much too cumbersome for the hunters and gatherers of the northern forests. Hence the French introduced the lighter, more slender Biscay axe. This axe was probably introduced into the trade towards the end of the 17th century, at about the same time that the HUDSON'S BAY COMPANY was establishing trading posts on James Bay. The English also found their axes too cumbersome for the Algonquian-speaking peoples with whom they traded and introduced a lighter, hatchetlike tool. The minor stylistic differences between axe types were probably not significant to the native peoples. But to the archaeologist and historian such minor differences are of primary importance because the distribution of the different types across an area allows reconstruction of the trade routes that stretched out from the various commercial centres. In addition, if the dates at which different styles were introduced into the trade are known, the information can be used in dating archaeological sites. For example, the earliest flintlock musket that the HBC traded into James Bay had a flat cock and lock plate; however, in 1682 the Oakes pattern, with rounded outer surfaces on the cock and lock plate, was introduced. These rounded surfaces remained characteristic of the Northwest gun throughout its history. Any archaeological site which produces the Oakes-pattern musket must postdate 1682.

Styles in trade goods changed through time. Although few such changes can be precisely dated, many are known with reasonable precision. For example, a collection of kaolin pipes can usually be dated to within a 10-year period, as can a collection of glass bottles. Glass beads and brass kettles are much more difficult to date, although some clues are available. For example, larger star beads are associated only with early French sites; small brass kettles with vertical sides seem to appear only on very late sites that were supplied by the HBC.

Native peoples adopted items of European manufacture because of their technological superiority: flintlock muskets, iron axes and knives and brass kettles simply were more efficient than the bows and arrows, stone tools and birch-bark baskets they replaced. Similarly, for much of the year, woolen clothing was vastly superior to skin clothing. Trade goods, however, were not limited to utilitarian objects. A pipe of tobacco may not have made a trapper more efficient, but it did make him more serene; and his wife and daughters could have tied back their hair with strips of skin, as had their ancestors for countless generations, but they found a brightly coloured ribbon more attractive.

The volume of goods that was imported during the early fur-trade period was impressive. For example, in 1684 the HBC shipped 300 flintlock muskets, 2000 iron axes, 2160 kaolin tobacco pipes, 3000 jackknives and 5000 butcher knives to its Albany post. During this period, the fur trade was dominated by those historic rivals, the French and English. The French led the way westward, following the ancient canoe routes of the Indians. Even after the conquest of NEW FRANCE, the commercial rivalry continued, with the Montréal traders pushing farther and farther west. At the height of their power, they were following a well-established "Voyageurs' Highway" that stretched from Montréal on the St Lawrence to Fort Chipewyan on Lk Athabaska. The trade goods they carried, the muskets, kettles, beads, pipes, woolen clothing, blankets, etc, were the currency of the fur trade, a trade that opened up half a continent and gave Canada its basic configuration. *See* CLOTHING; FIREARM. WALTER A. KENYON

Indian Treaties are formal agreements between Indians and the Crown involving promises of peace and friendship, land cessions and other issues and benefits. Rights promised to

INDIAN peoples in treaties are recognized and affirmed by the CONSTITUTION ACT, 1982; those included in LAND CLAIMS settlements also have constitutional force. There are, however, many areas of Canada where no treaties were made: Newfoundland and Labrador, Québec, the High Arctic, most of the NWT, the Yukon, most of BC and parts of the Maritimes are not subject to any treaty.

NS, NB, PEI For much of the 17th and 18th centuries, this region was hotly contested by the British and the French. Both rivals sought to neutralize Indian military prowess and to consolidate their gains from time to time. The British entered into a series of treaties of peace and friendship with the tribes between 1693 and 1794, all but the last securing only temporary peace.

Generally, these treaties did not include a purchase or cession of land to the Crown: British rights were considered to have been acquired by conquest from the French. Nor did they promise reserves or annuities (*see* INDIAN RESERVES). The usual provisions were for the establishment of "truckhouses," or trading posts, maintenance of peaceful relations, and noninterference with Indian hunting and fishing. Indian claims to exemption from fish and game laws are generally not recognized by local courts, but this situation may change when the Supreme Court of Canada decides the *Simon* case (1984), in which constitutional protection of a treaty right is claimed by an NB Indian.

Ontario After the American Revolution, Britain was faced with the problem of settling LOYALISTS and soldiers, including the IROQUOIS of upstate New York, in Canada. Initial purchases were made from the Mississauga and other tribes occupying the northern shore of Lk Ontario. This pattern of purchase continued into western Ontario and N to Georgian Bay. The dozens of treaty documents recording these purchases vary greatly; of particular interest is the so-called "Gunshot Treaty" (1787), which covered lands along the shore of Lk Ontario and as far inland as a gunshot could be heard on a clear day, about 19 km. Such ambiguities led in 1923 to a more comprehensive treaty with the Mississauga that is, however, also a contentious agreement.

The form of future treaties was set for the next century when, in 1850, Commissioner W.B. Robinson was dispatched to Sault Ste Marie to conclude treaties with Indians of the upper Great Lakes. These are known as the Robinson-Huron and Robinson-Superior treaties. They provided for cession of the Indian title in return for an immediate cash payment, annual payments to the tribes, reserves which could not be sold except to the Crown, and the "full and free privilege" to hunt and fish on unoccupied crown lands.

After Confederation, Treaty No 3, the Northwest Angle Treaty, was entered into at a time when the Dominion government believed the region to be part of Rupert's Land. Disputes over the respective land rights of the Dominion and the province led to the *St Catherines Milling* case (*see* ABORIGINAL RIGHTS).

The boundaries of Ontario were extended to their present limits in 1912, and Canada, having failed in an attempt to recoup the annuity expense of the Robinson treaties from the province, ensured that Ontario would take responsibility for concluding and paying for a treaty in the new lands. This led to Treaty No 9, the James Bay Treaty, in 1905-06. Québec's failure to conclude a similar treaty when its boundaries were extended (also 1912) led to the JAMES BAY AGREEMENT with the Cree and Inuit of northern Québec.

The "Numbered" Treaties When the new Dominion acquired the HUDSON'S BAY CO territories in 1870, it immediately began to secure land cessions from the Indians of the northwest. The numbered treaties, beginning with Treaty No 1 in 1871 and ending with Treaty No 11 in 1921, generally include these provisions: reserve lands in proportion to population, usually 128 acres (51.8016 hectares) per capita; a token annual payment to each person; farming and agricultural assistance; schools and educational assistance; ammunition and fishing twine; uniforms, medals and flags for the principal chiefs. Fishing and hunting were to continue as before, subject to government regulation from time to time. The interpretation of these provisions has led to disputes, which is hardly surprising since negotiations were conducted through interpreters and much of the discussion was not included in the treaties themselves.



Medal used for Indian treaties signed from 1871 to 1922 (*courtesy Public Archives of Canada/National Medal Collection*).

One particularly contentious clause, which occurs only in Treaty No 6, provides that a medicine chest shall be kept at the house of the Indian agent. Native groups have argued that, in modern terms, this represents a promise of free medical care. The courts have ruled that the promise entitles Treaty No 6 Indians to free medicine but not to free medical services (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). Similar arguments that the promise of certain school facilities means free education to the post-secondary level have not yet found their way into court (*see* NATIVE PEOPLE, EDUCATION).

Other claims arising from the numbered treaties relate to land and to hunting and fishing rights. In some areas the reserves promised were not provided or were smaller than promised; negotiations are being pursued with the Prairie provinces to resolve this issue. Under the BNA Act, 1930, the 3 provincial governments are obliged to supply the land to meet these claims, but disagreement as to the precise nature of that obligation has delayed resolution of the issue. The same Act excludes provincial regulation of Indian hunting and fishing for food on the Prairies and these rights are now defined by the provisions of the Constitution.

MÉTIS were usually given the option of taking treaty as Indians or "scrip," which entitled them to an allotment of land. Because scrip could be sold to non-natives, few such allotments were actually made to Métis themselves.

The numbered treaties are principally associated with the Prairie provinces, but they extend from Ontario across the Prairies, into northeastern BC and the Mackenzie Valley of the NWT.

BC For much of the 1850s James DOUGLAS was both chief factor of the HBC and governor of BC. Based at Victoria, he followed the practice of purchasing Indian lands required for settlement and, between 1850 and 1859, entered into at least 14 agreements covering lands mainly near the southern tip of Vancouver I. Indians were given a single payment, continued ownership of village sites and fields, as well as hunting and fishing rights.

By 1860, however, the COLONIAL OFFICE refused to provide funds for such purchases, and in time local officials disagreed with the policy of making them. No further treaties were made, and Indian tribes in BC, as in other nontreaty areas, rely on this omission in continuing to assert their aboriginal title.

Treaty No 8 applies to BC generally east of the Pacific watershed and north to the territorial boundaries.

The Territories Treaty No 8 and Treaty No 11 apply to parts of the NWT. These were concluded between 1899 and 1921-22, but some of the treaty promises, notably the promise of reserve lands, were never fulfilled.

Summary Many Canadian Indians rely upon the promises made in the treaties to ensure their distinctive status in Canadian law and society; but difficulties of interpretation, coupled with the anomaly of having domestic treaties with one class of citizens, prompted the federal government in the 1969 White Paper to suggest that the treaties simply be disregarded or replaced. With treaty rights entrenched in the Constitution of 1982, with land-claims negotiations in progress across the country and with courts more willing to enforce the oral promises made to secure treaties in the first instance, there is likely to be more attention given to treaty rights and promises. WILLIAM B. HENDERSON

Reading: G. Brown and R. Maguire, *Indian Treaties in Historical Perspective* (1979); P. Cumming and N. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); W. Daugherty, *Maritime Indian Treaties in Historical Perspective* (1981); R. Fumoleau, *As Long As This Land Shall Last: A History of Treaty 8 and Treaty 11, 1870-1939* (1975); *Indian Treaties and Surrenders from 1680 to 1890*, 3 vols (1905); R.W. McInnis, "Indian Treaties and Related Disputes," *University of Toronto Faculty of Law Review* 27 (1969); D. Madill, *British Columbia Indian Treaties in Historical Perspective* (1981); A. Morris, *The Treaties of Canada with the Indians* (1880, repr 1976).

Indonesians are one of the smallest (about 3000 people in 1981) and one of the more recently arrived ethnic groups in Canada. They have almost all emigrated since the 1960s when political instability in Indonesia threatened certain ethnic and political groups. About 90% of the Indonesians in Canada are of CHINESE origin, but because of language differences they have tended not to be strongly associated with the Chinese community. Though most Indonesians have come to Canada directly from Indonesia, people born in Indonesia have come to Canada from the Netherlands, Hong Kong, China and more recently Vietnam. Over 75% have settled in Ontario and BC, especially in Toronto and Vancouver. Most Indonesian immigrants are highly educated and have sought occupations in the scientific, managerial or clerical fields. Indonesians are best known to a majority of Canadians for their distinct style of cooking and their famous batik fabrics. DAVID S. MOYER

Industrial Design, as defined by the International Council of Societies of Industrial Design (ICSID), "is a creative activity the aim of which is to determine the formal qualities of objects produced by industry. These formal qualities include the external features, but are principally those structural and functional relationships which convert a system to a coherent unit both from the viewpoint of the producer and the user. Industrial design embraces all aspects of human environment that are conditioned by industrial production." Though allied to the disciplines of ARCHITECTURE and ENGINEERING, industrial design has a shorter history and did not

come into being until the mid-19th century. Prior to this time, the production of everyday products was mainly the result of individual manual effort within a craft-based economy, but the Industrial Revolution made possible the mass production of these same products. Thereafter, artist/craftsmen were largely excluded from the industrial process. The need for a balance between art and industry was expressed by concerned groups and individuals, and led to industrial design as we know it today.

The major early developments in industrial design took place in continental Europe, especially in Great Britain and Germany. In Britain William Morris founded a crafts-based school of design and "production" that was anti-industry, and Henry Cole advocated the introduction of art to industry; in 1837 the Normal School of Design (later named Royal College of Art) was founded; in 1849 the *Journal of Design* began publication; and in 1851 the Great Exhibition was held in London. A comparable development occurred in Germany. In 1907 industrialists, businessmen, artists and architects joined to form the Deutscher Werkbund; their manifesto protested the ugliness of the built environment and demanded the revival of artistic, moral and social ethics. This philosophical direction culminated in the establishment, in 1919, of the Bauhaus, the design school which has profoundly influenced the development of contemporary industrial design. In the US, the profession of industrial design began as a method of sales promotion, concerned with product styling and packaging. During the Depression this approach was used by designers such as Norman Bel Geddes, Henry Dreyfuss, Raymond Loewy and Walter Dorwin Teague.

Industrial design became firmly established in Canada only after 1945, as a direct result of the development of secondary industry during the war. C.D. HOWE, concerned that this industrial potential be preserved, established the Committee for Reconstruction and Re-establishment and requested that the Exhibition Commission arrange a display of industrial discoveries by the NATIONAL RESEARCH COUNCIL. The exhibit, organized by Donald Buchanan to show that design and technical competence are not mutually exclusive, opened in June 1946 at the annual convention of the Canadian Manufacturers' Association, then travelled across Canada. Buchanan pushed for further exposure to industrial design both through the NATIONAL GALLERY and in several small publications. In June 1947 he received a government grant to investigate the role of industrial design in Canada and later that year he proposed a list of recommendations, one of which led to the Industrial Design Act of 1961 and the founding of the NATIONAL DESIGN COUNCIL. During the same postwar period, industrial designers began to organize as a profession. In 1946 the Affiliation of Canadian Industrial Designers was formed, which by 1947 had incorporated itself as the Assn of Canadian Industrial Designers.

Industrial design education was not formalized in Canada until the late 1940s, when the first course was offered at the ONTARIO COLLEGE OF ART. In Québec, l'Institut des arts appliqués, formerly l'École du meuble, began the first design program, followed after 1969 by degree programs at U de Montréal and U du Québec. The School of Industrial Design at Carleton and several Ontario community colleges offer industrial design programs, as do the universities of Alberta and Calgary.

Several Canadians are well known as industrial designers. Jacques Guillon, Julien Hébert and Frank Dudas were pioneers in the profession and worked in transportation (Montréal's Métro in the 1960s, Via Rail's LRC in the 1970s), exhibition (Expo 67, Expo 70) and furniture. More recently, Douglas Ball has become known internationally for his office furniture. Ian Bruce played a significant role in designing the Laser sailboat and in arranging for its manufacture in many countries. John Tyson, Morley Smith and André Morin have influenced several everyday products, including telephones, snowmobiles and housewares. Thomas Lamb, Keith Muller, Jan Kuypers, André Jarry and Michel Dallaire are known in Canada and abroad as leading furniture designers. A number of Canadian manufacturers have also contributed to a better utilization of design in industry, notably Bombardier, Sunar, Cooper, Bell Canada, and Black and Decker. Within Canada, both industry and the general public are slowly developing a growing awareness of the value of industrial design.

JACQUES GIARD

Industrial Quality Control makes use of scientific techniques to determine product and service capabilities, to enable an organization to provide economically a product or service suitable for its intended purpose. The objective of a good quality-control program is to enable all people and machines concerned to do their jobs right the first time and to provide assurance to the customer that this has been done. The detailed techniques vary from product to product and from service to service, but the principles remain the same.

In Canada quality control started in the military, aviation and electronic fields. For many years, the only standards available were those issued by the Dept of National Defence, which are still recognized throughout NATO. In line with the understanding of the early DND Standards, many major companies prepared their own quality-control standards, insisting that their suppliers meet these standards. In the early 1970s the power UTILITIES recognized the problem caused to many sections of industry by this mass of similar standards. The utilities and regulatory bodies involved formed a Canadian Standards Association committee, which developed a family of standards that were originally applicable only to the nuclear industry but were later broadened to be more generally applicable. The development of further standards in this field has been assigned to CSA by the Standards Council of Canada.

In 1946 the first industrial quality-control technical society on this continent was formed. This society developed into the American Society for Quality Control (ASQC) which now has over 40 000 members throughout the world. Canada has been active in the society virtually from the start. Canadian sections or subsections are active in Hamilton, Kitchener, London, Montréal (separate English and French sections), Toronto, Vancouver and Winnipeg. Several Canadians have been designated fellows for their contribution to the discipline. Canadians have also been active on the society's board of directors and the executive committee. In the late 1970s the Quality Assurance Education Assn of Canada was formed to correlate both university and community-college educational activities in this field. Some of the courses identified are in engineering faculties; others, in business management faculties. In 1980 the Assn of Professional Engineers of Ontario (APEO) recognized the field of assurance engineering as one of the specialist categories within its program of recognizing individuals with specialized skills. This program has not yet been extended to the other provinces or territories. Canada has been a member of the International Organization for Standardization since its establishment in 1947. In 1980 the ISO Technical Committee on Quality Assurance was formed; its first meeting was held in Ottawa. The Secretariat was awarded to Canada and has been established at Rexdale, Ont. The first secretary was a Canadian.

C.A. MILLS

Industrial Relations are concerned with all aspects, individual and collective, of the relationship between employers and employees. The individual aspects include planning and staffing, the selection and placement of appropriate candidates, their integration into the organization, training and development, their performance appraisal and proper compensation, productivity and discipline. Where the employees have formed a union, the relationship with management comprises labour-organization problems, union-certification procedures, the COLLECTIVE BARGAINING process, strike and dispute resolution, grievance procedure and arbitration. The employment contract, some basic employment standards, health and safety questions and all matters concerning antidiscrimination laws and charters of rights have implications both individual and collective (*see also* EMPLOYMENT LAW).

Law, because it regulates the employer-employee relationship, and economics, because the basic and fundamental problem of industrial relations is always the distribution of the outputs of production, are central to industrial relations. Sociology, psychology, political science, business administration, organizational behaviour, philosophy and cybernetics also contribute to a better understanding and functioning of individual and collective relationships. An important controversy exists over whether industrial relations is a discipline in itself — with its own theory and special methodology — or a subject matter to be studied with a variety of tools. The controversy, which will probably never be resolved, partly explains the variety of approaches in the study of industrial relations as well as the different structural arrangements found in institutions that teach it.

In some cases a teaching department, complete with its own staff and students, has been created as a distinct unit; in other places a centre for industrial relations functions as a forum where professors of law, economics, sociology and other disciplines gather to discuss topics of mutual interest concerning employer-employee relationships. Courses in industrial relations can all be gathered under one faculty or department, eg, a faculty of management or business administration, a department of economics or sociology, or they can be divided according to subject, eg, the study of wages and other labour economic problems in a department of economics, of trade-union movement and labour organizations in sociology, of collective bargaining and collective agreement in business administration. Some of these centres have developed courses and seminars for both management representatives and trade-union leaders and members. The activity can be the exclusive responsibility of the centre or part of the university extension or adult-education services.

Queen's University in Kingston, Ont, was the first Canadian university to offer structured teaching in industrial relations, through its Industrial Relations Section, est 1937. In 1944 Laval University opened its Department of Industrial Relations, and Université de Montréal inaugurated its own teaching department a few months later. To put these dates into perspective, the first industrial-relations section of a N American university was created at Princeton, New Jersey, in 1922, and the famous New York State School of Industrial and Labor Relations at Cornell University, from which many Canadian specialists graduated, opened in 1945. At McGill University the Industrial Relations Centre was established (1948) in the Department of Economics and Political Science and transferred to the Faculty of Management in the early 1960s. The Institute of Industrial Relations at UBC was established in 1960 but closed in the 1970s. The Centre for Industrial Relations at University of Toronto was founded in 1965.

At the undergraduate level, Laval and Montréal have teaching and degree-granting departments as well as programs leading to masters' and doctoral degrees. Queen's had a teaching department until 1961, and now has an Industrial Relations Centre. In the late 1970s, U of T opened a graduate course leading to a master's degree in industrial relations (MIR) and in the early 1980s a course leading to a PhD.

The two universities with teaching departments have always offered courses in human-resources management and collective relationships. There are about 50 undergraduate courses, 15 of them obligatory, distributed among 5 or 6 fields of study: theory and methodology, business and personnel administration, trade unionism and collective bargaining, labour legislation, labour and manpower economics. Graduate courses are offered in the same fields. In other universities, industrial-relations courses, eg, industrial relations, labour relations, collective bargaining, labour law, arbitration procedures, usually concentrate on institutional aspects of collective-relationship problems. Subjects likely to be taught in the corresponding departments include labour economics and labour market analysis, industrial sociology, industrial psychology and labour history. Personnel administration and human resources are dealt with primarily in the administration curricula, eg, personnel administration, organizational behaviour, human-resources management, human relations.

In 53 Canadian universities almost 900 courses were taught in industrial relations and human-resources management in 1977-78, 70% of them at the undergraduate level and 60% of them offered by faculties and departments of management and administration. They were attended by about 50 000 students. At the college level, courses on the same subjects are given especially to commerce and administration students, who are likely to be given less theory and more application to prepare them as technicians rather than professionals.

Industrial-relations graduates work mainly in personnel and human-resources departments of large and medium-size companies, in trade unions and labour organizations as researchers, organizers and consultants, and in governments and industrial-relations agencies, eg, labour-relations boards and arbitration services. A few operate their own consulting firms. All these graduates compete directly with other professionals working in the same field — lawyers, administrators, industrial psychologists and on-the-job company trainees. In Québec there is a corporation of industrial-relations specialists.

Laval and Queen's are responsible for most academic publications in industrial relations. The Laval journal *Relations industrielles / Industrial Relations*, published since 1945 and bilingual since 1964, is recognized internationally. Queen's publishes a variety of studies. In 1978 Montréal started an important series of monographs on legal aspects of industrial-relations problems. Several universities publish the proceedings of their annual conferences, as does the Canadian Industrial Relations Association, a nonprofit, voluntary organization founded in 1963 that promotes industrial-relations research in Canada. The Laval journal is also the association's official publication. The longest-lived serial publication, *The Labour Gazette*, put out by the federal Department of Labour since 1900, fell victim to government economic constraints in 1980.

GÉRARD HÉBERT

Industrial Research and Development The history of industrial research and development (R & D) and innovation in Canada is unique and certainly has not yet been explained or understood. Prior to WWII, Canadian industry depended largely on imported TECHNOLOGY. The few indigenous innovations were the work of individual inventors rather than the result of systematic, planned research and development. During WWII, the MANUFACTURING industry grew spectacularly and the R & D to support it grew almost as rapidly. Canada emerged from the war with the world's fourth-largest manufacturing output, exceeded only by the US, UK and USSR. No one expected Canada to maintain this position when countries such as Japan, Germany, France and Italy recovered from the war, but Canada's steady descent to 13th place in 1981 was not forecast.

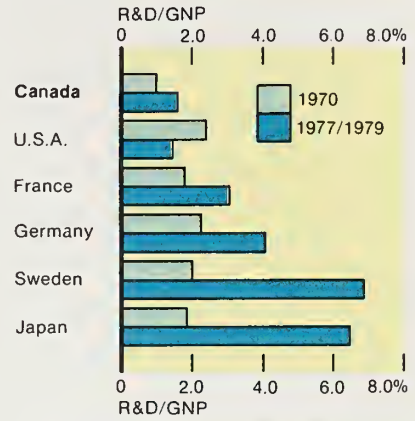
In the primary industries, Canadian R & D has been significant but not spectacular. There have been some important innovations in most such industries, including MINING, AGRICULTURE and PULP AND PAPER. In other areas Canada has been a competent user of technology, making many minor innovations but not being a world leader in development.

After the war, Canada had a substantial lead over most other countries in many HIGH-TECHNOLOGY fields. The Defence Research Board and the Armed Forces, supported in some areas by the NATIONAL RESEARCH COUNCIL and other government agencies, made a valiant but usually unsuccessful effort to maintain this lead. The history of industrial R & D and innovation in Canada from 1945 to the present can be told vividly by tracing the history of some of these defence-initiated activities (*see* DEFENCE RESEARCH). The outstanding technological success of the postwar period has been nuclear power and the evolution of the CANDU reactor. Canada became involved in building a heavy water reactor for producing plutonium as part of the US-British-Canadian atomic bomb effort. An Anglo-Canadian NUCLEAR RESEARCH laboratory, with substantial French involvement, was established in Montréal in 1942-43. Canada's participation was based on experimental work begun by George LAURENCE and others at the NRC as early as 1939. Credit for getting the projects started so quickly and so successfully must go mainly to C.J. MACKENZIE, then acting president of the NRC who had the support of C.D. HOWE, then minister of munitions and supply. Credit for the success of the design of the early reactors NRX and NRU goes to the team led by Sir John Cockcroft from Cambridge, England. British and French involvement made a significant contribution in the early stages but, over the years, the CANDU venture has become almost completely Canadian. The project was often assailed by both political and scientific doubters but Howe and Mackenzie were able to ward off all attacks. Final success was due to the impetus provided by John ROBARTS, then premier of Ontario, who decided that ONTARIO HYDRO would order the first commercial CANDUS. The result was a series of nuclear reactors, designed and built in Canada, that in spite of their recent problems remain among the most successful power-producing reactors in the world.

The scientists at ATOMIC ENERGY OF CANADA LIMITED, led by W. Bennett LEWIS, who succeeded Cockcroft, went on to do the research and development that could lead to a successor to CANDU. Over the years they have demonstrated the scientific and technical feasibility of an organically cooled, thorium-fueled version of the CANDU reactor that would have higher efficiency, less radiation hazard and would reproduce, in the form of plutonium, a substantial fraction of the fuel that it burnt. Such a reactor would produce power at substantially lower costs than even the present CANDU but not even a prototype has been built.

Private enterprise with, in some cases, effective support from government has made significant advances. At the end of the war, Canada had developed a substantial electronic research capability partly in government and partly in industry. The Defence Research Board (DRB) set out to maintain and expand this capability by supporting industry financially and through work in its laboratory, the Telecommunications Research Establishment, Shirley Bay, Ont. The NRC division of Radio and Electrical Engineering was also involved in the venture. This initiative contributed to the establishment of the Bell Northern Research Laboratory, also at Shirley Bay, and to the worldwide success of Northern Telecom Ltd, Mitel Corp and many other Canadian electronics ventures (*see* ELECTRONICS INDUSTRY). Work at Bell Northern Research led to advances in digital and electronics switching technology that have made Northern Telecom one of the world's major manufacturers of telephone switching equipment. In 1976 the Telecommunications Research Establishment was taken over by the Dept of Communications, which has continued the policy of supporting industry in areas such as SATELLITE COMMUNICATIONS and TELIDON.

Research and Development Expenditures of Several OECD Countries



Source: Catalogue 88-201 Annual, Statistics Canada

Development in the AEROSPACE INDUSTRY has been much more complex. Col W.W. Goforth, creator of the DRB, talked about the advent of satellites as early as 1945. From the beginning, DRB programs included work on rockets and electronics for guided missiles. The DRB laboratory at Shirley Bay designed and built the first Canadian satellites, the Alouette and Isis series. RCA Victor in Montréal, involved as a subcontractor, was chosen by the government in 1962 as prime contractor for research and planning for the first Canadian COMMUNICATIONS satellite. Telesat Canada was then formed and gave the contract for construction to the low bidder, Hughes Aircraft, in California. RCA Victor was anxious to follow its successful R & D by production of both satellites and Earth stations; instead it was given another research contract to work on the next generation of communications satellites. In Jan 1977 RCA sold its R & D facilities outside Montréal to Spar Aerospace Ltd, Toronto, and abandoned satellite research in Canada. The DRB laboratory, by then transferred to the Dept of Communications, continued to work on future satellites with Spar.

In 1954 the Canadian Armed Forces expressed interest in possible future uses of technology using infrared radiation for various purposes. DRB gave de Havilland Canada a contract for R & D work under which a specialist team was brought over from England to transfer this technology to Canada. Work began in the special projects and applied research division of de Havilland, which was later purchased by

L.G.A. Clarke and became Spar Aerospace Ltd. After many years of successful participation in the US space program, Spar broke into the headlines in 1981 with the CANADARM, the remote-manipulator system built for the US space shuttle. Spar has also worked with Hughes Aircraft on the Anik series of communications satellites and was completely responsible for Anik D, launched in 1982. The company is now building 2 similar satellites for Brazil for launch in 1985. In 1984 Spar negotiated a multimillion dollar contract for the development of infrared detection equipment for the US Navy.

Canadian universities showed an early interest in COMPUTER SCIENCE. In 1952 the NRC and DRB supplied the U of T with one of the world's big computers, the Ferut, made by the Ferranti Co in England. Shortly thereafter, Ferranti established a research laboratory in Toronto and DRB gave it a major contract. Many of the present leaders of computer technology in Canada were trained in this laboratory. Its first major project was Datar, an information management system for the Royal Canadian Navy that pioneered important new concepts and technology in information management. It was so far ahead of its time that no other navy adopted it; nevertheless, it served as a model for later systems.

Ferranti supplied the Gemini computer for Air Canada's first reservation system, which was highly advanced for its time. The company was later forced, for financial reasons, to sell its Canadian computer design facility and to withdraw from the computer field. Canadian efforts to finance the purchase of Ferranti or its latest design, the FP 6000, failed. The design for the FP 6000 was sold in the UK and the computer remained a best-seller in Europe for many years.

Under the impetus of defence production, Canada emerged from WWII with a relatively large, successful and innovative aircraft industry. At the end of the war the industry was largely government owned but, because of C.D. Howe's commitment to private enterprise, it was soon sold to British and US companies. In Toronto, the A.V. Roe Co designed, developed and produced the AVRO CF-100 fighter and the Orenda engine, both thoroughly competent and successful ventures by world standards. At the same time, as a private venture, A.V. Roe designed and built the AVRO JETLINER which first flew in 1949, only a few days after the de Havilland Comet flew in England. However, Howe ordered work stopped on the transport. By 1960 the AVRO ARROW, a new supersonic fighter, had made several spectacularly successful test flights and its Iroquois engine was doing very well on the test bed. However, costs had greatly outrun estimates and the US Air Force refused to place an order for the aircraft. PM John DIEFENBAKER ordered the project stopped and all prototypes and parts not just scrapped but physically destroyed. Economic and industrial historians will probably identify the cancellation of the Arrow as the turning point in Canada's history as a manufacturing nation. Subcontracts from the Arrow and other aircraft production supported a large and growing number of small companies capable of high-quality innovation and production. Although they were supported by the Arrow contract, their services stimulated progress in many related industries.

These few examples of the history of industrial R & D and innovation in Canada make it clear why Canadian high-technology industry has not prospered. Successive governments have failed to give continuing support to innovation and have, in many cases, not only failed to support success but have discouraged ventures that seem to be on the verge of breaking into new markets. Yet government cannot do it all, although it has long been customary for Canadians to blame most of their shortcomings in initiative, creativity and even productivity on the government. Certainly, a stable and encouraging political environment is a necessary but not a sufficient condition for success. However, with a few outstanding exceptions, Canadian financial institutions have been timid and conservative and many Canadian entrepreneurs and managers have been well below acceptable world standards.

Even with uncertain government support and changing policies, the genius of Canadians continues to break through. The aircraft industry has continued to be moderately innovative with the DE HAVILLAND OTTER, which dominates northern flying, the Dash 7 and Dash 8, the CANADAIR CHALLENGER, the Pratt and Whitney (United Aircraft) PT6 gas turbine (which powers the Twin Otter) and other successful aircraft. Through companies such as Northern Telecom, Mitel and others, the Canadian communications and electronics industry is now a frontrunner in fibre optics, digital data management, microprocessors, computer software, Telidon technology, etc. Canada has repeatedly demonstrated that it has the human, educational and research resources to do first-class industrial R & D. Success, measured in industrial jobs and exports, depends on a climate favourable to research and development at all levels (including the universities) and to industry. If these can be created and maintained, Canada can be reindustrialized in the next generation. *See* INVENTORS AND INVENTION; SCIENTIFIC RESEARCH AND DEVELOPMENT.

OMOND SOLANDT

Industrial Strategy is a term that generally refers to any attempt by government to apply a coherent and consistent set of policies that are designed to improve the performance of the ECONOMY. These policies are frequently directed at the manufacturing sector, but an industrial strategy could also centre on the performance of a number of other sectors in the economy, ranging from resource production to services. Industrial strategies are oriented towards correcting imbalances in the economy's performance, and involve the assumption by government of a prominent role in facilitating or effecting economic change. Sometimes the means deployed are very direct (what is now called "interventionist") but attempts to restructure an economy can be undertaken using a laissez-faire, free-market approach. Whatever the method employed, the policies implemented under and pursued by an industrial strategy reflect relatively detailed and coherent economic goals.

While the debate about industrial strategy is fairly recent, the concept of using the powers of government to shape the economy is not new. In the late 19th century, there were major efforts in Canada to build an integrated continental economy through tariff protection, the construction of the transcontinental railways and the encouragement of immigration to settle the West. Each of the elements of this economic design complemented the others to yield a national framework for development which was suitably labelled the NATIONAL POLICY. The intention was to encourage manufacturing in central Canada through the use of tariffs. Markets for the manufactured goods would be expanded by creating a wheat-based agricultural economy in western Canada through settlement policies (*see* IMMIGRATION POLICY). The western wheat economy would, in turn, provide the agricultural exports needed to support the new western population and to pay for eastern manufactured goods. All of this economic activity would be tied together by a transcontinental railway, which would permit the shipment of agricultural and resource products abroad and would allow manufactured goods to be shipped from central Canada to the West and to the Maritime provinces. Like many economic strategies, the National Policy was driven by an external imperative: the rapid growth of the US economy after the Civil War, which was expected to create pressures for the annexation of the Canadian West and for North-South economic integration (*see* CANADIAN-AMERICAN RELATIONS). The politicians of the time feared that if political means were not used to promote the emergence of a national transcontinental economy, Canada's future as an independent country would be seriously compromised.

The current interest in industrial policy has also been prompted by external factors, most notably the rapidly changing environment of INTERNATIONAL TRADE. By the end of WWII, Canada had emerged as a middle-level power both militarily and economically. In the postwar era, Canada's economic strengths lay in resource exports (principally to the US) and in the expansion of manufacturing (primarily through foreign-owned subsidiaries oriented towards domestic, as opposed to export, markets). However, by the early 1960s the manufacturing sector was under pressure. Europe had fully recovered from war and was expanding its industrial base. Moreover the US dominated the international trading system. Thus, while international demand for traditional resource products such as pulp and paper and minerals was still strong among Canada's industrialized trading partners, international trade in manufactured goods became more competitive and the manufacturing sector began to experience increasing difficulties. This resulted in a national debate about the future prospects of the Canadian economy, including the issue of whether Canada would revert to its former status as a resource producer or whether it would succeed in expanding its postwar manufacturing base.

Even in the early 1960s, there was a fairly developed national consensus about the nature of the problem. Manufacturing firms in Canada were internationally uncompetitive because they tended to be oriented towards the domestic market, because they were not sufficiently concerned with export activity, and because they were poorly managed, did little in the way of innovation or research and development (R&D), and often operated at a level of production too low to allow economies of scale (ie, lowering of the average costs of production). Debate revolved around the origins of this problem and the possibility of solutions. The majority of economists (but by no means all) argued that the root of the difficulties facing the manufacturing sector lay in tariff protection (a remnant of the National Policy) and advocated a steady reduction in the level of tariff protection enjoyed by Canadian firms and a fuller integration of the Canadian economy into the international economic system, eg, through active government support for international agreements and institutions that promoted the liberalization of world trade, such as the General Agreement on Tariffs and Trade (GATT). An increase in competition, generated by an increase in imported products, and wider export opportunities for domestic producers were anticipated to improve the health of Canadian industry, ie, to make it more efficient, innovative and export oriented.

Another school of thought stressed the structural problems of the manufacturing sector, such as the small size of most firms, excessive concentration on domestic as opposed to export markets, and a failure to give sufficient emphasis to industrial design and innovation. From this perspective, one of the major causes of the problems in the manufacturing sector was the high level of foreign ownership. Foreign ownership, it was argued, had encouraged firms to increase the purchase of parts and services from their parent firms, to rely on innovations from abroad, and to concentrate on the domestic market so as to minimize export competition with

the parent firm or its other foreign subsidiaries. Economists of this school stressed the need to reduce the level of foreign ownership in the economy and to improve the competitive capability and export orientation of Canadian-owned companies through various forms of government assistance, ranging from support for R&D to the promotion of leading sectors of industrial growth. These economists rejected the use of tariff reductions or free trade as a means of restructuring the Canadian economy, arguing arguing that a weak Canadian economy would be adversely affected by trade liberalization. Instead, they advocated a degree of restructuring before tariff barriers were lowered to ensure that Canadian industry would be strong enough to take advantage of new international markets and compete with increased imports. Restructuring in this context meant the development of an industrial strategy focused on Canada's key economic sectors.

Over the years, the federal government's approach to the question of industrial policy has embodied major elements of the trade liberalization approach. During the last 30 years tariffs have been gradually reduced, and Canada has been a strong supporter of the GATT system and of other attempts to liberalize international trade. In the mid-1960s a modified form of sectoral free trade in automobiles manufactured in Canada and the US was introduced, allowing the major N American car manufacturers to import and export cars free of duty provided that certain minimum production levels were maintained in both countries (*see* CANADA-US AUTOMOTIVE PRODUCTS AGREEMENT). However, federal (and provincial) industrial policy has involved more than trade promotion and tariff reductions.

During the 1960s the federal government took a number of steps designed to improve the structural characteristics of Canadian industry. In 1963 the Department of Industry was created and was charged with assisting Canadian manufacturing firms to improve their competitive capability. This department was then fused with the Department of Trade and Commerce to form the Department of Industry, Trade and Commerce (ITC) in 1969. The 2 departments developed a number of industrial assistance programs designed to encourage investment, to improve firms' marketing capacities both at home and abroad, and to increase corporate spending on R&D. The 1960s also witnessed the emergence of a number of specialized federal departments, some of which were designed to improve the government's management of the economy (eg, the Departments of Employment and Immigration, Communications, and Regional Economic Expansion); others were special-purpose agencies designed to assist industry in meeting foreign competition (eg, the Export Development Corporation). While all of these initiatives were intended to facilitate industrial development and sometimes to encourage industry to restructure, there was little, if any, attempt to lend these initiatives coherence through the development of an industrial strategy.

During the 1960s and early 1970s, however, there was strong pressure to develop such a strategy. A number of studies commissioned by the federal government raised the problem of foreign ownership in the Canadian economy (*see* FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INVESTMENT, TASK FORCE ON). These reports, and others, also suggested that a broader approach to the problems of the structure of the Canadian manufacturing sector was required. In addition, the growing importance in international trade of the newly industrializing countries of the Third World, the emergence of HIGH TECHNOLOGY (an area in which Canadian industry was weak) as a major factor in international trade, and increased uncertainty in the international trading system (caused by a worldwide increase in protectionism and the subsidization of domestic industries) seriously challenged Canadian firms in their efforts to expand export markets and to fight off import competition. These factors encouraged the federal government to deal with the problems of the manufacturing sector in a more comprehensive manner.

In 1974 an explicit attempt was made to control the flow of FOREIGN INVESTMENT into Canada through the creation of the Foreign Investment Review Agency. Later a number of other measures were taken in an effort to address specific structural problems in individual industries. Grants for R&D and investment were offered to the AEROSPACE INDUSTRY, and the government took over the country's 2 leading airframe manufacturers to ensure the development of new aircraft projects. Restructuring initiatives or financial assistance programs were also undertaken in other sectors, ranging from clothing and footware to forest products.

Although these diverse initiatives were not part of an overall industrial strategy, several federal agencies such as the Privy Council Office (PCO) and ITC made attempts to design one early in the 1970s; but no agency was able to design a strategy that met with general acceptance within the federal bureaucratic system. In fact, the ITC initiative, which had started as an ambitious effort to construct a strategy encompassing a large number of public policy objectives, gradually evolved into a more modest industrial consultation process that concentrated on sectoral competitiveness.

Despite these failures, the industrial strategy issue kept re-emerging. When the Liberal government of Pierre TRUDEAU was returned to power in 1980, there was another attempt to formulate an industrial strategy, inspired by the government's National Energy Program. This attempt also failed, partly because of growing American objections to Canadian energy and foreign-ownership policies. In the end, the federal government did succeed in developing a strategy, which appeared in an economic development White Paper published with the 1981 federal budget (*Economic Development for Canada in the 1980s*). This paper assumed that resource developments both in eastern and western Canada would be the future engine of growth, and that these resource developments would both provide industrial benefits for central Canada and expand and diversify economic activity in the regions. Unfortunately, this strategy also came to grief when the collapse in energy prices in 1981-82 led to the delay or cancellation of most of the MEGAPROJECTS on which it depended.

There are various explanations for Canada's continued lack of an industrial strategy despite the immense effort and large sums of money which the federal government has expended on industrial policy. One viewpoint holds that much of the problem centers on the nature of the bureaucratic system in Ottawa, in which various CENTRAL AGENCIES compete with individual departments for influence over policy. Different federal departments have evolved very different concepts of an industrial strategy, and some departments do not even believe that a strategy is needed. Politicians also find it difficult to commit themselves to a specific course of action in the industrial sphere; because if the industrial goals of an economic development strategy are not attained, they can be held accountable for its failure. The chances of failure are high because industrial strategies are highly dependent upon ECONOMIC FORECASTING, which is a very imperfect art, as the federal government found to its detriment with oil prices.

The highly diversified nature of the Canadian economy is another reason why it has been difficult to implement an industrial strategy for secondary manufacturing in Canada. In Canada, manufacturing accounts for less than 20% of total economic activity, compared to between about 25% and 33% in many European countries and in Japan. In fact, manufacturing has played a far less significant role in Canada than in virtually any other industrialized country. Moreover the growth of manufacturing in Canada has not been based as much on foreign-owned branch plants as on domestically owned firms. Even in the relatively homogenous economies of Europe and Japan, a consensus on industrial issues has never been easily achieved, but the structure of traditional industry-government relations in these countries and the bias towards manufacturing allows the development of a consensus on specific issues. In Canada, manufacturing interests are overshadowed by the resource sector, and fractured by disputes between large and small business and between domestic and foreign-owned firms.

In addition, and perhaps more importantly, there are marked differences of economic and industrial interest between the various regions within Canada (*see* REGIONALISM). For example, an industrial policy designed to assist the AUTOMOTIVE INDUSTRY will be seen by the western provinces, whose economies are based primarily on resource development and agriculture, as being favoured treatment for central Canada. Indeed the export markets of those provinces may be threatened if a policy for restructuring the automobile industry includes import restrictions on cars from a country, such as Japan, that is a major export market for western grain or coal.

The Canadian economy, with its highly industrialized centre and resource-producing periphery, frequently displays contradictions of this kind. Indeed, it was just these types of contradiction that in the end caused the breakup of the original National Policy. These contradictions explain, moreover, why provincial governments became much more active during the 1970s in implementing their own provincially based industrial policies. The provinces have fairly homogenous economies based on fewer and less diverse economic activities, and it is easier for them to develop coherent strategies that command a reasonable degree of local public support. The challenge at the federal level is to prevent the balkanization of the Canadian economy on regional lines, and at the same time to develop a national industrial strategy that is sensitive to regional aspirations. The task is daunting and may require a miracle of political compromise, but so too does the existence of the country.

MICHAEL JENKIN

Reading: R.D. French, *How Ottawa Decides* (1980); Michael Jenkin, *The Challenge of Diversity*, (1983); R.W. Phidd and B. Doern, *The Politics and Management of Canadian Economic Policy* (1978); Science Council of Canada, *Forging the Links: A Technology Policy for Canada* (1979).

Industrial Unionism, the dominant form of labour organization. An industrial union is one which, for organizational purposes, includes all workers in a particular industry (eg, steel, automobile) regardless of whether they are skilled or unskilled. The union's bargaining power is based upon the number of its members. In contrast, CRAFT UNIONS (plumbers, electricians) limit their membership to workers with a specific trade or skill. Their power is based upon the scarcity of highly skilled labour. Craft unions, established first, dominated the labour scene until the 1930s but are now largely confined to the construction industry. The first significant attempt to organize on an industrial basis was undertaken in the 1880s by the KNIGHTS OF LABOR, which opposed craft unionism, advocated unity of the producing classes, and (more practically) opposed employer blacklists and discrimination. It was briefly successful in organizing not only unskilled male workers but also women and minorities. After the demise of the Knights in the late 1880s, the idea of industrial unionism persisted as craft unions came to be regarded as

anachronistic in an increasingly industrialized society. Organizations such as the Catholic union movement in Québec in the 1920s (*see* CONFEDERATION OF NATIONAL TRADE UNIONS) and the All-Canadian Congress of Labour (est 1927) sought to combine the principles of nationalism and industrial unionism. In the 1930s, the Workers' Unity League, a Communist-sponsored organization, became interested in organizing all workers in the emerging mass-production industries.

The difficult task of organizing the bulk of the industrial labour force was not accomplished until WWII under the Congress of Industrial Organizations (CIO). This movement originated 1935 in the US in opposition to entrenched craft unions, but it also attracted thousands of Canadian workers into what would become established industrial unions such as the United Automobile Workers (*see* OSHAWA STRIKE) and the United Steelworkers. It was successful because the political and economic climate was ripe for a pragmatic form of "business unionism" which combined organization on an industrial basis with a philosophy emphasizing collective bargaining and strike action to improve the wages and working conditions of its members. In Canada, the new industrial unions also formed a lasting alliance with the CCF/NDP. In the 1960s and 1970s new white-collar unions have emerged which follow the industrial-union model, but their composition and characteristics are somewhat different from those of their blue-collar predecessors.

LAUREL SEFTON MACDOWELL

Reading: D. Morton with T. Copp, *Working People* (1980).

Industrial Workers of the World (popularly known as "Wobblies"), a REVOLUTIONARY INDUSTRIAL UNION fd 1905 in Chicago. The IWW's rapid expansion in the Canadian West demonstrated the influence of American labour ideology on the region's labour movement. Wobblies were mostly unskilled, low-status migrant workers ("blanket-stiffs") — miners, loggers, navvies and harvesters — who were recruited to the West primarily from southern and eastern Europe and were brutally exploited in the booming economy. The IWW doctrine which attracted them was a peculiar form of syndicalism (an international doctrine based upon the primacy of industrial unionism and the use of the general strike in the settlement of class struggles). Wobbly syndicalism was essentially pragmatic; it advocated the organization of all workers into one body and supported direct action as the only form of protest open to immigrant workers, who were excluded from the electoral process. IWW propaganda was disseminated primarily in street meetings. In 1912, when Vancouver authorities tried to ban street demonstrations, the Wobblies started and won a spectacular free-speech fight. Soon afterwards the IWW led 7000 workers out on strike against the CANADIAN NORTHERN RAILWAY in BC's Fraser Valley. The Wobblies lost, and massive state repression, combined with employer resistance and economic depression, began the process of the union's collapse. The Wobblies' days of glory ended before 1914, but their syndicalist ideology was adopted by the ONE BIG UNION, created at the end of WWI. A. ROSS MCCORMACK

Reading: A. Ross McCormack, *Reformers, Rebels, and Revolutionaries* (1977).

Industrialization, process in which human skills are both replaced and enhanced by the use of scientifically based TECHNOLOGY for the production of goods and services, with the aim of creating wealth by reducing per-unit costs of production. It exerts a force affecting the social, economic and political makeup of society; the process has placed Canada among the more highly developed nations in the world and has helped it to attain a high STANDARD OF LIVING.

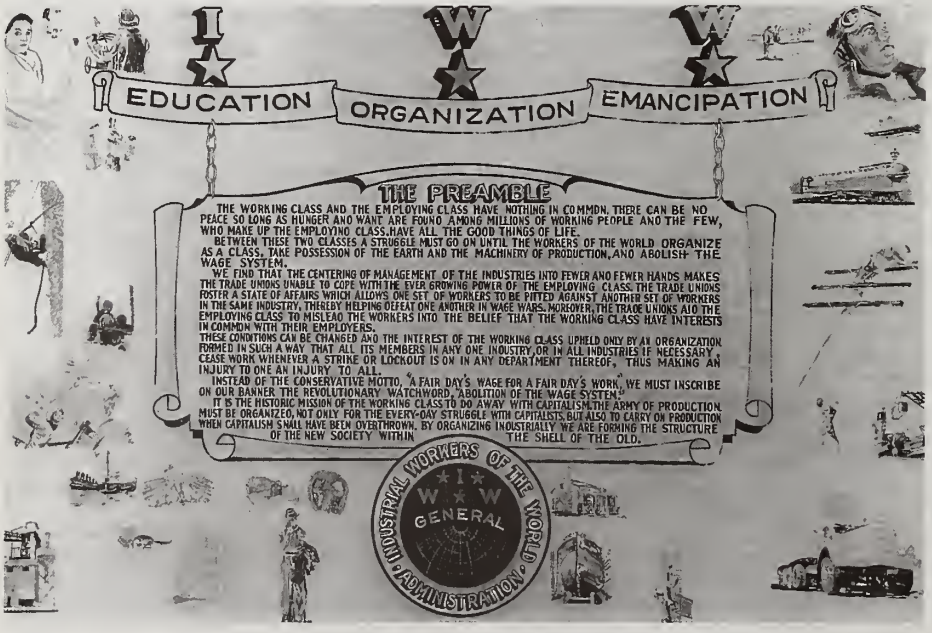
In Canada the processes of industrialization were readily apparent by the 1850s, by which time both Britain and the US were well ahead. Before industrialization, the economy of Canada, as a colony of France and then of Britain, had been based upon the export of fish, then fur and later timber. Finally the export of wheat to various markets, including the US, played a crucial role in generating income.

By 1846, as preferential trade agreements with Britain ended, Canadian business interests and governments had embarked upon a railway-building program in order to transport farm produce more efficiently to export markets and to attempt to compete with American shipment systems such as the Erie Canal. Many analysts argue that the demand for railway materials and equipment contributed to the development of heavy industry in the 1850s, and that the increased demand for agricultural products, especially wheat in the 1860s, stimulated a demand for new and improved agricultural equipment (*see* RAILWAY HISTORY). Agricultural equipment was in greatest demand in Ontario, where larger areas of tillable land made its use more efficient, possibly contributing to the decline of an emerging industrial base in the Maritimes.

By the 1870s, as demand increased, larger production enterprises were being formed to gain cost advantages of higher-volume production. In 1879 the federal government instituted the NATIONAL POLICY, which consisted of selected increases in tariffs on imported goods, the completion of a transcontinental railway and the encouragement of western settlement. Vested interests and the government hoped to stimulate and protect manufacturing enterprises, stem the flow of migration to the more industrialized US, increase the internal market for manufactured goods and improve the political unity of Canada. It is debatable whether these aims were accomplished, although steel production and the manufacture of agricultural equipment did increase. However, it was 1896 before any noticeable advances were made in the manufacture of capital equipment, consumer goods and the processing of natural resources. The transcontinental railway was completed in 1885, but concentrated land settlement did not follow until later.

Most of Canada's steel production capacity was developed from the turn of the century through WWI (*see* IRON AND STEEL INDUSTRY). Between the world wars, refineries for copper, zinc and magnesium were developed. SHIPBUILDING was expanded and aircraft and automobile industries were developed. Pulp and paper industries also grew as American timber supplies declined. By the 1930s transportation services and chemical and allied products production were developed. Steel and aluminum production increased again during WWII. Since then, mineral, oil and gas extraction and refining industries have expanded. These latter developments have had some stimulative effects upon the manufacture of extraction, refining and transport equipment, but the larger consequence has been an unusually high proportion of income from the export of raw materials and semi-finished goods in exchange for foreign-manufactured goods. This has caused concern about the vulnerability of Canada's economy to fluctuations in demand in external world markets. *See also* BUSINESS HISTORY; ECONOMIC HISTORY; FOREIGN INVESTMENT; INDUSTRIAL STRATEGY; INDUSTRY; MERCANTILISM; PROTECTIONISM; SOCIAL HISTORY; WORKING-CLASS HISTORY; JOSEPH SMUCKER

Reading: H.A. Innis, *The Fur Trade in Canada* (rev ed 1956); D.S. Landes, *The Unbound Prometheus* (1969); T. Naylor, *The History of Canadian Business, 1867-1914* (1975); R. Pomfret, *The Economic Development of Canada* (1981).



Preamble of the manifesto of the Industrial Workers of the World (*courtesy Public Archives of Canada/C-57200*).

Industry, in its broadest sense, includes all economic activity, but for convenience commentators divide it into 3 sectors. The primary sector includes establishments involved in the exploitation and initial processing of natural RESOURCES. For example, COAL MINING includes establishments that break, wash, grade or otherwise prepare coal for use as a fuel. The secondary, or MANUFACTURING, sector is made up of primary manufacturing establishments, ie, those that process raw materials to produce IRON AND STEEL, PULP AND PAPER, PETROLEUM products, etc, and secondary manufacturing establishments, ie, those that produce consumer goods (eg, CLOTHING) and capital goods (eg, ships). The tertiary or SERVICE-INDUSTRIES sector includes establishments in both the private and public sectors that provide services. These range from bakeries to the BANK OF CANADA. All these elements make up Canada's industrial system, which has become increasingly complex over time.

History in Canada

Industrial development has long been linked to the exploitation of Canada's rich resource endowment. In the earliest years of the FUR

TRADE, there was little related industrial development. Emphasis was on commercial activity related to the exportation of resources. But as settlement proceeded, domestic industry began to grow in areas that facilitated the exploitation of resources, such as RAILWAY equipment, SHIPBUILDING and farm machinery. A small IRON foundry was operating near Trois-Rivières, Qué, as early as the 18th century. In the 19th century, industrial development began in earnest. By 1850 there were paper mills and foundries in both Upper and Lower Canada. Steam engines and farming implements were also being produced. To spur industrial development, the NATIONAL POLICY was set in place in 1879 by the Conservative government of John A. MACDONALD. The policy had 3 thrusts: stimulation of domestic industrial development through the establishment of tariff barriers; encouragement of immigration to develop the agricultural potential of the West and to create a large domestic market; and completion of the CANADIAN PACIFIC RAILWAY to the West Coast as rapidly as possible. The policy did succeed. With the settlement of the West, AGRICULTURE, MINING, lumbering and fishing expanded. The government supported this type of industrial development by encouraging development of appropriate infrastructures (eg, railways, ships, grain elevators, ROADS). Manufacturing industries that supported development of Canada's natural resources were centered along the St Lawrence R and the Great Lakes in Québec and Ontario. These developments were accompanied by the emergence of the service sector (eg, commercial and financial institutions, public administration). Canada became a major trading nation, sending raw and semiprocessed natural resources to the large metropolitan markets of Europe and the US. Industrial development was given a further boost by WWI. War materials poured out of Canadian plants, strengthening manufacturing. This growing strength encouraged the great expansion of the 1920s. By 1929 pulp and paper, the largest single industry, had captured 64% of world trade. Government continued to encourage the development of infrastructure and undertook large programs, such as mineral exploration conducted by the GEOLOGICAL SURVEY OF CANADA and plant breeding research (eg, for hardy WHEAT strains), which directly assisted the private sector in industrial development.

While primary industries dominated the scene, manufacturing in areas such as the AUTOMOTIVE INDUSTRY grew as well. This great postwar expansion required large-scale capital investment, much of which came from the US in the form of direct investment in branch plants of US firms, which were thus able to serve the Canadian market and circumvent tariff walls set up by the National Policy. In fact, US capital rapidly replaced the British capital of the previous century, which had been mainly in the form of portfolio investment. By 1920 US capital represented over 50% of FOREIGN INVESTMENT in Canada, compared with 15% in 1900.

This rapid industrial expansion came to a sudden halt with the GREAT DEPRESSION of the 1930s. Between 1929 and 1933, Canada's export income dropped by 67%. Firms closed and unemployment soared. Export-oriented industries (wheat, fish, lumber, pulp and paper) were most severely affected. Industries established to serve the Canadian market, situated mainly in central Canada, suffered least and were in a much better position to respond to the industrial requirements of WWII. The war brought demands for sophisticated products such as aircraft parts, cars and trucks as well as raw materials. Many of these products required new techniques of production, which became integrated into Canada's industrial system in the postwar period, a period which saw high and sustained economic growth until the 1970s.

Modern Industry

Because the ravages of war had not touched Canada, the country's industrial structure was intact and it adapted readily to the requirements of a peacetime domestic economy and to the demands of postwar reconstruction in Europe. These activities shaped Canada's current industrial structure.

Structure Canada has an open economy, with more than 28% of its 1982 GROSS NATIONAL PRODUCT ($356.6 billion) being exported; about 70% of this trade is with the US. This state of affairs is reflected by a current account balance that indicates a large merchandise trade surplus, caused primarily by the export of crude and semiprocessed natural resources. Canada's strength in primary industries is not matched by a strong secondary manufacturing sector. In fact, as a proportion of GNP, the manufacturing sector has shrunk from a peak of 40% in 1973 to less than 30% today. There has always been a trade deficit in fully manufactured goods in the postwar period, but this deficit increased from about $3 billion in 1970 to $18 billion in 1980, reflecting a growing erosion. The service sector has continued to expand. Canadians now belong to what has been called "The Information Economy," based on the manipulation of information. Over the past 30 years, the number of Canadians employed in information has grown twice as fast as the work force as a whole. Today, over 40% of Canadian workers are in information fields, up from 20% in 1931. The shift towards a service economy based on information is a characteristic of industrialized countries.

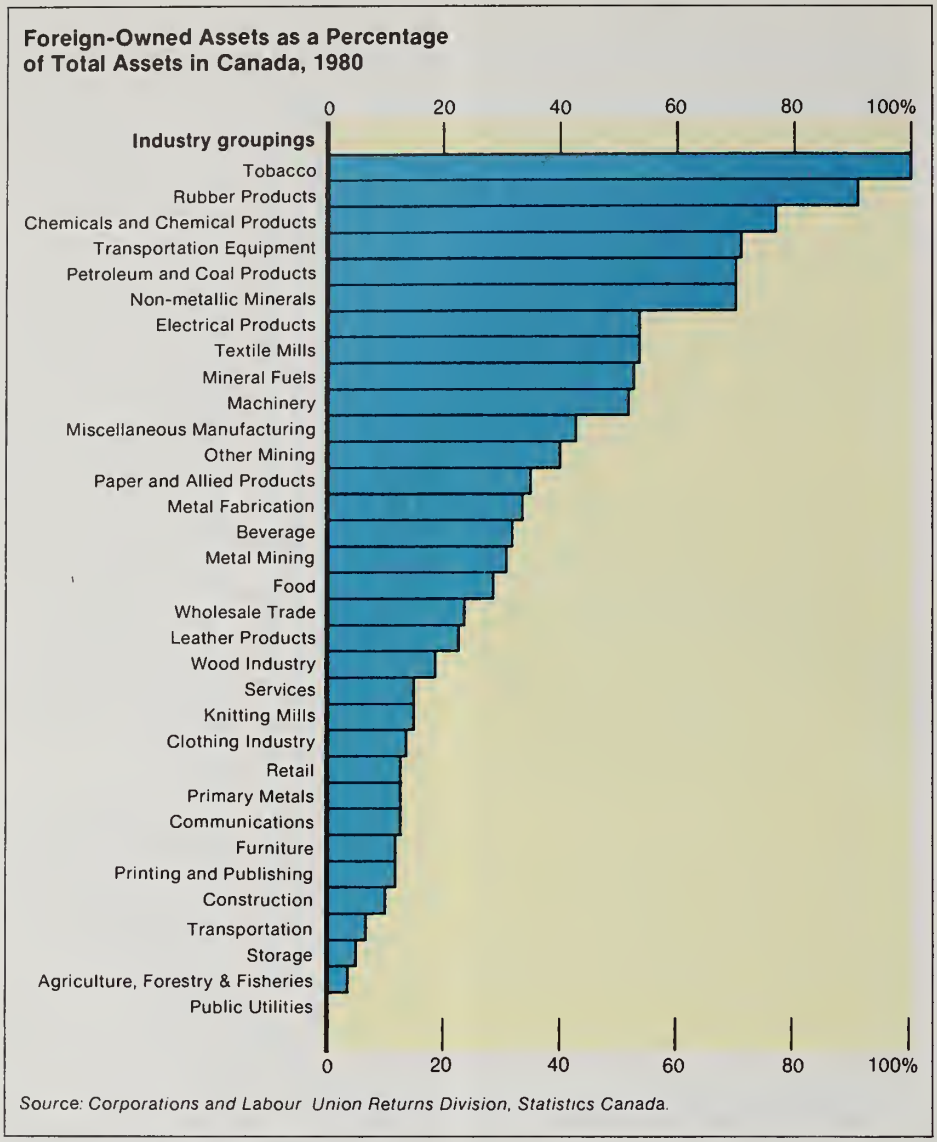
Regional Dimension Canada's industrial strength lies in Ontario and Québec where two-thirds of all primary and secondary industrial activity takes place, along with 80% of secondary manufacturing. The resource strength lies in the other provinces. Canada is said to have regional economies with distinct characteristics. Thus the West is strong in primary industries — agriculture, FISHERIES, FORESTRY, mining — with some development in the resource-processing sector — wood products, paper and allied products, primary metals and nonmetallic minerals, petroleum and coal. Ontario and Québec are strong in low-technology industries — FOOD AND BEVERAGES, TOBACCO, labour-intensive secondary processing (TEXTILES, FOOTWEAR, FURNITURE, etc), metal fabricating, TRANSPORTATION (excluding aircraft and parts), and electrical products (excluding major appliances, COMMUNICATIONS and industrial equipment). Inroads are being made in the high-technology fields — aircraft and parts, electrical products (major appliances, communications and industrial equipment), chemicals and chemical products and miscellaneous scientific and professional equipment. The Atlantic region is characterized by low-technology, and primary and resource-processing industries. The resource strengths of Atlantic Canada (fishing, mining) differ from those in western Canada (oil and gas, forestry).



The differences in regional economies lead to differing emphases in industrial development and international orientation. The resource-dependent provinces seek free-trade arrangements that encourage resource exports. Ontario and Québec, which are more vulnerable to foreign competitors in manufacturing, do not favour complete free trade and seek the support of the federal government to assist their industries to sell abroad. The near independence of the industrial structures of the regions makes it very difficult to develop a pan-Canadian INDUSTRIAL STRATEGY. Industrial policymaking is becoming increasingly regional in orientation.

Foreign Ownership The National Policy of 1879 did encourage INDUSTRIALIZATION, but of a peculiar nature. The policy was designed to force foreign (particularly US) industrialists to build factories in Canada if they wished to reach the Canadian market. The tariff brought direct (or equity) investment, which resulted in a branch-plant economy of unique proportions. For example, Canada's dependence on US direct investment in 1970 was some 10 times higher than the average of a group of 13 of the most industrialized countries belonging to the Organization for Economic Co-operation and Development. Some 60% of manufacturing industries have come to be foreign owned through equity investment; these industries are largely in central Canada. In some sectors (eg, oil and gas), foreign ownership is even higher (72% in 1980). The issues related to foreign-owned firms are now well known. They include truncated operations, ie, establishments which do not possess all the functions that are normally part of a business (eg, management, INDUSTRIAL RESEARCH AND DEVELOPMENT); production of a broad range of products mimicking those of their parent company, with very limited product and production specialization; a tendency to be import intensive; a tendency not to export because they are geared to serve the Canadian market; limited linkages with Canadian suppliers, since the parent company tends to provide the components for assembly.

This type of industrialization has resulted in ever-growing BALANCE OF PAYMENTS deficits in manufactured finished goods ($21 billion in 1981). Our overall merchandise trade balance is thus dragged down and it becomes increasingly difficult to balance our international accounts because of the growing deficits in service transactions (largely caused by massive interest and dividend payments on foreign borrowings and investment, and payments for foreign-management services). By the end of the 1970s the situation had reached the stage where the federal government felt that it had to establish policies favouring development of Canadian-owned industries. The most striking example was the National Energy Program of 1980, which aimed at increasing Canadian ownership



Source: Corporations and Labour Union Returns Division, Statistics Canada.

of Canada's PETROLEUM INDUSTRIES to 50% by 1990, up from 28% in 1980. Under this policy, Canadian ownership had increased to 34.7% by 1982.

Since foreign direct investment resulted in an unacceptable industrial structure, the federal government established a mechanism, similar to that in other countries, to control it. The FOREIGN INVESTMENT REVIEW AGENCY (now Investment Canada) was created to evaluate the intentions of foreign investors and to try to extract maximum benefits for Canada. Both federal and provincial governments try to redress unacceptable situations with policies (eg, on procurement) that favour Canadian industrial development.

Research and Development Expenditures on R&D, as a proportion of Gross Domestic Product, have come to be taken as a barometer of industrial health and sophistication within OECD countries. Canada, with an R&D expenditure level of about 1% of GDP, is in the company of the smaller industrialized countries. Since more than 50% of R&D is performed in government institutions, many technological innovations emerge from these laboratories, eg, the TELIDON interactive videotex system and communications SATELLITES. In fact, federal government laboratories in the Ottawa area are credited with being instrumental in the development of the HIGH-TECHNOLOGY industrial community that has established itself in the area since the 1960s.

Both the federal and provincial governments have played key roles in developing scientific and technological capabilities. Governments have not only provided public funds to support the private sector, but have become directly involved when the private sector considered the risks too great (eg, Panarctic Oil Ltd), where the private sector failed (eg, Canadair), or where the market system was deemed not to act in the national or provincial interest (eg, PETRO-CANADA; ONTARIO HYDRO; HYDRO QUÉBEC; ALBERTA OIL SANDS TECHNOLOGY AND RESEARCH AUTHORITY). Eight provinces have their own provincial research organizations. The involvement of governments in economic development has resulted in a large amount of R&D being sponsored by and performed within government agencies. However, the share of industry-funded R&D is increasing and Canadian expenditures on R&D are expected to reach 1.5% of GDP in the 1980s.

Canadian and US Industrial Structures

Because of close economic ties with the US, Canadians tend to believe that they have a similar economy and industrial structure. If the industrial structures of both countries were approximately the same, there would be little difference proportionally in the output of their various industrial groups. However, Canada's greatest relative strength is in the primary manufacturing industries, which are linked to resource development; its greatest weakness is in higher technology manufacturing areas. In fact the structure of Canadian industry complements that of the US; we export relatively unsophisticated products to the US, while it ships finished goods to us. While the US has a trade surplus in manufactured goods and a deficit in the rest of merchandise trade (particularly ENERGY), Canada has a large trade deficit in manufactured goods and a surplus in raw and semiprocessed goods. This long-standing relationship reflects Canada's historical role as a resource hinterland, first to France, then to Britain, now to the US (*see* ECONOMIC NATIONALISM).

Canada is now in search of a new national policy to restructure its industry around areas of strength to compete in a new international marketplace. Other industrialized countries are assisting industries to move into new technological domains, while newly industrializing countries (eg, Korea, Taiwan, Mexico, Brazil) are moving into our traditional manufacturing industries. Any new national policy cannot be built around tariffs, as in 1879, since these barriers to trade are being eliminated by international agreement. Moreover the issues of foreign ownership, quasi-independent regional economies, and dependence on the US market must be addressed. *See* ECONOMIC HISTORY; REGIONALISM; REGIONAL ECONOMICS; TECHNOLOGY. R.D. VOYER

Inflation popularly means rising general prices, most frequently calculated by the CONSUMER PRICE INDEX (CPI) — a measure of the cost of a basket of commodities purchased by a typical family. The rate of inflation refers to the percentage increase in the price level and is usually expressed at an annual rate; if the CPI rose from 100 to 132 over 2 years, then the price level rose by 32%; that is, the rate of inflation was about 16% annually. Most of the sharp inflation of the 19th and 20th centuries has been associated with major wars, and since WWII prices have generally risen.

The average annual rate of inflation in consumer prices from 1970 to 1975 was 6.5% in the US, 7% in Canada, 6% in West Germany, 12% in the UK, 18% in Yugoslavia, 50% in Argentina and 112% in Chile. In 1981 Canadian inflation reached an annual rate of 12.5%. In an inflationary period, distinctions must be made between money income (measured in dollars) and real income measured in purchasing power. If money income rises by the same percentage as prices of goods, then real income is unchanged. For real income to increase, money income must rise more than prices. Inflation does not necessarily harm everyone; its main consequence is the redistribution of real income. If prices are stable (the rate of inflation is zero) and A borrows $100 from B at a 2% interest rate, in 1 year B expects to receive $102 in real income. However, if prices rise by 5%, then $102 will not buy what $100 would have bought a year ago; B's real income will be reduced and A's real income will be higher. Unexpected inflation therefore redistributes real income from lenders to borrowers. Pensioners who contributed to PENSION funds when inflation rates were low and are now being repaid with dollars that are worth much less than anticipated are among those harmed by inflation.

The relationship among prices, employment, wages and profits is complex. Inflation can be halted by decreasing aggregate demand (total spending), achieved with FISCAL POLICY by reducing government expenditure or raising taxes, and with monetary policy by restricting the growth in the supply of money in the economy, thereby raising interest rates and reducing credit. However, much of the initial impact of the reduced aggregate demand is reflected in lower output and employment rather than in prices (even in the 19th century falling prices were generally associated with fairly high levels of unemployment), so governments have chosen alternatives such as wage and price controls, although these alone will not lastingly affect in-

flation. However, if controls are used in conjunction with appropriate monetary and fiscal policies, they may help reduce inflation, with fewer harmful side effects. Economists generally agree that inflation will not continue unless the money supply is allowed to increase; monetarists tend to emphasize control of the money supply, while Keynesians favour other tools such as wage and price controls. *See also* STAGFLATION; RECESSION. W.C. RIDDELL

Influence d'un livre, L' (1837) by Philippe AUBERT DE GASPÉ, Jr, regarded as the first French Canadian novel, offers a subtle satire of spiritual poverty in Québec through an account of Charles Amand's quest for gold. Amand's alchemical misadventures, influenced by a treatise on magic, alternate with the courtship of his daughter Amélie by a young medical student, and take him from the countryside near St-Jean-Port-Joli to Québec and to Ile d'Anticosti. Written probably in collaboration with Aubert de Gaspé's father, author of *Les* ANCIENS CANADIENS (1863), the novel is remembered for its documentary and folkloric elements, incorporating into its plot the legend of Rose Latulipe and the murder of the peddler Guilmette as well as superstitious beliefs and customs. *Le Chercheur de trésors* (1864), a bowdlerized edition by Abbé H.R. CASGRAIN, was replaced in 1968 by Léopold Leblanc's edition, appending 4 of many excised passages; by 1984 neither a facsimile nor a translation had appeared. MICHÈLE LACOMBE

Influenza, an acute infectious epidemic disease caused by a filterable virus. There are 4 main types of the virus — A, B, C and D — and many strains. The virus enters the body through the respiratory tract, but soon spreads to cause symptoms that include fever, chills, headache, sore throat, cough, gastrointestinal disturbances, muscular pain and neuralgia. An attack provides temporary immunity, but only to the particular strain involved. Outbreaks of the disease typically demonstrate high morbidity but low mortality rates, usually killing only the very old and the very young (deaths in these cases are usually related to the complications such as bacterial pneumonia). There is no cure for influenza. The best treatment is a combination of bed rest and increased fluid intake. Neither is there a sure means of prevention. Vaccines are available but they do not provide complete immunity from all viruses.

It was only with the eradication, through advances in PUBLIC HEALTH and medicine, of more major infectious diseases, that influenza was recognized as a serious threat. In Canada, influenza appeared in EPIDEMIC proportions on at least 7 occasions during the 19th century. The effects of the epidemic of 1832 were masked by cholera and those of the epidemic of 1847-48 by typhus, but the eradication of other diseases was not the only reason influenza grew in importance by the end of the 1800s. The epidemic of 1889-90 was particularly virulent, affecting 40% of the world's population.

The most damaging epidemic of influenza — for Canada and the world — appeared after WWI. The Spanish Flu of 1918-19 killed some 21 million people, including about 50 000 Canadians. It demonstrated a perverse tendency to kill the young and hearty. A long-term consequence for some victims was the development of a Parkinsonian syndrome, including a marked tremor. The Spanish Flu was brought into Canada by returning troops and made its way into even the remotest communities. In Labrador and Québec, which were the hardest hit, some villages were exterminated by the disease. Some areas unsuccessfully tried quarantine. All medical facilities and personnel were soon overtaxed and volunteers organized infirmaries in schools and hotels.

The epidemic brought not only death, but social and economic disruption as well. Children were left parentless and many families found themselves without the chief wage earner. Armies on both sides were temporarily debilitated. Businesses lost profits because of lack of demand for their products or because they were unable — as a result of a reduced work force — to meet the demand. Municipal governments, in an attempt to halt the spread of the disease, closed all except necessary services, and provinces enacted laws regarding quarantine and enforced the wearing of masks in public. Although the Canadian population unhappily accepted these restrictions, it defied the federal government's request that WWI victory celebrations be postponed until Dec 1. The influenza strain, although decreasingly virulent, remained active in Canada until the mid-1920s. The establishment of the federal Department of Health in 1919 was a direct result of the epidemic.

Although influenza is a yearly affliction, it is unlikely that another epidemic of such magnitude could occur today. Pneumonia contracted by a sufferer weakened by influenza rather than influenza itself was the major cause of death, and pneumonia lost its impact with the discovery of penicillin, which Canada began to manufacture during WWII. Health facilities are also much improved, the population generally is in a better state of health, and the virus itself is better understood. JANICE DICKIN MCGINNIS

Information Society The role of information in the economies of Canada and other technologically advanced countries is becoming more significant. The first half of the 20th century was characterized by a shift in the dominant economic activity from agricultural to industrial production. The second half is characterized by a shift toward the production, processing, storage, retrieval and consumption of information: not only the familiar press, radio, television, film and library information, but also specialized computer banks of data (ie, information) that are sold to subscribers over TELECOMMUNICATIONS lines. This development is made possible by major technological improvements in microelectronics, computers and telecommunications that have continually reduced the costs of processing and transmitting information.

The Canadian government has adopted a policy of promoting rapid adjustment to the information society, with its potential improvements in economic efficiency. This policy is not without problems. Information technologies often promote centralization, and since much Canadian information is already stored outside Canada, the Canadian economy could become even more dependent on the US and multinational corporations. Personal privacy will be more difficult to protect. Employment opportunities in Canada may be reduced. Information that used to be generally available, eg, in libraries, may have to be purchased from a databank. With information treated as a primary marketable commodity in the information society, unless social policies are adjusted accordingly, the wealthy may improve their position to the detriment of the poor. *See* COMMUNICATIONS TECHNOLOGY; COMPUTER COMMUNICATIONS; SATELLITE COMMUNICATIONS. WILLIAM H. MELODY

Reading: William H. Melody, "The Economics of Information as Resource and Product," *Proceedings of the Pacific Telecommunications Conference* (1981); Science Council of Canada, *Planning Now for an Information Society: Tomorrow is Too Late* (1982); S. Serafini and M. Andrieu, *The Information Revolution and Its Implications for Canada* (1980); K. Valaskakis, *The Information Society: The Issues and the Choices* (1979).

Ingersoll, Ont, Town, pop 8494 (1981c), inc 1865, situated on the Thames R, 36 km E of London. Founded as Oxford Village in 1818 by Charles Ingersoll, it was renamed Ingersoll for his father, Thomas, and incorporated as a village 1852. Following the opening of the Great Western Ry 1853, its population grew rapidly to about 4000 by 1871, and increased gradually thereafter. Its economy, based initally on the export of wheat and hardwood lumber, shifted to the production of cheese and agricultural implements in the mid-1860s. Ingersoll was the commercial centre for Canada's first cheese export trade and the Canadian Dairyman's Assn was founded there (1867). In 1866 the town sent a 3300 kg "Mammoth Cheese" — celebrated in verse by James McIntyre, the "cheese poet" — to exhibits in NY state and England. Now a manufacturing and residential centre, Ingersoll celebrates its past with an annual cheese and wine festival. GEORGE EMERY

Inglis, Charles, Anglican bishop (b at Glencolumbkille, Ire 1734; d at Aylesford, NS 24 Feb 1816). Having gained influence and preferment as a Tory cleric and pamphleteer in New York C during the American Revolution, he was named to NS as the Church of England's first colonial bishop in 1787. Historians long exaggerated the importance of his bishopric, citing his sympathetic relations with the clergy and his fostering of higher education. Although he used patience and discretion to overcome early antipathy on the part of his clerics, his minimal interference in parish affairs and reluctance to travel within his huge diocese exacerbated local weaknesses. Moreover, the establishment of King's College in 1788, largely to train a native clergy, perpetuated a reactionary Church of England ascendancy in the colony. Viewing his appointment as just reward for his loyalty, he went into semiretirement in 1795, though he retained the office for life. LOIS KERNAGHAN

Reading: J. Fingard, *The Anglican Design in Loyalist NS, 1783-1816* (1972).



Charles Inglis, the Church of England's first colonial bishop (*courtesy Public Archives of Nova Scotia*).

Injunction is an equitable judicial remedy issued at the court's discretion. It usually takes the form of an order preventing or restraining a person from performing an act. The order may also take a mandatory form by compelling someone to do something. It may be sought as a final remedy or at a preliminary stage before trial (the interlocutory injunction). The injunction is designed to provide more effective and appropriate relief than an ordinary common-law award of damages. In many circumstances applicants prefer to have an act prevented or performed rather than to receive compensation after the fact. J. BARNES

Injury and Prevention Some 3000 Canadians between the ages of one and 19 are killed each year because of injury, and over 100 000 are hospitalized. With the control of infectious diseases, injury has become the leading cause of death and disability in Canadian children and youth. The most frequent causes of fatal injury are traffic related, drowning, burns, suffocation, falls and poisoning. The vast majority of childhood injuries (95%) are the result of impact by moving objects, such as motor vehicles and hockey sticks; or from impact of the victim against stationary surfaces, such as car windshields. Burns account for 3% of all injuries; electrification, poisoning and radiation, 2%. The head and face are the parts of the body most commonly injured in motor vehicle crashes, in falls, and in other home injuries. Because of the incidence of brain injury and the significant level of neurologic impairment resulting from moderate or severe levels of head injury, and the evidence that mild injury may have significant unfavourable consequences, these injuries are a significant public-health problem.

Under a medicare system, the treatment costs from injuries to a family are minimal and are measured mainly in days lost from school or work. However, the costs to the community for the care of victims of injury are staggering. In Canada, it is estimated that $12.7 billion is spent each year on the treatment of injuries.

Injury and Child Development Many injuries are distinctly age related and developmentally determined. Infants, for example, are very susceptible to falls; and about 85% of injuries from birth to one year are due to falls, with baby boys being at greatest risk and head injury being the most frequent result. Scalds from hot bath water or spilled hot beverage account for 10% of injuries to infants, poisoning for 5%. The average infant travels some 8000 km annually in cars. If not protected by car safety seats or air bags, the threat of serious injury or death is significant. Regulations relating to size of soothers and toy objects have decreased choking deaths.

Children who have learned to walk and are able to explore their environment are at especially high risk to injury. In fact this is the most vulnerable stage for injury to girls. Overall, one in 10 toddlers is treated in a hospital emergency room each year for trauma or poisoning; the latter accounts for 12% of injury. Burns and scalds are common, but injury due to falls still predominates. Pedestrian and motor vehicle occupant injuries are the leading cause of death in this age group and the death rate from drowning is higher at this stage than at any other.

From 3 to 6 years of age, the child's environment extends from the home to the neighbourhood. Pedestrian injuries are the most common cause of death and serious injury at this age. The use of tricycles and bicycles also leads to more injuries than the use of any other product. During the ages 7 to 18, the child enters the world of sports, recreation and traffic; 98% of injuries result from mechanical objects, particularly, until the teenage years, from playground hazards and bicycles. The Canadian Institute of Child Health is currently developing safety standards for playgrounds in Canada. A gradually increasing ability on the part of children to recognize hazards and to protect themselves accounts for the low death rates around age 10 from almost all injuries.

Comprehensive data on sports injuries are lacking in Canada. The reduction in eye injuries since the compulsory use of hockey face masks is a notable Canadian accomplishment. Release bindings have reduced the incidence of leg fractures to skiers. A national study of the occurrence and circumstances surrounding spinal cord injury due to diving is currently under way.

During the teenage years, the rate of traffic injury reaches epidemic proportions. Over 50% of all deaths and serious injuries in this age group are traffic related, mainly to youths as drivers or passengers of motor vehicles. Transport injuries are the leading cause of brain injury (48%) and as a result produce more new quadriplegics and paraplegics each year than all other causes combined. Injuries to the brain are also the leading cause of epilepsy and of handicapping conditions in people between one and 19 years of age.

Injury Prevention has received relatively little scientific attention. It is commonly believed that bad luck and chance are the cause of "accidents" and fate is the main predisposing factor. The first step in influencing public policy would be a general realization that injuries are rarely accidental and most are preventable, and that the medical, social and human toll of injuries warrants a major investment in prevention. Some preventive measures require the co-operation of relatively few individuals but can influence the lives of many (eg, reduction of crib slat spacing resulting in the eradication of crib strangulation deaths of infants). Preventive measures directed at changing human behaviour, on the other hand, require the co-operation of many individuals (eg, car seats that require parents to buckle up their child with each ride).

Preventive strategies (eg, preventing the creation of the hazard in the first place, separating the hazard by time or space or physical barriers, and countering damage already done) are an important conceptual contribution to the field of injury control. If implemented, as interrelated approaches applicable to all types of injury, they could reduce drastically the incidence of injury in Canada.

Occupational Fatalities and Injuries In 1981 there were 967 fatalities, 1.21 million work injuries (48% of which were disabling) and 15.8 million workdays lost due to work injuries, including OCCUPATIONAL DISEASE. Injuries occur most frequently among young adult men, and by industry most frequently among workers in fishing, hunting, trapping, forestry, mining, construction and transport (fatalities in these areas per 100 000 workers were, respectively, 158, 120, 84, 32 and 20). The number of injuries from 1972 to 1981 rose by 37.2%, while employment increased by 31%. Expressed in injuries per 100 workers, the incidence rate rose from 12.39% to 12.93%. In Québec the incidence rate increased by 39% (which may have resulted from broadening of compensation coverage); in Alberta by about 24%; in BC by 16.4%; in Manitoba by 6.2%; and in Saskatchewan by 8.2%. The increase in the West may have resulted from increased industrial activity and employment.

The most frequent types of occupational injury are strains or sprains, bruises, cuts or lacerations and fractures or dislocations. The body parts most frequently affected are the back, hands, feet and eyes. Occupational injuries may result from unsafe acts, such as operating equipment without authority at an unsafe speed or in such a way that safety devices are rendered inoperative; or unsafe conditions, such as improperly designed or inadequately guarded machinery. Occupational-safety measures include designing safe equipment, machine guarding, maintenance of equipment, and the proper use of personal protective equipment, such as hard hats, safety shoes and eye protectors. Human factors to be considered and controlled in an occupational injury prevention program include fatigue, alcohol and drug use, carelessness and inexperience. Safety information and educational programs are available through provincial and federal government agencies responsible for occupational health and safety, eg, Labour Canada, the Canadian Centre for Occupational Health and Safety, and national and provincial safety associations.

The ECONOMIC COUNCIL OF CANADA has suggested that indirect costs of employment injuries and illnesses, eg, failure to meet customer demands, decreased efficiency and lowered employee morale, could range from 2 to 10 times that of direct costs (ie, medical aid, compensation and administration of claims). In this case the total cost of employment injuries and illnesses in Canada (1981) would be $5.7-$20.9 billion.

JOHN H. READ AND ROBERT ORFORD

Innis, Harold Adams, political economist, and pioneer in communication studies (b at Otterville, Ont 5 Nov 1894; d at Toronto 8 Nov 1952). Innis's earlier writings in economics and economic history gave rise to a distinctively Canadian approach to these subjects, and his later attempts to analyse the crisis in Western civilization led the way to a new emphasis on the importance of different modes of COMMUNICATIONS for understanding the nature and development of a society.

A veteran of WWI, Innis studied at McMaster and U of Chicago. His choice of a Canadian thesis topic, a history of the CANADIAN PACIFIC RAILWAY, was his first step towards a reorientation of many fields of study relating to Canada, especially in the social sciences. In 1920 Innis joined U of T's political economy department where he remained until his death. During the 1920s he became increasingly dissatisfied because he believed that the American- and British-trained scholars who predominated in Canadian universities were applying inappropriate models to their analysis of Canada's economy. Innis's first major work, *The Fur Trade in Canada* (1930), established his reputation and introduced the STAPLE THESIS of economic development. Innis also opposed the continentalist school and argued that Canada's political boundaries were the logical outcome of Canada's economic history — contrary to the tenets of CONTINENTALISM. Appointed head of U of T's political economy department in 1937, Innis continued to work on his second major study, *The Cod Fisheries* (1940). Although he had trouble finding a suitable publisher because of his cumbersome writing style, this work established him in the forefront of the world's economic historians. Whereas *The Fur Trade* had set Canada off from the US, *The Cod Fisheries* underscored Canada's European roots.

Harold Innis, brilliant political economist and pioneer in communications studies (*courtesy Public Archives of Canada/C-19694*).



During the 1930s and WWII, Innis rose to the challenge of defending the integrity of the universities and of scholarship which he saw as imperilled by the general atmosphere of crisis. He was active in establishing societies, such as Canadian Political Science Assn and the American Economic History Assn, and he used his connections and prestige to secure funding for Canadian research. More controversially, he vigorously opposed the efforts of fellow academics such as F.W. UNDERHILL who were involved in the LEAGUE FOR SOCIAL RECONSTRUCTION. To a considerable extent, the detachment of our contemporary Canadian academic community from political involvement derives from his attitudes and efforts.

Innis's scholarly reputation led to an invitation to visit the Soviet Union in 1945. His posthumously published *Russian Diary* shows his deep concern with the problems of Western civilization. In drawing attention to the impact of the media of communications on the extent and duration of a civilization, Innis's communications researches culminated his lifelong attempt to explain the interpenetration between Canada and Western civilization. He expressed these concerns in his 1947 presidential address to the Royal Soc of Canada, titled "Minerva's Owl," although his arguments were little understood at the time. He contended that Western Europe and N America were in a state of profound crisis. This crisis was rendered more severe because the dominant media of communication fostered an obsessive preoccupation with the present with the consequence that politicians and scholars were neither able to understand their circumstances nor to devise an appropriate remedy for their problems. Innis continued his researches amidst increasingly heavy administrative responsibilities. In 1947 he became dean of U of T's graduate school, and in 1948 he visited England to deliver the Beit lectures, material which he later included in *Empire and Communications* (1950). This synoptic study of ancient Egypt to the present explores the theme of the interconnection between the vitality and durability of countries and empires and the modes of communication that dominated in them. Innis was still working on these ideas at the time of his death.

Innis had few followers during his life, though after his death he has secured admirers from several different academic disciplines, ranging from Marshall MCLUHAN in communications to Canadian Marxists interested in his study of the interrelations between economics, politics and society. However, few of Innis's disciples have had the courage and the genius to follow him in the breadth of his reading and theorizing.

WILLIAM CHRISTIAN

Innu, *see* MONTAGNAIS-NASKAPI.

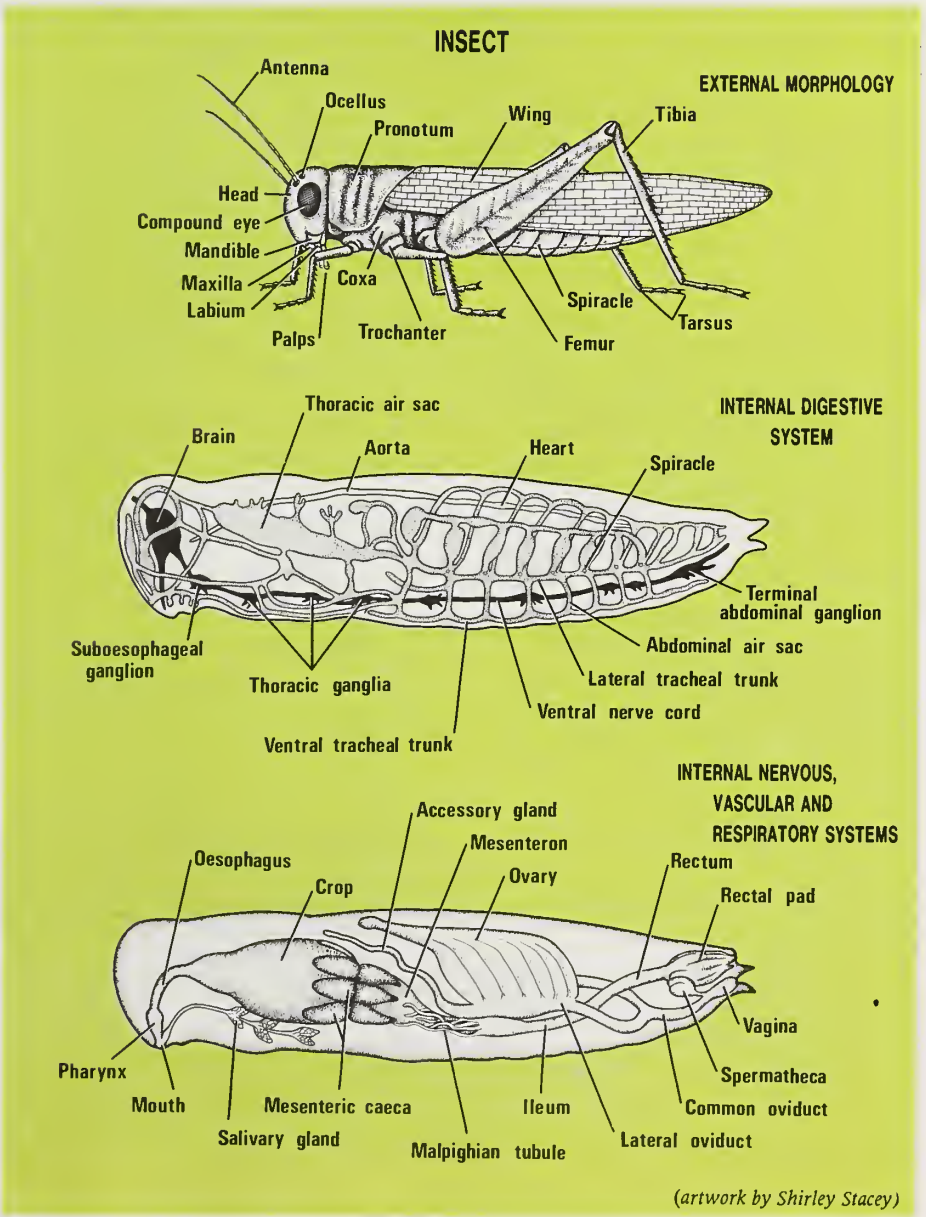
Innuitian Region is a physiographic subdivision of the great arc of younger, mainly stratified sedimentary rocks that surround the stable, ancient SHIELD core of Canada. It comprises a triangle-shaped area of 540 000 km^2 between the Shield and the Arctic Ocean, most commonly referred to as the QUEEN ELIZABETH IS. Its geological history and present form are best understood by visualizing it as the uplifted, drowned edge of the continent. In Cambrian and Upper Devonian times, an ocean-covered area of subsidence and sedimentation, known as the Franklinian geosyncline, bordered the Shield landmass. Deformation occurred in the Middle Devonian, thrusting up a belt of mountains that today stretch in an arc from the rugged peaks of NE ELLESMERE I, 2000 m high, and the highlands of AXEL HEIBERG, before the ranges progressively broaden and flatten into the plateaus of the western PARRY IS. About 330 million years ago, the Sverdrup Basin developed as a regional depression in which successive formations were built up over 270 million years to thicknesses as great as 12 250 m. During the opening up of the Arctic Basin these rocks were subjected to enormous forces, being pushed towards the unyielding Shield and folded and buckled into a chain of mountains running 2250 km from the Grantland, British Empire and United States ranges of NW Ellesmere, through the mountains of central and western Axel Heiberg. Less disturbed Sverdrup sedimentary rocks now form shale and sandstone lowland areas of rolling topography, though intrusion and piercement by evaporite domes has occurred. A narrow strip of thin, unconsolidated sand and gravel deposits is found along the Arctic Ocean coast.

DOUG FINLAYSON

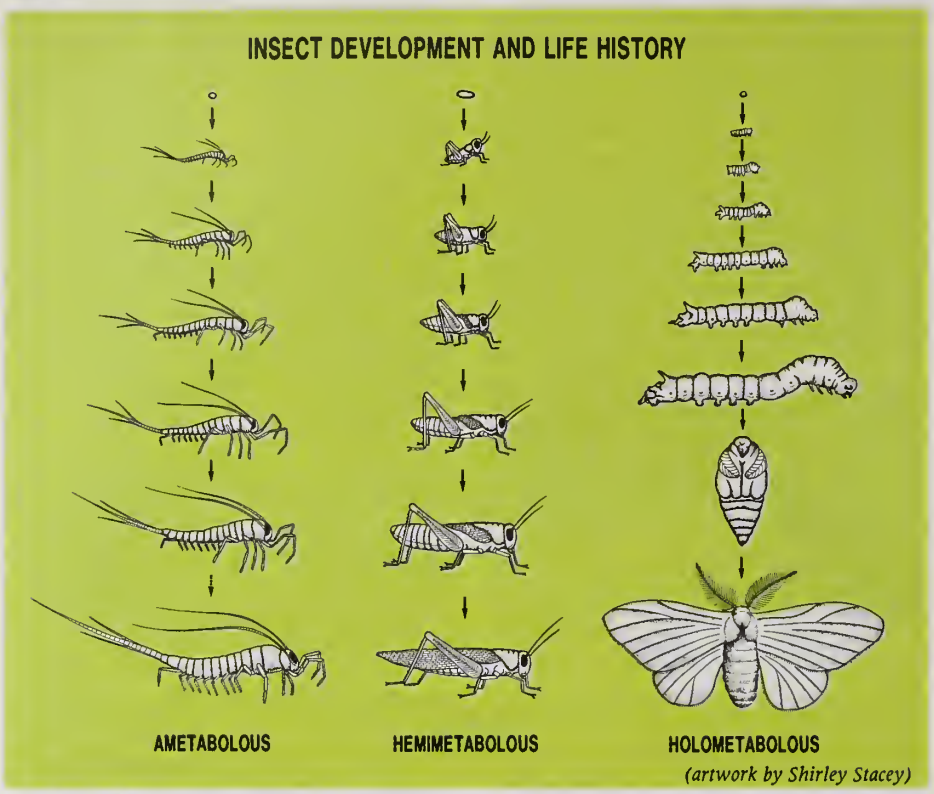
Inquiry Into Certain Activities of the Royal Canadian Mounted Police, Royal Commission of (McDonald Commission), was a federal commission, est 1977, following allegations of crimes by the RCMP Security Service. Matters referred to the commission included a break-in at a data-processing company and the theft of a PARTI QUÉBÉCOIS membership list; 400 break-ins without warrants, mainly in BC (since 1970); electronic surveillance of at least one member of Parliament; unauthorized mail openings; the burning of a barn in Québec; widespread monitoring of election candidates; theft of dynamite; and use of forged documents. Former RCMP Commissioner William Higgitt and former Security Service Director General John Starnes testified that they knew subordinates occasionally broke laws in performance of duties. RCMP officers also claimed that they had informed their ministers of various activities, but PM Pierre Trudeau and other ministers testified that they had received no such information. The commission recommended, among other things, that police comply strictly with the law; that the RCMP be permitted to open mail with judicial authorization; and that a civilian security agency, divorced from the RCMP, be created. This new civilian agency, the Canadian Security Intelligence Service, came into existence in July 1984 and was given broad powers. For example, under judicial warrants, CSIS has the power to open mail. *See also* INTELLIGENCE GATHERING.

JEFF SALLOT

Insect, small ANIMAL (more than 75% of known species are less than 6 mm long) with 3 pairs of legs, 1 or 2 pairs of wings, and a segmented body. Wings did not evolve in some primitive insects (Apterygota) and have been secondarily lost in some advanced groups (eg, fleas and lice). Although a few species occur in fresh water, in the intertidal zone of the seashore, or on the ocean surface, the vast majority are terrestrial.



(artwork by Shirley Stacey)



They are especially abundant in the tropics but may be found in all except the most extreme latitudes and altitudes. For example, about 300 species (mostly flies) live N of the 75th parallel, on Canadian arctic islands. A few species even occur in Antarctica, as parasites of birds or seals.

The diversity of insects is staggering: the 750 000 recorded species are estimated to represent only 10-50% of the world total. In Canada, about 55 000 species have been described. Insects owe their success to their adaptability and to their long and varied evolution; they were among the first terrestrial animals. As Arthropoda, insects possessed a light, strong, waterproof cuticular external skeleton (exoskeleton), which was critical in the EVOLUTION of the group. Their small size enables insects to hide easily from predators and to feed on scarce materials. Smallness, together with flight, facilitates dispersal by wind into new habitats, leading to geographic isolation of populations and, ultimately, to evolution of new species. Reproductive capacity and life history have also been important. Production of large numbers of eggs, combined with short generation time, has enabled insects to adapt rapidly to changing environments. The evolution of a pupal stage, between larva and adult, has permitted specialization of the life history such that the primary function of the larva is accumulation of food reserves; those of the adult are reproduction and dispersal. For many insects, the pupa has developed into a highly weather-resistant stage, which, together with the restriction of feeding activity to the larva, has enabled these insects to colonize habitats in which conditions are suitable for development only at limited times of year.

Insects inhabiting regions (including most parts of Canada) where adverse conditions (eg, lack of food, and temperatures unsuitable for growth and reproduction) regularly occur survive by becoming dormant. Dormancy may occur at any stage in the life history, the stage varying with species. Thus, many grasshoppers overwinter in the egg stage; some damselflies survive as larvae frozen in ice; many butterflies and moths overwinter as pupae; and some mosquitoes survive as adults. Usually the overwintering stage is laid in or seeks out locations where conditions may not be so extreme, eg, under leaf litter or bark, in soil or in holes in the ground. In addition, some species develop antifreeze molecules that prevent frost damage. An alternative strategy is migration; using wind currents, some insects may migrate several thousand kilometres to more suitable conditions. For example, monarch butterflies, which spend early summer in southern Canada, move S in Aug-Oct to overwintering sites in southern US, returning the following spring. CEDRIC GILLOTT

Insect, Beneficial Most insects are beneficial; less than 1% are pests. The largest group of insects, the parasitic wasps (about 200 000 species), attack other, often harmful, insects. Insects play a major ecological role and many systems would fail without them: they are the principal food of many ANIMALS and the survival of insect-pollinated PLANTS depends on them. Bees are not the only important pollinators; in northern Canada POLLINATION is largely by flies and butterflies. Plant-feeding insects also function in maintaining plant diversity: if they are removed, a few plant species tend to displace the others. Similarly, if plants or plant-feeding insects are introduced without their natural enemies, they often become pests. The solution, called biological control, involves introducing enemy species. Before 1930, the European spruce sawfly was spreading across eastern Canadian spruce forests. The introduction of parasitic wasps and a VIRUS disease reduced the sawfly from a major threat to an economically unimportant insect. Biological control is also used against WEEDS, particularly introduced species causing problems in permanent pasture and wild areas. In the interior of BC in 1950, St John's-wort (an introduced European weed) was excluding native forage. A specialized European beetle was introduced which, in most areas, reduced the weed to scattered plants, without damaging other vegetation. This approach is often the cheapest solution and avoids possible side effects from herbicides but may take 20 years. There are currently projects to control leafy spurge and diffuse knapweed in western Canada using European insects. Insects can also feature in biological control of wastes, as in Australia, where beetles were introduced to control the accumulation of cow dung in pastures and an associated fly problem.

In some parts of the world, insects are used directly as food (eg, grasshoppers). There is a Canadian account, in Samuel HEARNE's diary for 1771, of eating warble-fly grubs, which were said to taste like gooseberries. The most widely used insect product is honey (*see* BEEKEEPING); others include silk from the cocoon of the silkworm moth; shellac from the secretions of a scale insect on fig trees in Asia; red dye from the cochineal insect on cactus. Cochineal is now returning as a red food colouring because the coal-tar dyes that displaced it have been implicated as carcinogens. Insects are important tools for GENETICS and population-dynamics research. Last but not least, butterflies, dragonflies and beetles have been an inspiration for art, literature and music. PETER HARRIS

Insect Classification A classification system acts as an efficient storage mechanism for information about each taxon or group. A natural classification also attempts to present the genealogical (historical, phylogenetic) relationships known or hypothesized to exist among them. Necessarily, such a classification is closely linked to and dependent on an understanding of the group's EVOLUTION. In the case of insects, different entomologists have different viewpoints on evolutionary history, and are likely to propose quite different classification schemes. Insects are classified primarily on the basis of wing structure, mouthpart structure and type of metamorphosis. It is estimated that about 55 000 insect species occur in Canada, categorized in 569 families, belonging to 32 orders. This number includes all Arthropods (segmented, jointed-limbed animals) which have a body divided into head, thorax and abdomen, and 3 pairs of thoracic legs. The class Insecta, as so defined, includes 3 taxa (Protura, Collembola and Diplura) that some workers would exclude from a strict definition of an insect. All 3 groups have mouthparts withdrawn into pouches in the head, and are sometimes considered to constitute a natural group, the Entognatha [Gk, "internal jaw"]. While all 3 are primitively wingless, they are very different morphologically. Protura (telsontails) lack antennae and have a twelve-segmented abdomen with the female genital opening behind segment 11; 8 species are estimated to occur in Canada. Collembola (springtails and snowfleas) have musculated antennal segments and a six-segmented abdomen; 520 species are estimated to occur in Canada. Diplura (no common name) have 3-4 spiracles (tracheal openings) on the thorax and a specialized method of leg suspension; 5 species are estimated to occur in Canada.

Insects, defined in a restricted sense, have nonmusculated terminal antennal segments; 6 legs, each having 2 points of articulation with the thorax; and an eleven-segmented abdomen. Two apterygote (wingless) orders have protruding (ectognathous) mouthparts: the Microcoryphia (bristletails, 13 species estimated in Canada), which have mandibles with a single point of attachment to the head capsule; and the Thysanura (firebrats and silverfish, 12 species estimated in Canada), which have mandibles with a double point of attachment to the head capsule. Within the subclass Pterygota (winged insects), the infraclass Paleopterygota contains insects unable to fold the wings back and down onto the abdomen. Two very different and rather unrelated orders are represented in the living paleopterygotes, the Ephemeroptera (mayflies, 411 species estimated in Canada) and the Odonata (dragonflies and damselflies, 197 species estimated in Canada). In the infraclass Neoptera, all adults are able to fold the wings

over the body and flat down onto the abdomen. The group originally had chewing mouthparts, but members of several descendant groups have departed widely from this condition.

Three subdivisions (cohorts) are recognized within the Neoptera, each representing an independent evolutionary line. The Polyneoptera are generally characterized by chewing mouthparts, a distinct anal lobe to the hind wing, abdomen with cerci (appendages), numerous Malpighian tubules (long vessels functioning primarily in excretion), and an incomplete metamorphosis. In incomplete metamorphosis, juveniles in later instars (periods between molts) closely resemble adults and have the same feeding habits, habitat and type of mouthparts. Eight orders of Polyneoptera can be recognized in the Canadian fauna: Plecoptera (stoneflies, 310 species estimated in Canada); Dictyoptera (cockroaches and mantids, 16 species estimated in Canada); Isoptera (termites, 3 species native to Canada); Notoptera (grylloblattids, 5 species estimated in Canada); Dermaptera (earwigs, 5 species estimated in Canada); Grylloptera (long-horned grasshoppers and crickets, 96 species estimated in Canada), which are often grouped in the next order; Orthoptera (short-horned grasshoppers, 140 species estimated in Canada); and Cheleutoptera (stick insects, 2 species estimated in Canada). Orthoptera are the most common worldwide. Notoptera is a very interesting group of secondarily wingless, predaceous insects living in the western mountains, often associated with ice and snow fields. Since they have a rather primitive morphology, they are regarded by some entomologists as living fossils.

The second cohort of the Neoptera, the Paraneoptera, usually have piercing and sucking mouthparts, a hindwing with a very small or no anal lobe, abdomen without cerci, 4 or fewer Malpighian tubules and an incomplete metamorphosis. Four orders can be recognized in the Canadian fauna: Psocoptera (bark and book lice, 103 species estimated in Canada), Phthiraptera (bird and mammal lice, 775 species estimated in Canada), Hemiptera (true bugs, 4226 species estimated in Canada) and Thysanoptera (thrips, 246 species estimated in Canada). Hemiptera are the most abundant worldwide.

The third cohort, the Oligoneoptera, characteristically have a complete metamorphosis, with distinct egg, larval, pupal and adult stages. Such a life cycle permits larvae and adults to diverge in form and habits. The generalized mouthparts are of the chewing type; however, the 10 orders represented in the Canadian fauna have very different ways of feeding. The commonest order worldwide, the beetles (Coleoptera, 9116 species estimated in Canada), are distinguished by chewing mouthparts and forewings modified as stiff, hard, protective elytra. Next most common are the true flies (Diptera, 14 464 species estimated in Canada), distinguished by having only one pair of wings, the forewings. The most familiar group is probably the Hymenoptera (bees, wasps and ants, 16 665 species estimated in Canada), with constricted waists allowing stinging movements. The remaining orders of Oligoneoptera are, in order of Canadian representatives: Lepidoptera, butterflies and moths, with 6734 species estimated in Canada; Trichoptera, caddisflies, 746; Siphonaptera, fleas, 190; Neuroptera, lacewings, etc, 87; Mecoptera, scorpionflies, 32; Megaloptera, dobsonflies and alderflies, 20; and Raphidioptera, snakeflies, 7. *See* individual species entries.

G.G.E. SCUDDER

Insect Pests Insects and humans cohabit the Earth and have developed complex relationships. Insect pests (less than 1% of all species) are those insects that feed on, compete for food with or transmit diseases to humans and livestock. With recent increases in human population and in areas of the earth exploited for resource extraction, the potential for interaction between insects and humans has increased. Indeed, many insects are forced to adapt to human-dominated ecosystems, and thus may become pests, or become extinct.

Injury to Humans and Animals

Effects on Humans The human body provides food and shelter for the crab louse and 2 forms of human louse (head and pubic lice). Fleas and bedbugs obtain food from human bodies and inhabit human dwellings between blood meals. Out of doors, humans are attacked by blood-sucking flies (mosquitoes, black, horse and stable flies), which torment victims and may cause toxic or allergic reactions. In Canada, human dwellings, barns and other buildings are essential for the survival of insects from warmer climes (eg, cockroaches, clothes moths, carpet beetles, silverfish and some species of ants).

Many blood-sucking insects are vectors of human diseases, picking up the disease organism while feeding on an infected host (human or animal) and infecting subsequent victims. Human lice are important vectors of trench fever, relapsing fever and epidemic typhus; fleas can transmit plague bacilli from rodents to humans; and different species of mosquitoes transmit malaria and encephalitis. In these diseases, the insect is an essential part of the chain of development of the disease organism, but other diseases are transmitted mechanically. The house fly, which occurs almost worldwide, breeds on organic wastes and can carry disease organisms to food.

Attacks on Livestock Livestock are attacked by the same types of insects as humans. Each type of livestock is attacked by one or more species of lice, which causes lack of vigour and stunted growth. Blood-sucking flies (eg, the introduced stable fly, face fly and horn fly) feed on and pester cattle, reducing growth and milk production. In some areas, mosquitoes or black flies may be so abundant that they reduce cattle feeding and may cause stampedes. Native black flies can cause severe anemia and even death. Cattle raised in black-fly areas are somewhat resistant to attack, but animals brought in for herd improvement lack resistance and suffer severely or die.

Injury to Plants and Plant Products

In Canada, short growing seasons and cold winters restrict most insects to one generation annually. This reduces the number of pest species and the amount of injury they cause, in comparison with the impact of pest species in warmer parts of the world. Nevertheless, insects cause significant losses, and their control adds to the cost of many agricultural and FORESTRY products.

Cultivated Crops Intensive agriculture encourages the development of insect pests by concentrating food items (CROP plants and stored food) on which insects can feed. Food-plant concentrations, often in monoculture, also may reduce the effectiveness of natural enemies attacking pest species in natural environments. Insects may attack any part of the PLANT, at any stage of development. Seed grains and potatoes are attacked by wireworms; newly germinated seedlings of almost all crops are attacked by cutworms, while flea beetles are a major pest of newly germinated rape and other cruciferous crops; the growing plant is fed on by climbing cutworms, armyworms, aphids, Colorado potato beetles, etc; corn ears are fed on by corn borers and grain ears by several species of aphids. Several species of beetles and moths may infest stored grain, and other species of these groups feed on flour and processed foods.



Pesticides have been used since 1950 against such tree pests as tent caterpillars to maintain sustained tree harvesting programs (*photo by Norman Lightfoot*).

Losses, caused by insect attack, and costs of control are difficult to determine and little information on this subject is available. Yield losses of up to 5% per year and maximum losses of 25% are estimated to occur on CEREAL grains in western Canada. The production of canola was estimated to have been reduced, in 1979, by 10% by flea beetles, despite expenditure of about $12 million for insecticides.

Transmission of Plant Diseases Sucking insects that transmit infections from diseased to healthy plants seriously affect several crop plants in Canada. Serious damage can be caused by very few infected insects. Aphids are the only vectors of barley yellow-dwarf virus of cereals, which drastically reduces grain yields. Leafhoppers transmit aster yellows, which affects not only asters but also lettuce, celery, carrots and potatoes. Aphids also transmit virus diseases of potatoes, a continuing threat to production in eastern Canada. In BC, cherries and peaches may be infested by the little cherry virus disease carried by leafhoppers.

Damage to Forest Trees and Wood Products Canadian forests are composed mainly of a few tree species, and these stands were normally subject to attack by insects, especially when they reached maturity. Insects (eg, spruce budworm, hemlock looper and various species of bark beetles) killed old trees to make way for regeneration. They now compete with man for forest resources. In Ontario, Québec and the Atlantic provinces, outbreaks of spruce budworm have occurred periodically for many centuries. Since 1950, PESTICIDES have been used to prevent tree death and maintain sustained tree-harvesting programs. Unfortunately, spraying has prolonged the outbreaks so that some parts of these forests must be sprayed yearly. Bark beetles occupy a similar position in western forests, normally attacking over-aged or weakened trees. They not only compete with man for wood but also are pests in PARKS, where over-aged stands are maintained for aesthetic reasons.

The interior of lumber, poles and wooden portions of buildings may be hollowed out to form nests of black carpenter ants. In addition to serious structural damage, these large ants can be household pests, feeding on moist foodstuffs and sometimes damaging fabrics and paper products. Termites can cause serious structural damage to buildings. In Canada they occur only in southern BC and southern Ontario. *See* individual species entries.

W.J. TURNOCK

Insolences du Frère Untel, Les (1960), by Jean-Paul Desbiens (published anonymously), is an eloquent plea for educational reform couched in a whimsical, occasionally irreverent but always incisive style. Anticipating the formation of Québec's ministry of education in 1964, the essays attack the cultural and linguistic poverty which the author, a teaching friar, attributed in part to the inadequacies of an antiquated and repressive parochial education. Reproducing controversial letters between André Laurendeau, Desbiens and others which had been published in the newspaper *Le* DEVOIR, the

introductory essay analyses the prevalent, exclusive use of JOUAL by secondary-school students as reflecting an insular, anti-intellectual form of discourse. Desbiens addresses the real fears dictating self-censorship; he also discusses inadequate teacher training, the need for religious, social and economic reform, and related topics, presenting his arguments in a nationalist text which became one of the classics of the QUIET REVOLUTION. Often reprinted, it was translated by Miriam Chapin as *The Impertinences of Brother Anonymous* (1962). MICHÈLE LACOMBE

Institut Armand-Frappier In 1938 the Institut de Microbiologie et d'Hygiène de Montréal was established as an autonomous, nonprofit organization. In 1972 it was integrated into Université du Québec and, in 1975, became the Institut Armand-Frappier (IAF), after its founding director Armand FRAPPIER. Four complementary objectives make IAF unique in Québec and Canada: research in microbiology and related sciences, with applications for preventive MEDICINE and industry and other nonmedical aspects; graduate and technical teaching; services to public-health authorities, hospitals, universities, industry and the community (including viral and immunological diagnosis, epidemiological investigations, vaccinations and consultation); and the manufacture of BIOLOGICAL PRODUCTS (vaccines, serums, etc), diagnostic products and biological reagents. This work is done in 6 centres specializing in bacteriology, epidemiology and preventive medicine, IMMUNOLOGY, VETERINARY MEDICINE, food sciences and virology. Practical, production-related activities include commercial production and quality control. The Institut, located in Laval, employs 450 people, including 70 scientists and professionals, 90 graduate technicians, and receives over 50 graduate students and other research trainees. Recent concerns include BIOTECHNOLOGY, particularly GENETIC ENGINEERING and modern fermentation techniques.

Institut canadien, fd 17 Dec 1844 in Montréal by a group of young French Canadian intellectuals who wished to establish a centre of patriotism and culture. The institut quickly became a political and cultural force in francophone society, and similar organizations were established in about 60 other centres. At first politically neutral, it fell under the spell of Louis-Joseph PAPINEAU and developed leftist leanings in harmony with *L'Avenir,* a newspaper fd July 1847, to which a number of institut members contributed articles. In 1854, 11 members were elected to Parliament. But their radical nature, which earned them the nickname "rouges" (*see* PARTI ROUGE), and their stand favouring annexation to the US caused the Liberal-Conservative Party and the clergy to join forces against them. In 1858 the opposition of the bishop of Montréal, Mgr Ignace BOURGET, led to the resignation of 138 members, to Rome's condemning the institut and placing its 1868 yearbook on the Index of forbidden books, and to the GUIBORD AFFAIR. Conservative public opinion turned against the institut, beginning a decline virtually completed by 1885. The Institut canadien had sponsored the most liberal and innovative discussions of the period, and its library was a collection of major scientific, legal and literary works. An ultraconservative political, social and religious climate ruined the hopes raised by its foundation. PHILIPPE SYLVAIN

Institut québecois du cinéma (IQC) was created 19 June 1975 by the adoption of the Loi sur le cinéma to meet long-standing demands from Québec cinematic groups. Its mandate was to promote and support the creation, production, distribution and showing of high-quality films in Québec. The law also established certain requirements in dubbing, subtitling, children's films and film research that were designed to strengthen the Québecois presence in the industry. The 7 members of the IQC represent all sectors of the industry and its clientele. Its aid programs cover all aspects of film and include investments, loans, grants and advances for distribution. The annual budget since 1977 has been around $4 million. In June 1981, the IQC published new policies for medium-term assistance and a 5-year plan to revive the Québec film industry. Unlike the CANADIAN FILM DEVELOPMENT CORPORATION, the IQC invests in short- and medium-length films, in TV series and in animation. It has made possible many works which otherwise would not have been made. PIERRE VÉRONNEAU

Insulin is a peptide hormone secreted by cells in the pancreas. It has a molecular weight of 5800 and is composed of 51 amino acids. The molecule is composed of an A and B chain connected by 2 disulfide bridges. One milligram equals 24 international units. When synthetic insulin is released into the blood, the liver retains 20-60% of it. The liver is also the major site for insulin degradation. The synthesis and release of insulin is regulated by a moment-to-moment relationship to concentrations of substances affecting receptors on beta cells such as glucose, amino acids and other hormones, as well as to activities of the sympathetic nervous system. Among the former substances, glucose is the principal stimulant and among the latter activities alpha-adrenergic action of epinephrine is the principal inhibitor.

Insulin is the most potent hormone of fuel storage, affecting carbohydrate, fat and protein throughout the body. Acting through binding to receptors on cell membranes, the principal targets of insulin are in liver, fat and muscle. Concentrations of glucose, free fatty acids and amino acids decrease in the circulation as a result of augmented insulin action, and fuels are thus stored. Their breakdown (catabolism) and release are inhibited and growth is facilitated.

During exercise, when there is need for fuel mobilization for the requirements of contracting muscles, there is co-ordinated inhibition of insulin release in association with the release of counter-regulatory hormones such as epinephrine, glucagon, cortisol and growth hormone.

Insulin has been made available for treatment of DIABETES MELLITUS by extraction from beef and pork pancreatic islets since the discoveries of F.G. BANTING, C.H. BEST, J.B. COLLIP and J.J.R. MACLEOD in 1922. Recently, through GENETIC ENGINEERING, biosynthetic human insulin is becoming available. G.D. MOLNAR

Insurance can be defined as an agreement under which some or all economic losses are transferred to an insurer who, for a premium, promises to compensate the insured for the losses resulting from specified risks (*see* INJURY AND PREVENTION) during the term of the agreement.

The modern world is full of hazards. While the perils — accident, fire, sickness or death — may result in financial losses, it is the hazards that create the potential for losses. "Risk," a term used to reflect the likelihood of a loss, is faced continually by individuals, organizations and society as a whole. The need for safety and security is deeply entrenched in human nature, and most people fear the threat of loss posed by risk. It is therefore not surprising that attempts to cope with risk have been developed since early in man's history.

The idea of pooling risks originated in ancient civilizations. Chinese merchants divided their cargo among several ships during dangerous trips in China's waterways. Through such pooling, no single merchant would suffer a total loss as a result of a shipping disaster. Various forms of risk sharing were practised in ancient Greece and Rome and by the trading nations of the Middle Ages. The concept of transferring the economic consequences of risk, ie, the purchasing of insurance protection, is an important constituent of risk management.

Although a number of parish and municipal fire-insurance companies operated in the mid-1830s in Lower and Upper Canada, the first Canadian life-insurance company was founded in 1847 in Hamilton, Ont. The formation of major insurance companies (Mutual Life, Sun Life, Confederation Life and London Life) in the 1870s was prompted by the passing of the first Canadian insurance law in 1868. With INDUSTRIALIZATION and the introduction of new technologies, the insurance industry developed rapidly.

Underlying Principle of Insurance Insurance involves an agreement between the insured, who pays a premium, and the insurer, who promises to reimburse the insured for financial losses incurred from specified risks. For an insurer to enter such an agreement with an individual or an organization, a large enough number of agreements covering similar risk characteristics are required. By combining many risk exposures, it is possible to predict the collective losses quite accurately. The underlying principle is the law of large numbers which — in the context of insurance — states that with an increasing number of risk exposures the actual losses approach their expected value quite closely. The expected collective loss is then shared proportionally by all the insured in the form of premiums. With insurance, individuals or organizations exchange the risk of uncertain but potential losses.

Operation of Insurance An insurance agreement is a contract between the insurer and the insured defining the risk to be covered, specifying the conditions under which the contract applies, and outlining the procedure for settlement. Insurers are either privately owned corporations or government-operated agencies. Most private insurers are stock and mutual companies. Stock companies are profit oriented and owned by shareholders; mutual companies are owned by the insurer and any excess of income over claim settlements and expenses are returned to the insured in the form of dividends or reduced premiums. An association of individuals can also act as insurers. In such an arrangement the individual insurers characteristically assume the risks personally and are therefore liable for loss settlement with their personal assets. The best known of such associations is Lloyd's of London, which operates worldwide and insures large risks that other insurers may have rejected.

Government-operated agencies also provide protection, typically mandatory, against certain risks. Such programs are termed social insurance (*see* SOCIAL SECURITY) and include WORKERS' COMPENSATION plans, automobile insurance in certain jurisdictions, and some pension plans. Such programs do not necessarily operate on the implicit assumption that sufficient funds are accumulated in advance for the payment of losses; payments are made from general tax revenues.

Supervision and Regulation The insurance industry is regulated for a number of reasons, eg, because premiums are paid in advance and benefits may be paid in the (far distant) future to the insured or others with little or no power to protect their interests; to protect consumers from unfair practices; and because unreasonably low or high premiums can lead to insolvency or to unwarranted profits. In addition to self-regulation through industry associations, the responsibility for supervision of insurance in Canada is shared by the federal and provincial governments. The federal Department of Insurance is responsible for the registration and licensing of federally registered companies and is concerned with their ability to meet obligations to policyholders. This is accomplished by re-

quiring insurance companies to submit financial statements to establish that they have sufficient financial resources (through solvency tests) and by restricting the investment of the funds of insurance companies. The provincial superintendents of insurance prescribe statutory contract conditions, regulate the licensing of agents, brokers and adjusters, and regulate (in several provinces) the rates for automobile insurance. Nevertheless, insurance companies can and do go bankrupt (although this is quite rare), leaving the insured — particularly after a loss — in a difficult position, because little if any compensation for their losses can be expected.

Insurance "Products" A large variety of different forms of insurance protection are available, eg, life insurance, which provides financial resources to support the survivors of the insured or to pay for the obligations (credit insurance) in case of the death of the breadwinner. While term life insurance protects against the risk of (premature) death during a specified term, whole life insurance pays the face value of the policy whenever the insured dies. Under an endowment life contract the face value of the policy is payable upon death or at maturity of the policy; thus it carries the added function of capital accumulation. Life insurance is sold not only to individuals but also to industrial and professional groups.

Disability insurance, which protects the insured against the loss of income due to disability, is similar to life insurance.

The other major category of insurance protection in this area is health insurance. Sickness or accidents may lead not only to considerable loss of income but also to substantial medical expenses. Life-insurance companies therefore offer health insurance (as do other types of insurance companies). Health insurance offered by government-operated agencies is now mandatory in Canada (*see* HEALTH POLICY).

Another major form of insurance is the protection against liability claims resulting from wrongdoings by individuals or organizations. The legal basis for liability exposures are TORTS and contracts (*see* CONTRACT LAW). While liability claims from contracts arise from violation of contract obligations, tort claims arise from wrongdoings occurred by intentional interference (eg, trespass, defamation) or by negligence. If a wrongful act leads to losses to others, the wrongdoer is liable for the financial consequences. To meet these obligations to others (third parties), liability insurance in our litigious society has become essential. Under a liability coverage, payment of damage or losses only arises if the insured is legally liable. Liability insurance is offered to individuals to cover losses arising from bodily injury or property damage or both; it is offered to businesses (product liability is an important form) and more recently to professionals (eg, to protect medical doctors from MALPRACTICE claims).

Automobile insurance is probably the most widely held insurance coverage. Auto insurance policies providing protection against liability claims are typically mandatory and a prerequisite for licensing a vehicle. Both fault and no-fault automobile insurance plans exist. In no-fault plans there is no determination of blame, in the courts, for an automobile accident before payments for bodily harm and perhaps property damages are made by insurance companies. The elimination of fault must be approved by provincial legislation. Saskatchewan introduced the world's first no-fault system of automobile insurance in 1946; Québec introduced a similar plan in 1978. Policies providing protection against physical damage to the automobile from collision and other risks such as theft, storm and fire are voluntary.

Fire insurance indemnifies the insured in the event of damage or destruction of property by fire. Over the years standard forms of fire policies have been developed. Fire insurance is typically part of the homeowner's policy, which includes, in addition, protection against break-ins, theft, water damage and personal liability. In fact the homeowner policy is a so-called "multiline" contract which provides convenience and cost advantages to the insured.

Many other forms of property insurance exist, including marine and aviation insurance, hail, windstorm and earthquake insurance, insurance against fraudulent computer use, and even insurance against a rained-out vacation. Ransom and kidnapping as well as skyjacking insurance can now be purchased.

Future Issues Insurers attempt to reduce costs of premiums by mass marketing; group insurance is part of this development. A major concern is the increase in fraud, arson and crime and its implications for insurance. Another important trend is the increasing internationalization of economies, which has sparked further need for insurance of export credit risk. Not only has the insurance volume increased worldwide — domestic and foreign insurers compete in the same market — but the need for reinsurance (ie, the assumption of part of the risk insured by one insurance company, by a second insurance company, to reduce the risk) has also grown. International aspects of insurance significantly affect the national BALANCE OF PAYMENTS (ie, the export and import accounting).

The question of HUMAN RIGHTS may also affect future trends in the insurance industry. The principle of insurance (ie, that insurance companies come together to share their risks in a class or group) is in many respects opposed to the principle of human rights (ie, that no individual should be assigned or characterized by the characteristics of a group). Various segments of the Canadian population, eg, women and the handicapped, have expressed their concern over what they believe are discriminatory insurance rates.

From a regulatory point of view, it is necessary to guarantee that the insurance industry is viable and financially solvent, and that insurance is available to so-called substandard risks. Continued supervision, the possibility of establishing a scheme that protects the insured in case of BANKRUPTCY, and the creation of "pools" may contribute to these goals. With the increasing potential for catastrophic losses (eg, supertankers) and the shifting relationships in the socioeconomic system, the insurance business faces considerable challenges in the future.

C. HAEHLING VON LANZENAUER

Reading: D. Bickelhaupt, *General Insurance* (1979); R. Mehr and E. Cammack, *Principles of Insurance* (1976).

Intellectual History is a record of the thought of groups and individuals who may or may not be academics or "intellectuals." The study of intellectual history often includes the treatment of sensibilities, emotions and ideological or cultural preoccupations as well as systematic thought, and touches on the concerns of historians in areas such as SCIENCE, POLITICS, society, EDUCATION, ART, ECONOMICS, PHILOSOPHY, RELIGION, LITERATURE and JOURNALISM.

French Canada

Intellectual history in Québec, somewhat unfocused before 1760, became more distinctive after the CONQUEST. Its development was marked by the establishment of printing (1764) and was strongly affected by local political events (establishment of a house of assembly) and international ones (American Revolution, 1775-83, and French Revolution, 1789). Intellectual debate focused on civic or political issues; the press — *The Quebec Mercury* (1805), Québec's *Le Canadien* (1806), Montréal's *La Minerve* (1826) — was the most important medium of expression of the new liberalism. After about 1820 schooling led to increasingly polarized ideological stands, with a rising bourgeoisie in the liberal professions pitted against a still somewhat disorganized Catholic church preoccupied by its educational responsibility. At the time of the Lower Canada REBELLIONS OF 1837, a time of economic crises and parliamentary impasses, anglophone cultural institutions were particularly active.

During the Union period (1841-67) the gazettes were intellectually lively, and cultural institutions were increasingly polarized between an ULTRAMONTANE Catholic Church consolidating its position and a bourgeoisie weakened by the rebellion. The long search for a "national" literature began in the 1840s, and gained momentum with the publication of *Histoire du Canada* (1845-48) by François-Xavier GARNEAU. New papers kept appearing. There was a proliferation of voluntary associations, such as the liberal INSTITUT CANADIEN, where members could read local and foreign newspapers, borrow library books or take part in rhetoric-laden discussions. The generation of 1845 had access to a much larger network of schools under the new Surintendant de l'instruction publique (1841), to classical colleges and to UNIVERSITÉ LAVAL (fd 1852).

The entire 19th century was marked by the ideology of a church inclined toward Rome, supporting the priority of church over state, justifying thereby its intervention in intellectual, academic and social domains. Post-1870 liberal thinkers failed to implant the values of the bourgeois revolutions: respect for the freedoms of conscience, opinion, speech and association, and the idea of the separation of church and state. Wilfrid LAURIER was the first (in 1877) to attempt a courageous public distinction between political liberalism — that of the Liberal Party — and Catholic liberalism, condemned by a church closely linked with the Conservative Party.

After 1867 political life and especially partisan politics dominated. The public torpor was shaken by the 1885 hanging of Louis RIEL, the defeat of French minorities on the school question in Manitoba, New Brunswick, Keewatin and Ontario, and the sharp awareness that the French language — and "race" — were threatened, even in Québec. Henri BOURASSA clashed with Laurier over IMPERIALISM and NATIONALISM. Bourassa became the rallying point for a new nonpartisan political awareness. With Olivar Asselin, founder of *Le Nationaliste* (1904), and Jules Fournier, Bourassa founded *Le Devoir* (1910), the first exception to the rule of a partisan and "servile" press. A new linguistic awareness set the tone for the establishment (1902) of the Société du parler français, the first Congrès de la langue française (1912) and the creation of the Ligue des droits du français (1913). A new religious awareness among young people led to CATHOLIC ACTION, realized in the nationalist Association catholique de la jeunesse canadienne-française (1903-04).

The great intellectual movement 1917-29 was ACTION FRANÇAISE, which, according to its guiding light, Abbé Lionel GROULX, was to synthesize the scattered ideas of nationalist thinkers. This "intellectual action" was also the uneasy response to transformations in Québec society caused by urbanization, INDUSTRIALIZATION, Americanization and CONSCRIPTION. These social phenomena had preoccupied Action française and concerned workers' unions and then legislators before the church finally put together a Catholic SOCIAL DOCTRINE. The church's hesitant involvement in social issues is the key to intellectual history after the GREAT DEPRESSION. It brought the church closer to working-class circles and provided training for young lay people to learn the elements of political action. But until the mid-1930s, all these "actions" — Catholic, intellectual, social or national — were ideologically continuous with the 19th century,

when the church had dominated the educational and social fields.

Evidence of a growing state role in cultural life was the new dynamism of the provincial secretariat, where Athanase David directed, 1919-36, an "intellectual action." In this context discussions took place about the existence of a unique French Canadian literature. Modern social patterns received little examination but nevertheless were felt in a life-style whose pace was set by movies, automobiles and new household technologies. Modernism was already present in painting in 1928, the year painter Paul-Émile BORDUAS left to study in France.

The Depression deeply disturbed the generation then coming of age, whose search for a program of social, economic and spiritual recovery was taken up by the new ACTION LIBÉRALE NATIONALE (1933) and in movements and journals (JEUNE-CANADA, *L'Action nationale*, *La* RELÈVE). This generation was the last to believe in "the primacy of the spiritual." The social situation finally undermined the ultramontanism of a church increasingly mocked by the Depression. All who participated from the early 1940s in the lay action movements — Catholic, student, worker or rural — lived through the near paralysis of spiritual values as those values were overwhelmed by temporal and material life. The "social" church cracked during the ASBESTOS STRIKE (1949) and finally broke at the end of the 1950s. The shock of the Depression also served to root the UNIVERSITY in reality as its faculties of applied sciences multiplied and the social sciences started to develop.

The Depression also created an uneasiness about the future, which led intellectuals toward a new subjectivity expressed by the poets, eg, Hector de Saint-Denys GARNEAU and Alain GRANDBOIS, at the time of the war. In painting, the move from figurative to abstract around the end of the 1930s, eg, by Borduas and Alfred PELLAN, was as radical an intellectual break as was the social challenge of the REFUS GLOBAL manifesto published in Aug 1948.

The intellectual and cultural landscape of Québec at the start of the 1950s was radically altered by postwar prosperity and consumption, movies, radio, the automobile and the arrival of television in Sept 1952 — the later QUIET REVOLUTION would reveal a monument already virtually in place. The first writings seriously examining the intellectual history of Québec had appeared at the end of WWII. In 1945, amid works by Benjamin Sulte, Claude de Bonnault, Robert de Roquebrune, Séraphin Marion and Auguste Viatte, Marcel Trudel published *L'Influence de Voltaire au Canada*. The writers of intellectual history began to focus on precise topics: the cultural significance of the Conquest (Claude Galarneau); the reverberations of the French Revolution in Québec and the state of subsequent cultural relations with France (Mason Wade, Michel Brunet, Gustave Lanctôt and, after 1960, Jean-Pierre Wallot, John Hare and Philippe Sylvain); the start of a printing industry and the beginning of NEWSPAPERS (Wade, Brunet and Lanctôt); and, in the 1970s and 1980s, liberalism and ultramontanism (Sylvain, Pierre Savard, Jean-Paul Bernard, Nadia Eid, Yvan Lamonde and Marcel Lajeunesse). A passion to defend the liberals of 1837 and thereafter coincided with the beginnings of the Quiet Revolution, that great "collective undertaking" that was to inspire new research into ideologies; this trend, publicized in *Recherches sociographiques*, first peaked in 1969 with a special issue, "Idéologies au Canada français 1850-1900." Other publications about the ideologies of the 19th and 20th centuries followed. This research, based on accounts of major figures, groups and movements, soon revealed its limitation: a privileged position for the written word. Intellectual history thus found itself challenged to include those who had no voice. In the early 1980s Québec's intellectual history was at this point in the debate: Is there a satisfactory intellectual or cultural history which is not first of all a SOCIAL HISTORY?

YVAN LAMONDE

English Canada

Much of Anglo-Canadian thought in the first century after the Conquest in 1760 attempted to preserve British and Christian values in a colonial environment, or to establish some acceptable middle ground between a European heritage and an American geographical circumstance. Some of the first such exercises were in the form of humorous social satires (*see* HUMOROUS WRITING), such as Thomas MCCULLOCH's "Letters of Mephibosheth Stepsure" (1821-23) and Thomas Chandler HALIBURTON's *The Clockmaker* (1835). McCulloch helped initiate a tradition of moralistic social criticism present in English-Canadian intellectual history since 1820.

McCulloch was a Presbyterian minister and, as founder of Pictou Academy and first principal of DALHOUSIE UNIVERSITY, a major Canadian educator. Elsewhere in English Canada, serious intellectual effort also arose at the pulpit and the lectern. Between 1850 and 1900 many intellectuals were preoccupied with the apparent conflict between science and religion, especially with regard to the implications of evolutionary theory (*see* EVOLUTION; SOCIAL DARWINISM) and higher criticism. Clerics and professors sought to defend social and religious orthodoxy against an increasingly materialistic science by upholding the premises and conclusions of the Scottish "common sense" school of philosophy, the anti-speculative Baconian method in science and an evangelical pietism in religion.

From 1870 to WWI there appeared accommodation to the philosophy of evolution, most noticeably through a Hegelian idealism professed by philosophers such as George Paxton YOUNG and John WATSON. This idealism dominated academic thought and writing in English Canada into the 20th century, for it appeared to reconcile religious and scientific claims by subsuming the latter within the former. The ROYAL SOCIETY OF CANADA facilitated the development of a national academic community. New publishing ventures, most notably the *Canadian Monthly and National Review* (1872), *The Week* (1883) and QUEEN'S QUARTERLY (1907), provided creative outlets for social critics, including William Dawson LESUEUR, Goldwin SMITH, Agnes Maule Machar and Andrew MACPHAIL. While differing in emphasis and audience, these magazines reflected a consensus of values marked by a broadly conservative social philosophy set within an acceptance (sometimes an uneasy one) of the workings of a capitalist market economy.

These years also saw the emergence of a preoccupation by English Canadians with the nature and implications of nationalism. By the turn of the century this took the form of an intense debate between those such as George Parkin and G.M. GRANT who placed Canadian nationalism within the context of the British Empire, and those such as Goldwin Smith and John S. EWART who insisted that nationalism was hollow unless it pointed towards constitutional autonomy and away from colonial status. For the half century following WWI, English Canadian thought was thus beset with competing forms of nationalism, one based on sentiment and the other on rationalism. In this respect, historians Harold INNIS and Donald CREIGHTON may be seen as intellectual heirs of Parkin and Grant, just as F.H. UNDERHILL and Ramsay Cook follow Smith and Ewart.

The emergence of the professional writing of history was testimony to the increasing importance of the university in shaping the direction of English Canadian thought (*see* HISTORIOGRAPHY). By the 1920s, U of T had begun to dominate academic affairs, particularly in the humanities and social sciences; MCGILL UNIVERSITY maintained its high status in medical and scientific research; and Queen's U established a tradition — largely inspired by the example of Adam Shortt and O.D. SKELTON, but derived from the idealist heritage — of commitment by intellectuals to public service in government agencies. This latter trend was paralleled in religious affairs by the Protestant SOCIAL GOSPEL movement, which held an organic view of society, a belief in the immanence of God and a desire to achieve the Kingdom of God on Earth. One result was a further erosion of traditional denominational commitment and the creation in 1925 of the UNITED CHURCH OF CANADA, which committed itself to Christian engagement in the activities of secular social agencies. Implicit in the Social Gospel was a criticism of Canadian society, a criticism that took the form of a Christian socialism typified in the careers of J.S. WOODSWORTH and Salem BLAND.

Between the wars, research in the emerging SOCIAL SCIENCES, particularly political economy and history, became more empirical — if not materialistic — in causal inference. Writing in the humanities tended to bear witness to the continued importance of idealism. But some intellectuals became actively engaged in public social issues, particularly during the Great Depression of the 1930s. By the mid-30s the LEAGUE FOR SOCIAL RECONSTRUCTION, consisting largely of progressive university academics such as Eugene FORSEY and F.R. SCOTT, had in the collectively written *Social Planning for Canada* formulated a major critique of Canadian society and public affairs. Such social concern, together with the considerable intellectual effort that undergirded the federal Royal Commission on DOMINION-PROVINCIAL RELATIONS (1940), pointed toward a major redirection of social assumption and constitutional arrangement after 1945.

Directions in English Canadian intellectual life after WWII were largely derived from a recognition of the American domination of world affairs. The Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (the "Massey Commission," 1951) warned of the threat to Canadian cultural life by American-dominated mass media. Throughout the 1950s, as a result, a vigorous cultural nationalism was given forceful expression by a number of social commentators, especially Hilda Neatby, historian and member of the Massey Commission, who in *So Little for the Mind* (1953) criticized the Canadian educational system for accepting the American values implicit in the "progressive education" movement. The creation of the CANADA COUNCIL in 1957 reflected this enlarged concern for the future of Canadian cultural traditions. But by 1957 nationalist thought was beginning to shift from cultural to economic matters. Walter GORDON's Royal Commission on Canada's economic prospects (1958) was a strong statement of the need for ECONOMIC NATIONALISM. Throughout the 1960s a lively and productive debate took place on the merits of national industrial policy and on the problems — political, sociological and philosophical — inherent in a technology of mass communications dominated by the US. Was it possible to maintain real autonomy in the era of the "universal and homogeneous State"? This question was posed in different forms by philosopher and critic George P. GRANT, most forcefully in *Lament for a Nation* (1965). Economic, political and historical writing during these years by Mel Watkins, Abraham Rotstein, Donald Creighton, W.L. MORTON, Ramsay Cook and others provided abundant fuel for animated debate both in the academic community and before the public.

The intellectual efflorescence of the 1960s, coupled with a vast expansion of the country's university system, bore much fruit in the 1970s. The work of Marshall MCLUHAN, himself in-

spired by Harold Innis, helped assure that Canadians would pay attention to the theory and technology of communication; that of Northrop FRYE nourished a self-confident generation of novelists, poets and critics whose work fused intellect and imagination. The greater division of labour afforded by larger university faculties vastly increased the quality and quantity of scholarly "production." With this specialization, however, also came a more tentative approach to large-scale generalization in all academic fields. In that of history, for example, the older theme of "nation-building" as fundamental to the thematic ordering of scholarship broke down in the face of intensive research based on newly discovered regional, thematic and ideological "realities." In the 1970s Canadian scholarship entered an age of analysis rather than synthesis. Still concerned with questions of nationalism, English Canadians also sought to establish degrees of limitation in social identity and to articulate the cultural differences imposed on the nation by region and ethnicity. This more cautious approach to reflections on national life held true in the realms of the intellect, the imagination and public affairs.

A.B. McKILLOP

Reading: L. Armour and E. Trott, *The Faces of Reason* (1981); C. Berger, *The Sense of Power* (1970); R. Cook, *The Maple Leaf Forever* (1977); A.B. McKillop, *A Disciplined Intelligence* (1979); S.E.D. Shortt, *The Search for an Ideal* (1976); S.M. Trofimenkoff, *The Dream of Nation* (1983).

Intelligence Gathering, broadly defined, is the collection of information by a government agency from all available sources for the purpose of analysis. Intelligence data are used by the federal government to assist international diplomacy and to protect national security, and by federal and provincial governments for law enforcement purposes.

The Department of NATIONAL DEFENCE (DND) has specialized military and intelligence units, but with one major exception these are analysis units and are generally not engaged in intelligence gathering. Canada obtains much of its foreign intelligence, both diplomatic and military, from its allies, particularly the US, and the UK and other Commonwealth countries. The one major intelligence-gathering unit within DND is the top secret Communications Branch, which is responsible for protecting Canadian diplomatic and military communications networks from electronic eavesdropping; the branch also intercepts foreign electronic communications and, it is believed, maintains listening posts of its own to monitor the diplomatic radio and microwave transmissions from foreign embassies in Ottawa and to pick up Soviet aircraft and naval transmissions in the Arctic.

Law-enforcement intelligence gathering is carried out for the federal government by a variety of specialized units within the ROYAL CANADIAN MOUNTED POLICE, eg, the ORGANIZED CRIME and narcotics squads. Revenue Canada gathers intelligence about possible large-scale smuggling operations and major tax frauds. The Department of EXTERNAL AFFAIRS collects so-called "open-source" foreign intelligence from diplomatic posts abroad, but the Canadian government does not have a foreign intelligence service for the covert gathering of information in foreign countries.

Intelligence is gathered within Canada to counter threats to national security, eg, terrorism, espionage and so-called subversive activities. This function has been carried out traditionally by the security service of the RCMP, which on occasion has broken the law in its efforts (*see* INQUIRY INTO CERTAIN ACTIVITIES OF THE RCMP). The RCMP security service has gathered information and compiled files on some 800 000 individuals in Canada and on many organizations. In the early 1980s, in response to RCMP abuses, the Liberal government made several legislative attempts to create a civilian intelligence service. The Canadian Security Intelligence Service came into existence 16 July 1984.

Intelligence-gathering techniques include open-source collection of published material and interviews. Covert intelligence-gathering techniques include physical surveillance (eg, "tailing" an individual), wiretaps, electronic surveillance with hidden microphones and cameras, surreptitious entries into private premises, mail opening, and examination of personal information files and records compiled by other government agencies or by private institutions. Many of these techniques are illegal or can only be lawfully authorized by a judge or the federal solicitor general.

One of the most effective techniques for gathering intelligence is the use of informants. The informant may be an employee of the intelligence agency who assumes an undercover identity to infiltrate an organization, or may be someone recruited by the intelligence service from within the ranks of the organization under investigation. Defectors are sometimes persuaded to continue as "agents in place" to provide valuable intelligence about enemy espionage operations.

The intelligence-gathering capability of governments is greatly enhanced by the ability of computers to store information and to retrieve it quickly from a variety of sources and compile a single dossier (*see* COMPUTERS AND SOCIETY). However, civil libertarians charge that these computer data-bank links also threaten PRIVACY.

JEFF SALLOT

Reading: W.T. McGrath and M.P. Mitchell, *The Police Function in Canada* (1981); J. Sawatsky, *Men in the Shadows* (1980).

Intendant of NEW FRANCE, office created in 1663 when Louis XIV established a system of colonial government, including a GOUVERNEUR and SOVEREIGN COUNCIL. Second in rank to the governor, the intendant controlled the colony's entire civil administration. He gave particular attention to settlement and economic development, and to the administration of justice. Because he also managed financial matters, he had the most sweeping powers in the colony's government. Appointed by a royal commission and subject to recall at will, the intendant reported to the minister of marine (*see* MINISTÈRE DE LA MARINE). He ensured that the king's decisions were implemented, appealed to the minister over difficulties with new policies and presented a detailed annual report on the colony. He acted either by direct order or by decree of the Sovereign Council, which he chaired. Intendants were usually chosen from influential circles outside the nobility and were noted for the competence and care with which they performed their duties. New France's best-known intendants were Jean TALON, Gilles HOCQUART and François BIGOT.

JACQUES MATHIEU

Intercolonial Railway Construction of a railway linking the Maritime colonies and the PROVINCE OF CANADA was proposed as early as the 1840s. Surveys were carried out and deputations were sent to England to solicit financial support. A line was opened between Halifax and Truro, NS, in 1858 and from Saint John to Shediac, NB, in 1860. In 1865 Sandford FLEMING presented a report recommending a route along the Baie de Chaleur, through the Matapedia Valley and along the St Lawrence because it was far from the American border and passed through rich timber country. Completion of the railway was made a condition of CONFEDERATION, in 1867, and construction began shortly after. Fleming was appointed engineer in chief and was involved in many heated controversies with officials who controlled finances.

The first section between Truro and Amherst, NS, was opened on 9 Nov 1872, and that between Rivière-du-Loup and Ste-Flavie [Mont Joli], Qué, in Aug 1874. The link between Campbellton and Moncton, NB, was completed 1875 and the gap between Campbellton and Ste-Flavie was closed 1876. Fleming declared the railway (some 1100 km long) ready for traffic on 1 July of that year. Construction of the railway did not require spectacular engineering feats, but presented numerous difficult challenges and was built to high standards. At Fleming's insistence, all but 3 of the BRIDGES were built of iron.

The Intercolonial acquired the GRAND TRUNK RAILWAY line from Rivière-du-Loup to Point Lévis, Qué, in 1879 and 10 years later gained running rights into Montréal from the GTR. It added the Cape Breton Railway in 1891, providing ferry service across the Strait of Canso. Built to fulfil the terms of Confederation, the Intercolonial was never a commercial success. Nevertheless, it provided employment, developed towns and villages along its route, and was a customer for Maritime coal. Up to 1918 it was administered by the Dominion government under the minister of railways and canals. Freight rates were kept low in order to promote trade, and deficits were met by the government. In 1918, with other elements of the CANADIAN GOVERNMENT RAILWAYS, it was placed under the control of the CANADIAN NORTHERN RAILWAY, and in 1919 became part of the CANADIAN NATIONAL RAILWAYS.

JAMES MARSH

Interest is the price paid by a borrower for the temporary use of someone else's money or, conversely, the price charged by a lender for the temporary use, by someone else, of his money. In ancient and medieval times, the difference between a moderate interest payment and a high rate of interest based on the desperation of the borrower wasn't clearly understood. All interest was called "usury," a term reserved now for exorbitantly high interest rates.

Interest is stated as a rate, ie, a percentage of the amount borrowed (principal) to be paid for an agreed period of time (usually a year) that the money is on loan. It has often been estimated that the basic rate of interest, the simple payment to the lender for waiting, is about 3% annually, but other factors add to this rate. First, there is a risk that the borrower cannot or will not repay the money. The risk of lending to the federal government is not large (although even countries, or "sovereign" borrowers as they are sometimes called, have defaulted on loans), but it rises somewhat on loans to provinces and even more on those to large companies. On loans to individuals, risk is often reduced by a mortgage on property or collateral, ie, something valuable, such as a bond deposited with the lender as security. The lender can then seize something valuable belonging to the borrower if the loan is not repaid. Unsecured consumer loans carry a high risk (*see* CONSUMER LAW), and therefore have high interest rates. Second, risk increases the longer the money is loaned. The borrower's ability to repay money may not change much in a month or a year, but over 10 or 20 years it may change radically, as may the need of the lender for the use of his own money. Third, INFLATION affects the buying power of the money when it is repaid to the lender. On a $100 loan at 5% interest, the lender will lose money if inflation runs at 10%, because the $105 paid in principal and interest at the end of a year will buy only what about $95 would have bought when the loan was made. The inflation that must be taken into account, however, is not the inflation rate at the time the loan is made or over the year; it is the future rate, which can only be guessed by lender and borrower. If inflation is generally expected to drop, short-term loans may cost more in interest than long-term

loans, because the greater risk of default on the longer-term loan is more than balanced by the hope of lower inflation.

In the 1970s and early 1980s, economists found that uncertainty also affected interest rates. "Real" interest rates, ie, the stated rate minus the expected inflation rate (usually 3%), had risen to 7%, because in a time of economic instability, lenders had attempted to protect themselves from uncertainty.

There is always a range of interest rates, depending on the borrower and the risk of the loan. For example, in 1983, when the federal government was paying 10% to buyers of its bonds, large corporations were paying 11% as the "prime rate" for bank loans (the prime rate is the interest charged by banks to their best-secured corporate customers); companies were paying 12% on money borrowed by issuing bonds for longer periods than the shorter-term prime rate loans; mortgage loans were costing as much as 13% and consumer loans 14%. Interest rates on credit-card loans ranged from 18.6% to as high as 28.8%. This whole range of rates moves up and down, more or less together, as changes occur in the general level of interest rates (which in Canada is determined by the MONETARY POLICY of the BANK OF CANADA, the demand for loans, interest rates in the US and inflation rates).

The Bank of Canada fixes the BANK RATE, ie, the amount it charges for the relatively infrequent loans it makes to the commercial banks. More importantly, the bank rate signals the direction in which the Bank of Canada wants interest rates to move. In the 1970s the bank rate was fixed for months at a certain percentage rate and then changed by a Bank of Canada announcement, but in March 1980 the Bank of Canada shifted to a system under which the bank rate was changed each week in step with changes in the rate paid by the federal government to borrow money for 90 days by selling treasury bills.

Under this system the Bank of Canada could affect the bank rate directly by bidding at the auction held each Thursday when treasury bills are sold, mostly to the commercial banks. With the bank rate set at 0.25 of a percentage point above the average interest rate on 90-day treasury bills, the Bank of Canada could raise the rate by bidding up the treasury bill rate. Small changes in the bank rate may be ignored by other lenders, but when the bank rate rises significantly in a short period, the commercial banks raise their prime rates and other interest charges follow.

In 1975 the Bank of Canada began trying to cut inflation by raising interest rates. This move was based on the theory that with high interest rates, consumers are unwilling to borrow for goods such as houses and cars, and businesses are unwilling to invest; thus a rise in interest rates cuts down the demand for goods and services, which reduces the upward pressure on prices. This policy (use of interest rates to cut inflation) culminated in 1981 when the bank rate rose above 21% and the prime lending rate was 22.75%.

Canadian rates might not have reached such levels had it not been for the rise in rates in the US where a similar monetarist policy was in effect (*see* MONETARISM). When American rates rise and Canadian rates do not follow, money tends to flow to the US as lenders seek the higher return on their loans. This outflow pushes the value of the Canadian dollar down in terms of American funds. Imported goods then cost more in Canadian dollars, and this tends to raise the inflation rate in Canada. One way to break the close connection between Canadian and American interest rates is to control the flow of money in and out of Canada, as was done during WWII by a system of exchange controls.

The general level of interest rates is also affected by the demand for borrowed money, which tends to rise and fall with the economy. In times of RECESSION, businesses and consumers are less interested in borrowing, and this tends to reduce the general level of rates. But with economic recovery, businesses want to expand and consumers want to buy on credit, and this increases the demand for loans and pushes interest rates up. If the interest rates rise so high that consumers and business executives are discouraged, another recession will ensue. This swing of interest rates, from low in recession to high in recovery, is one reason for the pattern of ups and downs in the economy, a pattern no economic theory or policy has so far succeeded in fully explaining or controlling. D. MCGILLIVRAY

Intergovernmental Finance In a federal state, to ensure that regional and cultural differences are respected while national interests and policies are pursued, responsibilities and corresponding powers are divided between 2 levels of government, each of which is autonomous within its own designated sphere of responsibility (*see* DISTRIBUTION OF POWERS). The CONSTITUTION ACT 1867 assigns to the federal government responsibilities for the regulation of trade and commerce, the postal service, money and banking, the criminal law and the PEACE, ORDER AND GOOD GOVERNMENT of Canada in relation to all matters not assigned exclusively to the provinces. The national government was authorized to legislate for the raising of money by any system of taxation, or "the borrowing of money on the public credit," but each province was assigned exclusive authority to legislate concerning management and sale of public lands and timber; prisons, hospitals and charitable institutions; municipal institutions; and local works and undertakings other than those involving transportation facilities extending beyond the limit of the province or those declared by Parliament to be "for the General Advantage of Canada or for the Advantage of Two or more of the Provinces." Provincial legislatures were also assigned responsibility for property and civil rights in the province, and all local or private matters. They were assigned the power to raise revenues through direct taxation both within the province and through the administration of the public lands. Agriculture and immigration fall concurrently under both federal and provincial jurisdictions, but provincial legislatures were assigned exclusive jurisdiction over education subject to provisions regarding rights of minority groups, in which area the federal government has the authority to pass remedial legislation. Local or municipal governments are generally responsible for fire and police protection, health and safety inspection, local works and land use, sanitation, etc. While many of these services are financed directly from property taxes or by transfers from the provincial or (to a much lesser extent) federal government, municipalities, as creatures of provincial governments, derive their responsibilities and taxing powers from provincial legislation.

It has been said that until 1937, in its judicial interpretation of the Constitution Act 1867, the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL narrowly interpreted the residuary powers of the federal government associated with peace, order and good government and broadly interpreted the property and civil rights clause, but recent and explicit constitutional amendments may have extended the reach of federal powers. As circumstances change, however, the revenue sources or taxing powers assigned to different levels of government may become inadequate, in which case 4 solutions are possible. First, taxing powers (tax room) can be transferred by legislation. Second, transfer payments to other governments can be authorized as direct expenditures. Third, a particular responsibility may effectively be assumed by another level of government, and finally, through regulation, expenditure obligations (or compliance costs) can be transferred to agents outside government.

Revenue Sources In a federal system, the powers to raise revenues must somehow be matched to the expenditure responsibilities of each level of government but must also somehow be co-ordinated, because the same taxpayers support both. The Constitution Act 1867 assigned customs duties, excise taxes and all indirect levies exclusively to the national government. The relatively unimportant (at that time) direct taxes on local inhabitants were assigned to provincial governments, whose responsibilities were not expected to grow, and small statutory subsidies were established for anticipated shortfalls in provincial revenues. The century of economic expansion and national development after Confederation, however, dramatically altered this calculated balance. The provinces, searching for new revenues, claimed increased subsidies and introduced a widening array of licences and taxes, succession duties, and, for the first time, income taxes. Federal income tax, purportedly temporary, was introduced to finance WWI. Industrialization and urbanization led to rapid increases in provincial expenditure responsibilities during the subsequent 15 years, until the GREAT DEPRESSION brought several provincial and municipal governments to the brink of bankruptcy and the nation to an uncoordinated mesh of conflicting and overlapping direct TAXATION measures characterized as a "tax jungle."

By 1939 direct income taxes were a critical source of government revenue and until 1962, under tax rental agreements made at the time, the federal government collected personal and corporate income taxes on its own behalf and on behalf of all the provinces, returning an agreed portion of these revenues to provincial governments, although Québec had opted out in 1947 to establish its own corporate and personal income-tax collection system and Ontario its own corporate income-tax collection (both provinces continued to adhere voluntarily to the federal government's definitions of taxable income). In 1962, the tax-rental agreements were replaced by a tax-collection agreement, according to which the federal government collected income taxes levied by provincial governments under their own provincial legislation, and returned to the province the taxes collected in that province. After 10 years of bitter debate over the appropriate sharing of the available tax room and then over federal proposals for tax reform, in 1972 the agreements were changed again; provincial tax rates were defined as a percentage of basic federal tax and it was emphasized that provincial tax revenues resulted from provincial tax legislation and were not simply an agreed share of some total revenue pie. The principle of access or joint cultivation of tax fields implied in these arrangements reinforces the ability of provincial governments to raise additional revenues independently to finance their expenditure commitments. It is a transition from tax sharing to an attempt at co-ordinating simultaneous federal and provincial government exploitation of the common income-tax base. Unfortunately this co-ordination through tax collection agreements is threatened by the opting-out of Québec, Ontario and now Alberta (since 1981) from the corporate tax-collection agreements, and threats by Ontario, Alberta and BC to join Québec in adopting their own personal income-tax collection systems if the federal government proves unwilling to administer a sufficiently rich variety of special provincial tax provisions. Both this issue and the acute intergovernmental struggle for shares of revenues derived from the exploitation of natural resour-

ces are extremely sensitive areas of intergovernmental finance.

Federal-Provincial Grants and Programs Instead of transferring taxing powers or tax room, governments also transfer to each other direct annual payments (or cash transfer). Several different types of transfer exist, the most important distinction being between unconditional, or general purpose grants, and conditional, or specific purpose, grants. Unconditional grants require no particular commitment by the recipient government, but conditional grants must be spent for a specific purpose, for programs complying with conditions decided by the donor government. Examples include incentive grants (to stimulate expenditure by the recipient government on particular activities), matching or shared-cost programs, and closed- or open-ended grant schemes (the former being those in which payments will be made to designated limits, the latter involving a payment share of a specific fraction of approved expenditures for a designated purpose, without reference to the size of the expenditures). The most important category is the shared-cost program, an open-ended matching grant in which the donor is committed to meet an agreed fraction of approved program costs, in contrast to both block-funding arrangements in which, notwithstanding general conditions, the amounts transferred are determined by a formula independent of actual expenditures and to deficiency payments designed to make up an estimated shortfall of revenues below expenditure commitments. Unconditional payments reflect the federal government's responsibility enshrined in the Constitution Act, 1982 "to ensure that provincial governments have sufficient revenues to provide reasonably comparable levels of public services at reasonably comparable levels of taxation." (*See* EQUALIZATION PAYMENTS). This responsibility was implicit in the Constitution Act 1867, in the provision requiring the Dominion government to make unconditional per-capita payments to each of the federating provinces to enable them to meet their expenditure obligations with the revenue sources assigned to them. These statutory subsidies are now not as important as the equalization program. Estimated at $4.5 billion for the 1982-83 fiscal year, these payments represent almost 1/3 of a total $15.3 billion federal-provincial cash transfers for that year, and form as much as 25% of total revenues for some provincial governments.

A variety of other federal-provincial transfers designed to encourage provincial expenditures in particular areas, eg, health, education and social services, which are generally thought to fall within exclusive provincial jurisdiction, are controversial. The transfers include first, cash contributions (about $5.9 billion for 1982-83) under the Federal-Provincial Fiscal Arrangements and Established Programs Financing Act of 1977, determined on the basis of block funding, to support provincial programs in hospital and medical insurance, extended health care and post-secondary education. The post-secondary education component is almost always unconditional; the health-care component is broadly conditional upon compliance with conditions legislated in the Hospital Insurance and Diagnostic Services Act of 1957 and the Medical Care Act of 1966, but not directly related to provincial expenditures; second, cost-shared programs or matching grants, eg, Canada Assistance Plan (CAP) in which the size of the federal transfer for provincially administered social services and social assistance (about $2.6 billion for 1982-83) is directly determined by provincial expenditures on eligible services; third, special purpose grants, or grants-in-aid, eg, those for economic development ($400 million) or bilingualism in education ($200 million); and fourth, direct federal payments, eg, those under the Canada Manpower Training Plan, for services rendered by provincially funded agencies.

Under the Established Programs Financing arrangements, (1977, amended 1982) hospital insurance, medical insurance, and post-secondary education were no longer funded under 3 separate cost-sharing arrangements, reflecting the view that these arrangements infringed too severely upon provincial discretion in setting priorities and provided inadequate incentive for control of costs. However, in 1982 the programs were again separated, reflecting both a concern that program objectives, including a national interest in universal access to an adequate level of services, were adversely affected by provincial efforts at expenditure restraint and the federal government's desire to reduce its own expenditure growth and to correct what it viewed as a critical imbalance in fiscal powers between it and the provincial governments. At one extreme in the controversy over conditional grants is the argument for complete federal control over the uses of federal revenues disbursed in the national interest even when the expenditures impinge on provincial jurisdictions; at the other extreme is the argument for complete discretion on the provincial governments' part in deciding the allocation of funds for programs for which they are responsible.

Shared-cost programs may distort provincial priorities, reduce the degree of control over costs and create forecasting problems for the federal government. Block-funding arrangements reduce the federal government's accountability for and influence on the allocation of resources to programs, while increasing the federal control over the level of payments. Of the choices, reassigning revenue sources until all provinces have sufficient revenues to meet their expenditure obligations, accepting continuing transfers of federal revenues to provincial governments to finance provincially administered programs, or transferring to the federal government responsibilities earlier assumed by provincial governments, neither the first nor the third are generally acceptable and an uneasy balance exists between the desires of the federal government to extend its control and of the provincial governments to increase their discretionary powers. Conditional grants are an attempt to reconcile powers assigned to the provinces in 1867 with the reality that the exercise of these powers is no longer of only local or particular interest.

Intergovernmental Economic Issues Tax transfers and cash transfers form only one part of an apparatus of government which also includes regulatory powers, direct services and a maze of production activities. The issue of power over the economy affects fiscal FEDERALISM first because the distribution of taxing and spending powers influences the ability of the federal government in particular to maintain appropriate levels of aggregate economic activity. Although recent studies conclude that the requirements of federal FISCAL POLICY need not preclude further transfer of tax points by the federal government, in recent years the budgets of provincial governments have sometimes run counter to federal STABILIZATION efforts, reducing the leverage of the federal government to influence the budget of the government sector as a whole. Economic federalism also affects interprovincial flows of goods, services and productive resources. When competition among provinces for productive activities intensifies, tax concessions — incentives to locate economic activity in one province rather than another — are commonly introduced. Such outright regulation can reduce the effectiveness or even threaten the existence of a Canadian common market. Federal-provincial tax collection agreements to ensure tax harmonization thus become essential to the preservation of a strong economic union. The structure of intergovernmental financial flows also influences organization, eg, the extent of decentralized decision making. Measured by relative shares of total government revenue, or by relative expenditure after intergovernmental transfers, decentralization in Canada would appear to have diminished sharply from the late 1920s to the late 1940s and to have increased strongly from the late 1940s to the late 1970s, although after the mid-1970s the Liberal government declared as its objective the reversal of this trend and the establishment of greater national control of fiscal and economic matters. Balance between regions, or the degree of regional influence in national matters, is also affected by the devolution of authority to regional agencies of the federal government and by regional representation in national institutions. In neither respect, however, can it be argued that decentralization has been significant in recent years. Finally, intergovernmental finance will undoubtedly be affected by constitutional developments concerning the ownership, management and taxation of offshore resources; provision for the taxation of state enterprises, mobility rights and the flow of people or materials across provincial boundaries; and regional representation in national economic and financial institutions. A.R. DOBELL

Interior Design is a process for solving the physical and aesthetic needs of people using interior spaces for living, working, personal care, worship or recreation. The interior designer deals with a variety of design problems in private residences, commercial businesses and corporations, and public and private institutions. The designer must identify and analyse the client's problems, creatively develop the best solution and supervise the installation of the project. The design solution will include such elements as furnishings, lighting, colour, interior architectural components, decorative accessories and art. These elements will be organized for the client according to function, architecture, climate and individual needs and preferences. Interior designers must be competent in design theory and aesthetics, history, analysis, space planning and programming, specifications and inspections, as well as related aspects of environmental design. Technical knowledge should include interior construction; building systems and related codes; equipment; business, graphic and written-communication skills.

The desire to create a suitable and pleasant interior environment has no beginning date in history. Interior decoration as a career began in the US late in the 19th century, receiving its initial impetus from Candace Wheeler, who published an article in 1890 entitled "Interior Decoration as a Profession for Women." Until 1950 the decorator was principally concerned with the selection and arrangement of interior furnishings for the affluent. After WWII the rapid expansion of industry, the extensive development in commercial and domestic building, and the increasing desire for better living and working conditions greatly stimulated the demand for qualified interior designers. Canadians who have distinguished themselves in the field since 1950 include Jacques Guillon in Montréal, Alison Hymas, Robert Meiklejohn and Murray Oliver in Toronto, Grant Marshall and Margaret Rose Stinson in Winnipeg, Arthur P. Fishman in Calgary and Robert Ledingham in Vancouver. Others work under company or team identification, or as in-house designers for corporations or government agencies.

In Canada there are a number of interior-design programs. Community colleges offer 2-year certificates and 3-year diploma courses in almost every province W of the Maritimes. There are only 2 degree-granting 4-year programs in Canada, at the University of Manitoba

and at Ryerson Polytechnical Institute in Toronto. Interior Designers of Canada (IDC) and Design Canada, both in Ottawa, and provincial organizations of interior designers provide assistance in educational planning. The Foundation for Interior Designers Education Research (FIDER), the accrediting body for interior-design programs in N America, publishes a directory of undergraduate and graduate interior-design programs, available through its New York office. The Interior Design Educators Council (IDEC) is a joint American and Canadian association. The future of interior design will be affected by technological advances as well as an increasing emphasis on professionalism. Designers must be prepared to accept greater responsibility and accountability for the environments they shape. GEORGE R. FULLER

International Boundary Commission, comprising a Canadian and an American commissioner, is responsible for the maintenance and supervision of the boundary line between the US and Canada under the terms of the 1925 Boundary Demarcation Treaty. The Canadian section is empowered by the International Boundary Commission Act; it is administered by the Department of Energy, Mines and Resources but reports to the secretary of state for external affairs. The commissioners meet at least once a year, alternating between Ottawa and Washington. In a recent controversy (1983) the commission revealed that the US had been using chemicals Agent White or Agent Orange along the US-Canadian border in New Hampshire and Maine until one of the commissioners discovered its use.

International Development Research Centre est as a public corporation by Parliament in 1970 to support research designed to adapt science and technology to the specific needs of developing countries. The first chairman was Lester B. PEARSON. Headquartered in Ottawa, it has regional offices around the world. Five program divisions fund projects — agriculture, food and nutrition sciences; information sciences; health sciences; social sciences; and cooperative programs (the only division supporting co-operative research projects between Canadian and Third World institutions). Funded by the federal government, IDRC reports annually to Parliament through the minister for external affairs. GREGORY WIRICK

International Economics, branch of economics concerned with international trade and investment, including the role of international economic institutions, the world monetary system, capital flows, commodity agreements and the international co-ordination of economic policy. Canada could undoubtedly survive in complete isolation from the rest of the world, producing sufficient food and other necessities to provide at least a subsistence level of income, but certain metals, eg, tin, would not be available and certain fruits and vegetables, eg, oranges and bananas, could only be produced at great cost. The main cost of such isolation, however, would be the loss of access to foreign markets for goods that can be produced more efficiently abroad and the loss of markets for Canadian products.

Just as it is to the advantage of individuals to specialize in specific tasks, so it is to the advantage of nations to specialize in producing specific commodities. Comparative advantages for production may derive from the possession of plentiful resources, from the development of technological skills or from economics associated with large-scale production. Canada benefits from importing commodities from countries most efficient at producing them and paying for these imports with exports in which Canada has a production advantage. Canada, for example, has enough arable land to produce more food than Canadians could consume, while in many Asian countries, because of high population-to-land ratios and low wages, labour-intensive products (eg, clothing) can be produced at relatively low cost.

International markets do not operate on a barter system but through a complex international financial structure (*see* INTERNATIONAL TRADE). Before WWI, most international transactions used the GOLD STANDARD, but this system was abandoned when it proved unfeasible, partly because it imposed severe restraints on domestic policymakers. In recent history the $US has served as the principal international medium of exchange and other currencies are usually quoted in $US. For Canada the $US is of particular importance because a large proportion of Canadian trade is with the US. Trade is facilitated through well-developed foreign-exchange markets where domestic currencies can be traded for one another.

The value of the $Canadian against the $US has traditionally been determined by market forces, that is, by the demand for and supply of $Canadian, which is in turn determined partly by relative rates of INFLATION, the demand and supply of Canadian (and foreign) trade goods and expectations of future economic circumstances and events. The $Canadian has, over the last few decades, ranged from over $1.05 US in the 1960s to under 80¢ US in 1982, reflecting, it is generally believed by economists, government policy rather than any deficiency in foreign-exchange markets.

Canada in the World Economy A variety of international organizations have developed to facilitate the complex interactions among nations. Among the most important are the World Bank and the General Agreement on Tariffs and Trade (GATT). Canada belongs to both organizations. The World Bank was established to act as an international central bank to assist financial transactions among countries and to help developing countries obtain loans and credit. GATT was created to stabilize trading relations and provide uniform trading regulations for signatories; for example, the articles of GATT prohibit preferential treatment of individual countries so that a specific tariff rate available to one country must be made available to all. Exemptions for the formation of customs unions and free-trade areas have been granted and justified on the argument that they have advanced the cause of free trade.

Measures such as NATIONAL INCOME per capita vary widely among world nations. The World Bank publishes an annual *World Development Report* providing statistics on all countries of the world. Countries are categorized as low-income, middle-income, industrial-market and non-market-industrial; capital-surplus oil exporting countries have recently been added as a fifth group. In 1982 the low-income countries, eg, Bangladesh, India, China and Indonesia, had an average per capita income of $280 (all figures are in $US 1982), with a range of $80 to $410. Middle-income countries, eg, Egypt, Cuba, Mexico, Israel and Spain have average per capita incomes of $1520, with a range of $440 to $6840. The 19 industrial-market economies have an average per capita income of $11 070 US and a range of $5150 (Ireland) to $17 010 (Switzerland). Canada, with an average per capita income of $11 320 is eighth from the top of this group, just below France, Germany and Denmark and just above Australia and The Netherlands. These comparative statistics, however, are very sensitive to currency values.

This subdivision of nations is somewhat arbitrary, but the relatively small group of industrial-market economies do share a number of characteristics apparently associated with high levels of development: high LITERACY rates, long life expectancies, well-developed capital markets, relatively stable governments and high industrial productivity. In all of them only a small percentage of the LABOUR FORCE is involved in agriculture (6% on average for industrial economies, 71% and 44% respectively for low- and middle-income countries) and large service sectors (56% of the labour force in the industrial countries compared to 15% and 34% for low- and middle-income countries). Among these countries the percentage of exports comprising primary commodities (including fuels and minerals) ranges from 78% (New Zealand) to 4% for Japan, with an average of 23%. The percentage in Canada, 46%, is well above that for industrial countries but well below the averages of 70% and 64% for low- and middle-income countries.

Canada participates in the world economy through trade and FOREIGN INVESTMENT. Both have been important in establishing Canada as a high-income industrialized nation, although the presence of foreign companies in Canada, despite the resulting benefits, has also inspired controversy. Canada also participates in the world economy through its banks, which invest in foreign countries (*see* BANKING).

JAMES MELVIN

Reading: W.T. Easterbrook and M.H. Watkins, eds, *Approaches to Canadian Economic History* (1967); W. Ethier, *Modern International Economics* (1983).

International Hockey Hall of Fame and Museum, located in Kingston, Ont, was founded in 1943. The present building was constructed in 1961-62 and opened in 1965. Originally sanctioned by the NATIONAL HOCKEY LEAGUE and the Canadian Amateur Hockey Assn, the hall is now independently and community operated. It has inducted, with one exception (Fred J. "Bun" Cook) the same players, builders and referees as the HOCKEY HALL OF FAME in Toronto. It stresses the international and historical aspects of amateur and professional HOCKEY, and features an outstanding collection of early skates, sticks and memorabilia that trace ice hockey's evolution and rules. One room is dedicated to Capt James Thomas Sutherland (1870-1955), who devoted the last 13 years of his career to the establishment of the world's first recognized hockey hall of fame. J.W. FITSELL

International Joint Commission, the oldest of Canadian-American intergovernmental organizations, est by the BOUNDARY WATERS TREATY of 1909 to deal mainly with the apportionment, conservation and development of water (including hydro power) resources along the international boundary. Since beginning its work in 1912 it has reported on over 50 issues affecting the US and Canada, produced decisions on even more applications for diversion of waters and supervised dozens of decisions for Canadian-American joint boards and committees. The IJC has a wide range of investigative, quasi-judicial, administrative and arbitral functions. It can also act as a final court of arbitration on any issue between Canada and the US, but has never been used thus. The IJC comprises 3 Canadian and 3 American commissioners and maintains offices in Ottawa and Washington. It has limited staff and budget, yet enjoys a great deal of independence. It has been highly successful, and suggestions have often been made that the IJC model, especially its fact-finding techniques, be applied to other problem areas. *See* JOINT COMMISSION. N.F. DREISZIGER

International Law is the body of rules that governs the conduct of STATES and other international associations, such as the UN, although in the human rights area, international law, in some instances, may be directly applicable to individuals as well as to states. Modern international law has its origins in 16th- and 17th-century Europe. Created to regulate relations among a few states with common religious

background and common commercial interests, international law has developed from a system that sought merely to secure peaceful coexistence within the international community to a system that seeks to protect the common interests and achieve the common aims of states. Today, Canada is one of at least 160 countries that consider themselves bound by the principles, customs and standards of international law.

The peace settlement following World War I led to the creation of the LEAGUE OF NATIONS, the first attempt by the international society to promote international co-operation and to achieve international peace and security. An important feature of the League was its use of unanimity of decision. The League was unable to prevent World War II, but it provided a valuable precedent for an international organization after that war. The post-WWII period saw major developments in international law, including the establishment of the UNITED NATIONS, the successor to the League. Canada was a founding member of the UN. A number of former colonies that obtained independence after WWII joined the community of nations as full-fledged members. By 1939, when Canada declared war independently of Britain, it had already established a separate identity.

Today the scope of international law is very extensive, covering laws pertaining to war, recognition of governments and states, LAW OF THE SEA, AIR LAW AND SPACE LAW, international obligations, treaties (*see* TREATY-MAKING POWER), international economics, international political and economic institutions, HUMAN RIGHTS and dispute resolution. Since the inclusion in the international community of nations at varying stages of economic development, issues related to economic justice have begun to play a significant role in international law.

The UN serves not only as a forum for discussion and deliberation of international issues among the nations of the world, but through its organs is instrumental in multilateral PEACEKEEPING, in the progressive development of international law, in dispute resolution and in the promotion and fostering of common economic, political and social goals. Canada has been active in the suppport and development of international law and has played a leading role in the areas of peacekeeping, human rights, the law of the sea and international economic law at the UN and other international forums.

Sources of International Law Canada's obligations, rights and responsibilities in international law may be found principally in treaties, in the conduct and practice of states, and to a lesser extent in general principles of law, in judicial decisions, in writings of highly respected scholars and in certain UN General Assembly resolutions. Treaties, which may be either bilateral or multilateral, are international agreements between states that are binding in international law. Treaties that reflect customary international law are binding even on nonsignatories of the treaty. For instance, Canada regarded itself bound by many of the provisions of the Vienna Convention on the Law of Treaties, even before it became a signatory to the convention. Treaties concluded by Canada are published in the Canada Treaty Series and are registered with the UN. There are about 200 treaties between Canada and the US alone.

Canada, as all other states, is also bound by customary rules of international law. Custom is evidenced by the general practice of states acting upon a recognition that the practice is legally binding. Canadian courts have accepted the view that customary international law forms part of the law of Canada. However, most custom that formed a source of international law is now incorporated in multilateral conventions. The 1961 Vienna Convention on Diplomatic Relations, for example, codified some rules of customary international law that were centuries old. Largely because of the heterogeneous nature of the community of nations, general principles of law recognized by nations, judicial decisions and writings of highly qualified publicists are treated as subsidiary sources of international law.

Some Current Issues in International Law Since the end of WWI the international community has been preoccupied with maintaining the peace. The UN Security Council, which consists of 5 permanent members and 10 rotating members, has the primary responsibility for maintaining international peace and security. Under the UN Charter, all members of the UN agree to accept and carry out the council's decisions. When a dispute leads to fighting, the Security Council attempts to bring an end to the hostilities and has on some occasions sent UN peacekeeping forces to the site of the troubled area. Canadian troops have sometimes been part of ad hoc UN peacekeeping forces.

Since its creation, the UN has given priority to the international protection of human rights. In 1948 the Universal Declaration of Human Rights, which set forth basic rights and fundamental freedoms to which all people are entitled, was adopted by the UN membership without a dissenting vote. It has been suggested that the resulting influence of the Declaration as well as repeated invocation of the Declaration has made it a part of customary international law. A Canadian, Professor John Humphrey, served as the first director of the UN Human Rights Division. In 1976 Canada acceded to an important multilateral human rights treaty, the International Covenant on Civil and Political Rights and its accompanying Optional Protocol. By signing these documents, Canada has bound itself to an international standard of human rights protection and opened the possibility for individual Canadians to submit to the UN Human Rights Committee complaints of human rights violations by the Canadian legal system.

One of the major post-WWII achievements of multilateral negotiations is the 1982 UN Convention of the Law of the Sea (UNCLOS). Canada's extensive coastline has given it a long-established interest in maritime issues and Canada played a leading role in UNCLOS negotiations. The convention, which was signed by Canada in 1982, sets out a comprehensive framework of laws to regulate the peaceful uses of the sea. Canada's main objectives during the UNCLOS negotiations were to a large extent satisfied by the provisions of the convention. Canada sought and obtained jurisdiction over fisheries within a 200-nautical-mile (370 km) limit of its coast and over all the resources of the continental shelf within and beyond the 200-mile limit. It obtained only limited powers to control POLLUTION along its coastline but it ensured its ability to take antipollution measures in the Arctic. Canada also supported the innovative UNCLOS idea that the international seabed be reserved for peaceful purposes and that the area be designated the "common heritage of mankind."

The growing gap between rich and poor nations has led many of the latter to challenge the norms of international law and to charge that international institutions protect and maintain the economic interests of Western capitalist countries. In 1974 the majority of UN members voted in favour of the Declaration on the New International Economic Order, which called for a new set of rules to govern international economic relations. Canada abstained from voting on the Declaration and its complement, the Charter of Economic Rights and Duties of States. In practice, however, Canada has pursued a policy of supporting the efforts of economically less developed countries to increase their share of world trade and foreign investment. One illustration of Canada's commitment to changing established patterns of trade is the General Preferential Tariffs legislation which grants preferential treatment to poorer countries.

Dispute Resolution The UN Charter clearly prohibits the use of force by states except in self-defence. Canada may settle a dispute with another state in any one of a number of ways: diplomatic negotiation, mediation, international arbitration or, as a final recourse, it may present its case to the 15-member International Court of Justice (ICJ), a UN organ. The ICJ may preside over disputes between states that agree to submit to its jurisdiction; a decision by the court is binding only upon those states that are party to the dispute in question. Canada and the US submitted their dispute over the maritime boundary in the Gulf of Maine area to a chamber of the ICJ. This was the first time a chamber was utilized instead of the full court. The decision came out in Oct 1984.

The responsibility for Canada's conduct in external relations is handled primarily by the Department of EXTERNAL AFFAIRS and its ministers. *See also* EXTERNAL RELATIONS. EMILY F. CARASCO

International Monetary Fund (IMF), is the principal independent international financial agency concerned with the management of the international monetary system. It was formed in 1944 by 45 nations participating in a Monetary and Financial Conference called to seek international co-operation in avoiding the protectionist trade practices and competitive EXCHANGE RATE devaluations of the GREAT DEPRESSION. The UK was represented by renowned economist John Maynard Keynes. Until the early 1970s, the IMF was remarkably successful in providing a framework for managing stability and adjustments in the world monetary system, and more recently it has devised mechanisms to support countries with serious short-term BALANCE OF PAYMENTS difficulties. Headquartered in Washington, with a voluntary membership of 146 countries, the IMF is governed by an executive board of 20 members, each representing a group of countries. Each member nation contributes to the fund's reserves in amounts commensurate with its role in the world's economy, excluding the Soviet bloc; eg, the US contributes 21.5%, Canada 3.5%. The IMF employs a professional secretariat, surveys economic policy in each member country, holds annual conferences of ministers in conjunction with World Bank meetings and maintains a research and publications program. T.K. SHOYAMA

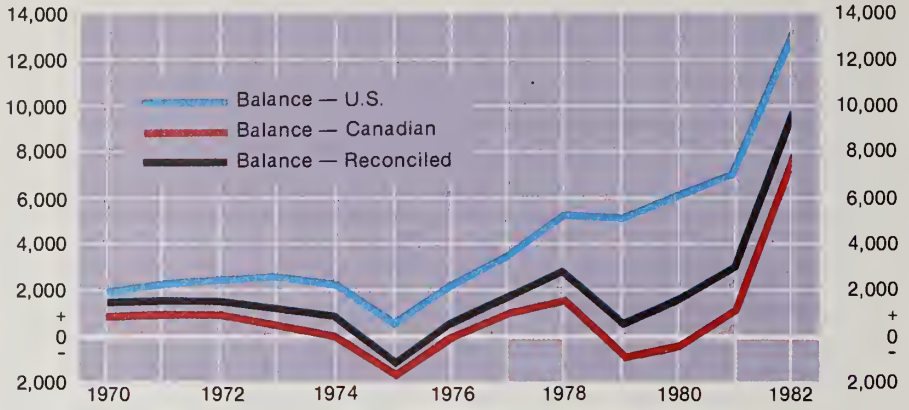
International Trade is the purchase and sale of goods or services between residents of different countries. The traders may be individuals, private businesses or government agencies. Canadian exports of merchandise and services amount to about 30% of the nation's total production, the merchandise accounting for 25% and services about 5%. Since 1960 (except 1975) Canada has exported more commodities than it has imported and has had a merchandise trade surplus. But the annual import of services has always greatly exceeded the export of services, so that a sizable deficit on trade in commodities and services combined has generally occurred.

Merchandise Trade The US, which purchases about 70% of Canadian merchandise exports and supplies over 70% of all merchandise imports, is Canada's most important trading partner. Reliance upon the US as a market for Canadian products has been growing for 100 years. Until WWII the US and the UK frequently exchanged positions as the first and second most important destinations for Canadian exports. The UK imports less than 5% of all Canadian shipments, and 3% of Canadian imports come from the UK.

Japan has supplanted the UK as Canada's second most important trading partner, although it

Merchandise Trade Balance Between the U.S. and Canada

Annual (Millions of U.S. dollars)



Source: Statistics Canada, Daily Bulletin, Catalogue 11-001E.

is not nearly as important as the US. Almost all imports from Japan are highly manufactured commodities, eg, automobiles and electronic equipment, whereas exports to Japan are almost entirely raw materials, eg, lumber, metals, coal and farm products.

The relative significance of Canada's trade with European Economic Community countries (excepting the UK) has remained roughly constant since the mid-1960s, approximately 7.5% for exports and 5.5% for imports. Trade with other nations has been expanding slowly. The largest single import is crude oil from Saudia Arabia, Venezuela and Mexico, but other goods such as tropical products, labour-intensive goods (in which the developing countries have a comparative advantage) and highly manufactured goods come from developing countries and a few eastern European nations. Exports to other nations comprise about 16% of total Canadian sales abroad, including wheat, grains, agricultural products, lumber, newsprint, chemicals, metals, minerals, various types of industrial and transportation machinery and equipment.

Well over one-third of Canadian exports are automobiles and other highly manufactured goods; crude and semiprocessed materials from the farm, forest, mining and energy sectors make up the remainder. In contrast, about 55% of Canadian imports are automobiles and other highly manufactured products; 45% are crude and semifabricated goods. Consequently, Canada has a consistent surplus on commodity trade in raw and semiprocessed goods and a deficit on highly manufactured goods, an historical Canadian pattern. In its early development Canada depended upon its natural resources for its export base, relying first on fish, furs and lumber, then on farm products, especially grains; pulp and paper; and various metals and minerals. Since WWII petroleum and natural gas, uranium, iron ore, sulphur, potash, coal, electricity and canola have augmented the nation's raw material exports.

Today, relatively few products dominate export trade in each broad category. Wheat accounts for over 45% of all agricultural exports. Softwood lumber, wood pulp and newsprint comprise over 85% of forest-product foreign sales. Iron, copper, nickel and precious metal ores and concentrates, asbestos and sulphur total over 75% of crude mineral exports. Automobiles account for over 20% of total exports or over 55% of all highly manufactured commodities.

Highly manufactured goods are, in volume and value, the most rapidly growing segment of Canada's exports. They are also among the fastest-growing imports in volume, but because the value of such imports greatly exceeds the value of exports, the absolute dollar gap between these sophisticated imports and exports is still widening. Other rapidly growing imports of value are nondurable and semidurable manufactured goods and some mineral products.

Canada's particular mix of merchandise trade is attributed mainly to its generous endowments of both renewable and nonrenewable natural resources. They provide the foundation for comparative advantage in, and the massive shipments abroad of, crude and semiprocessed minerals as well as energy and agricultural and forestry products. Even highly processed exports from the chemical sector rely on natural gas and petroleum deposits. Some recent advances in exports of sophisticated manufactures may be related to increased production by firms under licence from foreign parents or holders of technology. In other instances, economies of scale have been achieved through domestic rationalization of industry, making domestic industries more competitive with those abroad. In still other cases new technological advances in Canada have been influential. However, Canadian research and development in the manufacturing sector has been meagre, and the adoption of foreign technology slow, leaving firms in Canada at a comparative disadvantage in technology-intensive products. Much reliance has been placed upon imports of these commodities; hence the large proportion of highly processed manufactures imported. This proportion is also related to the high percentage of FOREIGN INVESTMENT and control of Canadian industry, because foreign firms import a larger share of their purchases than do domestic firms. The importation of new US-manufactured products to satisfy Canadian demand patterns influenced by those in the US has also grown. Organization of production and productivity of labour, which affect the long-run competitiveness of industry and Canada's comparative advantage, are also influenced by taxes, education, skill and aggressiveness of management, education and training of labour, and labour-management relations.

Commercial Policy Trade is also affected by Canada's commercial policy, especially import tariffs (which are decreasingly important) and import quotas. The former are taxes or duties levied, usually as a percentage of declared value, on imported merchandise; the latter are specific quantitative restrictions on imports of particular commodities.

In the early years of Confederation, tariff revenues comprised about 75% of total federal government revenues. Today they make up less than 8%. The NATIONAL POLICY of 1879 increased tariffs, providing a sheltered market in which domestic and foreign firms could establish manufacturing plants. They have also been used to bargain down other nations' tariffs. When the GREAT DEPRESSION began, rates were again raised dramatically. The hope has always been to increase domestic processing; therefore the tariff structure has tended to be graduated — lower rates on raw material imports and higher rates for processed products. A British Preferential System was initiated (1897) in an attempt to encourage trade with Britain and other members of the Empire but it had little noticeable effect and is now being phased out as it applies to the UK, Ireland and South Africa.

Canadian tariffs are now at their lowest level, amounting to less than 5% on average for all imports and 14% on dutiable imports. Nondutiable imports account for over 65% of all purchases from abroad. Various bilateral and trilateral agreements before WWII and postwar multilateral negotiations under General Agreement on Tariffs and Trade (GATT) have reduced the Great Depression tariff rates. The Tokyo Round of multilateral negotiations, completed in 1979, entails additional progressive reductions over the years up to 1 Jan 1987, when Canadian duties on dutiable imports will be decreased to an all-time low of 9%.

Composition of Canada's Merchandise Trade, 1983
(Source: Statistics Canada, *Summary of External Trade, 1983)*

	Billions$			Percentage	
	Exports (1)	Imports (2)	Balance (1)-(2)=(3)	Exports (4)	Imports (5)
Agricultural products	10.2	5.7	4.5	11.6	7.5
Fish products	1.5	0.4	1.1	1.7	0.5
Forest products	13.1	1.2	11.9	14.9	1.6
Crude minerals (except energy products)	4.2	2.0	2.2	4.8	2.6
Energy products	12.8	5.2	7.6	14.5	6.9
Semiprocessed minerals	8.3	5.4	2.9	9.4	7.1
Chemicals and fertilizers	4.3	4.4	-0.1	4.9	5.8
Automobiles and parts	21.3	19.4	1.9	24.1	25.6
Other highly manufactured goods	12.3	31.0	-18.7	13.9	41.0
Special transactions (trade)	0.2	1.0	-0.8	0.2	1.3
Total	88.2	75.7	12.5	100.0	100.0

Canada's Trade in Services, 1983[1]
(Source: Statistics Canada,
Quarterly Estimates of the Canadian Balance of International Payments: Fourth Quarter, 1983)

	Exports (Receipts)		Imports (Payments)		Balance
	Billions$	%	Billions$	%	Billions$
Travel and tourism	3.9	23.1	5.9	17.7	-2.0
Interest and dividends	1.9	11.2	11.3	34.0	-9.4
Freighting and shipping	4.0	23.7	3.6	10.8	0.4
Other service receipts:					
Government transactions	0.5	3.0	1.0	3.0	-0.4
Business service and other transactions	3.6	21.3	6.2	18.6	-2.6
Miscellaneous income	3.0	17.8	5.3	15.9	-2.3
Total	16.9	100.0	33.2	100.0	-16.3

[1] Excluding withholding taxes recorded under service payments as these go to the Canadian government

Under tariff protection more domestic and foreign-owned manufacturing plants have been established in Canada than have been needed to supply the market efficiently. Consequently, economists argue that plants have either been too small to achieve the lowest production costs or, more often, have produced too many product lines so that lengths of run have been shorter and therefore cost more than in foreign plants. As tariffs are lowered and firms attempt to increase their productivity, Canadian plants may become more competitive with those in foreign countries.

Quotas There are also quantitative restrictions on imported merchandise. Under the GATT Multi-Fibre Arrangement, Canada has negotiated bilateral agreements with over a dozen countries, limiting imports of textiles and clothing. Nonleather footwear imports are also restricted under GATT rules. Agricultural products, including eggs, chickens, turkeys, milk and other dairy products also face quantitative import restraints. These are used to support domestic supply management programs. Beef and veal too are on the regulated list of imports, even though there are no comprehensive domestic agricultural marketing programs or marketing boards for these products. Where international commodity agreements exist, Canada discriminates against nonmember countries in its imports of products such as sugar and coffee.

Quantitative restrictions on imports provide clearer limits than do tariffs and are therefore often preferred by those wishing to protect certain industries. Where labour costs and hence prices on foreign products are particularly low, as with clothing, textiles or footwear from developing countries, quotas preclude the need for high tariffs and have the same limiting effects on commodity inflows. As the GATT forces governments to lower tariffs, there may be more frequent recourse to the use of quotas or other nontariff barriers by the Canadian and other governments.

Tariffs, quotas, subsidies on domestic production and other methods to encourage domestic industry at the expense of industry abroad often mean higher prices for domestic consumers and inefficient use of domestic labour, capital and other resources. These economic costs must be weighed against the benefits of such industry-preservation programs.

Services Trade When Canada borrows funds, either by issuing bonds or other types of debt, or by welcoming foreign firms establishing subsidiaries in Canada, payment must be made for the use of the capital involved. This may take the form of interest, dividends or corporate undistributed earnings, which are reinvested to increase the foreign ownership of Canadian industry. Similarly, Canada receives payments from foreigners for the use of the capital her residents invest abroad. Canada has borrowed much more than she has lent abroad, however, especially since WWII, and now has a sizable deficit in service charges on capital — over $9 billion in 1983. If the services from short-term and long-term investments as well as international BANKING and INSURANCE activities are included, the deficit would be several billions more.

The net balance on other business service receipts and payments, eg, the use of patents and licences, consulting and management expertise, generates an additional deficit. Also, Canadians spend more on travel abroad each year than do foreigners coming to Canada. The only increase in net exports in recent years has been in freight and shipping services. *See* SERVICE INDUSTRIES.

BRUCE W. WILKINSON

Reading: Bruce W. Wilkinson, *Canada in the Changing World Economy* (1980).



Japanese Canadians being relocated to internment camps in the BC interior during WWII (*courtesy Public Archives of Canada/C-57253*).

Internment, detention or confinement of a person in time of war. In Canada such persons were denied certain legal rights, notably habeas corpus, though in certain cases they had the right to appeal their custody. Though not strictly PRISONERS OF WAR, civilian internees were generally treated according to international POW standards.

During WORLD WAR I enemy aliens (nationals of Germany and of the Austro-Hungarian and Turkish empires) were subject to internment, but only if there were "reasonable grounds" to believe they were engaged in espionage or otherwise acting illegally. Some municipalities "unloaded" indigents, many of them recent immigrants, on internment camps. In 1916-17, many Austrians were paroled to fill labour shortages. Of 8579 men at 24 camps across Canada, 5954 were Austro-Hungarians, 2009 Germans, 205 Turks and 99 Bulgarians; 81 women and 156 children, dependants of male internees, were voluntarily interned. Although responsibility shifted in 1915 from the Dept of Militia and Defence to the Dept of Justice, Maj-Gen Sir William OTTER remained officer commanding (later director of) internment operations.

In WORLD WAR II the minister of justice could detain anyone acting "in any manner prejudicial to the public safety or the safety of the state." Thus both enemy nationals and Canadian citizens were subject to internment. Precise statistics are not available but the number of internees was less than during the earlier war. Most of the Germans were members of German-sponsored organizations or leaders of the Nazi Party in Canada. After Italy entered the war, a number of prominent Italians and Canadian fascists, notably Adrien Arcand of Montréal, were interned. Immediately after Pearl Harbor the RCMP interned 38 Japanese nationals, and during the general evacuation from the Pacific coast in 1942, an additional 720 Japanese, mainly Canadian citizens and members of the Nisei Mass Evacuation Group who resisted separation from their families, were interned. Because citizens could be interned for belonging to such outlawed organizations as the Communist Party, some claimed internment was used as a weapon against labour leaders, eg, J.A. "Pat" Sullivan, president of the Canadian Seamen's Union, interned 1940. Along with about 90 other Communists, he was released in 1941 after the USSR joined the Allies. Most prominent, however, was Mayor Camillien HOUDE of Montréal, interned 3 years for denouncing national registration in 1940 as a prelude to CONSCRIPTION.

Administration was divided between the army and the secretary of state. A total of 26 camps operated in Ontario, Québec, Alberta and New Brunswick, but only 2 held primarily Canadians. In WWI, Canada had accommodated 817 internees from Newfoundland and British Caribbean colonies; in WWII Canadian camps housed POWs and merchant seamen captured by the British, as well as some British civilians. At the peak in Oct 1944, Canada held 34 193 persons for the UK. Provision for internment continues. An emergency planning order approved May 1981 by Cabinet authorizes the solicitor general to establish civilian internment camps in wartime.

PATRICIA E. ROY

Reading: D.J. Carter, *Behind Canadian Barbed Wire* (1980); F.E. LaViolette, *The Canadian Japanese and World War II* (1948); D. Morton, *The Canadian General; Sir William Otter* (1974).

Inuit simply means "people." Inuit were earlier known by Europeans as "Eskimos" — a pejorative, roughly meaning "eaters of raw meat," applied to them by INDIAN groups. They are one of the original groups to inhabit the northern regions of Canada populating small, scattered communities and villages throughout the Arctic from Alaska to E Greenland. In 1981 Statistics Canada estimated that the Inuit population in Canada was 25 000. There are 8 main tribal groups: the LABRADOR, UNGAVA, BAFFIN ISLAND, IGLULIK, CARIBOU, NETSILIK, COPPER and Western Arctic Inuit (who replaced the MACKENZIE INUIT). They speak a common language known as Inuktitut, or Inuttituut, divided into 6 different dialects (*see* NATIVE PEOPLE, LANGUAGES). Traditionally, the Inuit were hunters and gatherers who moved seasonally from one camp to another. Large regional groupings were loosely separated into smaller seasonal goups: winter camps (called "bands") of around 100 people and summer hunting groups of fewer than a dozen. Each band was roughly identified with a locale and named accordingly, eg, the Arvirtuurmiut of Boothia Pen, "baleen whale-eating people."

During roughly 4000 years of human history in the Arctic, the appearance of new people has brought continual cultural change. The ances-

tors of the present-day Inuit, who are culturally related to Inuppiat (N Alaska), Katladlit (Greenland) and Yuit (Siberia and W Alaska), arrived about 1050 AD. As early as the 11th century the NORSE exerted an undetermined influence on the Inuit. The subsequent arrival of explorers, whalers, traders, missionaries, scientists and others began irreversible cultural changes. The Inuit themselves participated actively in these developments as guides, traders and models of survival. Despite adjustments made by the Inuit over the past 3 centuries and the loss of some traditional features, Inuit culture persists — often with a greater reflective awareness. Inuit maintain a cultural identity through language, family and cultural laws, attitudes and behaviour, and their acclaimed INUIT ART.

The Inuit have never been subject to the INDIAN ACT and were largely ignored by government until 1939, when a Court decision ruled that they were a federal responsibility. Some Inuit still follow a nomadic way of life, but others are involved in the administration and development of northern Canada — in business, local and territorial politics, teaching, transportation, medicine, broadcasting and the civil service. *See* NATIVE PEOPLE: ARCTIC.

MINNIE AODLA FREEMAN

Inuit Art The Eskimo word "Inuit" is a fairly recent Anglo-French Canadian term and will be used in this article only with reference to the historical and modern Canadian Eskimo. Greenlanders, who speak a dialect similar to the Canadian Inuktitut and whose art and artifacts are often almost identical to those found in the Canadian Arctic for the past 4000 years, call themselves Katladlit. Siberians (or Asiatic) Eskimos and Eskimos of W and SW Alaska call themselves Yuit. They speak a dialect called Yupik, and their art forms, except during Thule culture, bear few stylistic resemblances to those of the Canadian Arctic. Yet there exist strong iconographic (image) and thematic (content) relationships between the art forms, indicating a common ancestry or various cultural diffusions and interchanges, or both. Obviously, the words Inuit and Eskimo do not have identical meanings and, therefore, careful differentiations must be made.

Culture Phases The history of Eskimo cultures and the art of the various regions and times can only be understood if the myth of a homogeneous Eskimo culture is discarded altogether. Though it has not been possible to determine the exact origin(s) of the Eskimo, nor of the various Eskimo cultures, 5 distinct cultures have been established in the Canadian area: PRE-DORSET, DORSET, THULE, Historic and Contemporary.



Men Hunting Animals by Alasi Audla (*courtesy La Fédération des co-opératives du Nouveau-Québec*).

Pre-Dorset Culture developed out of the migrations of people coming from Siberia via the Bering Strait some 4000 years ago (*see* PREHISTORY). While few art objects of this period seem to have survived, the exquisitely shaped artifacts discovered — particularly the projectile points of harpoon heads and lances fashioned from carefully selected lithic material (stones) — are not merely functional but also of considerable aesthetic value. These objects can in fact be called art even though they lacked imagistic intentions. Through their simple splendour and intensive craftsmanship they exude intentions of magic that perpetuated themselves in the succeeding Dorset culture. Pre-Dorset culture lasted for over 1000 years, extending into the beginning of the first millennium BC.

Dorset Culture started to evolve between 600 and 500 BC, and can be called the first native Canadian Arctic culture. It spread from Coronation Gulf to the bottom tip of Newfoundland and to the entire west coast of Greenland. Several problems have arisen in dating Dorset art, particularly its origins. In the chronology established by Danish archaeologist Jørgen Meldgaard for the Igloolik area, with the highlights occurring between 500 and 1000 AD, art emerges only in the Middle Dorset period, 400-500. Yet the well-known Tyara maskette, made with the same perfectionist artistry that characterizes the best of Dorset art, has been dated to before 600 BC. The explanation may lie in faulty carbon dating, or in the possibility that the maskette is a work from the Pre-Dorset culture that somehow survived. Two Pre-Dorset maskettes from the Igloolik area exist which are similar in appearance. In Pre-Dorset culture imagistic supernatural objects may have been destroyed or discarded after use, as in other prehistoric and preliterate cultures, and the Tyara maskette could have been an incidental survivor, used or preserved in the later culture. Or perhaps the fine craftsmanship and aesthetic beauty of both the maskette and Pre-Dorset artifacts point to a magical concept in their creation: that form does not merely follow function but increases efficacy.

High Dorset art appears to be largely magico-religious in its purpose; this appears to be so in particular of the "excaved" (hollowed out and perforated) Dorset bears and falcons relating in shape to harpoon heads. The points of the harpoon heads become the bear heads; the line-hole openings become the front legs attached to the body (or bent backwards in a swimming motion), and the basal spurs become the hind legs (more or less abstracted). The excaved falcons resemble the excaved forms of the harpoon heads and, at the same time, the skeletons of birds. The image of disembowelled creatures refers to a ritualistic technique used in shamanic initiations in many parts of the polar world from Siberia to Greenland: the SHAMAN had to think of himself as a durable skeleton, devoid of flesh and blood, so that the helping spirits might consider it worthwhile to come to him. The skeleton designs incised (not etched) into many of the animal carvings have a similar origin and hint at several supernatural meanings: the body as spirit or dematerialized essence, as a kind of ritual form, or as an instrument for magico-religious purposes.

Linear or incised signs on many of the carvings — joint marks and crosses — can also be found in other prehistoric and preliterate cultures. They too seem to have supernatural associations and reinforce the largely magico-religious content of Dorset art. Several other image types exist in Dorset culture, such as the antler or wooden "face clusters," wooden masks, maskettes, human figures, multiple animal images, various birds and land and sea mammals (some with and some without skeleton markings). While their purposes are largely unknown, they do have common characteristics: most are carved in ivory or to a lesser extent in bone, antler or wood; they are very small — anywhere from 1 to 10 centimetres; all are 3-dimensional, carved with strong or expressionistic features and with decisive strokes of the knife or graver. Except for the wood and antler carvings, they have a remarkably smooth finish despite their small size and expressionist form.

Petroglyphs have been cut in soapstone outcroppings near the sea at Wakeham Bay in Ungava (Nouveau Québec), faces or maskettes not unlike the previously mentioned face clusters (*see* PICTOGRAPHS AND PETROGLYPHS). The shapes themselves, however, are reminiscent of the Tyara maskette, which comes from nearby Sugluk I. While this similarity asserts a Dorset origin for the Tyara maskette, it brings the date of its origin further into question.

Thule Culture is much easier to define and to date, but again some anomalies exist. Thule culture migration from northern Alaska into the Canadian Arctic began after 1000 AD and reached eastern Greenland by 1200. Thule is the

Inuk sculptor Joseph Kaniak shows his carvings (*photo by Lyn Hancock*).



most uniform of the Eskimoan cultures, covering, as it did, the entire Arctic of the western hemisphere, including the eastern tip of Asiatic Siberia. That manifest uniformity was responsible for giving Eskimos the appearance of homogeneity, which is misleading except for Thule culture artifacts. Thule art across the Arctic was not as uniform as many social scientists once believed and, therefore, the less conspicuous art forms of the Thule people in comparison to powerful Dorset and Old Bering Sea art (of Alaska) have led to the revision by a new generation of archaeologists of many misjudgements.

The Thule people, whose pre-Thule ancestry can be traced to SW Alaska but who had evolved into their new culture type in N Alaska, were themselves the true ancestors of the contemporary Inuit. In Canada, however, the art forms of these 2 cultures reflect little of this relationship. This is in contrast to the Thule art tradition in Alaska, which continued well into the late 19th and early 20th centuries.

The most frequent types of Thule art in Canada are combs, needle cases, "swimming figurines" (birds, spirits and humans), as well as various kinds of female effigies and utensils. In contrast to Dorset art which had hardly any stylistic similarities to contemporaneous Alaskan art forms, Canadian Thule art is almost totally dependent on Alaskan prototypes of the same culture and period.

While Dorset art, in its stark and expressionist form and technique, has a definite masculine quality which in form and content relates to weapons and tools used by males, Thule art relates in almost every detail to female images, forms and uses. Utensils such as combs, thimble holders, needle cases, bodkins and pendants are obviously women's practical and decorative equipment; the "swimming figurines" too are either female representations or relate to them in their shape. They are identical in their basic structure, with only the upper parts of their bodies shown; the parts underneath the waterline, not being visible, are therefore not shown. These figurines obviously had a common origin, probably as amulets or for similar magico-religious purposes. It is therefore difficult to believe that these carvings were gambling pieces (*tingmiujang*), though they were the prototypes for the pieces used after the breakup of traditional Thule whaling culture in the 17th and 18th centuries.

Besides being small, elegantly shaped and often beautifully decorated, almost all female figurines and statuettes of Thule art are faceless, in contrast to the Dorset figures, with their strongly expressed male faces. The 2 notable Thule exceptions with beautifully carved (almost Dorset-like) faces are a comb from the Pelly Bay region and a marrow fork (or perhaps a bodkin for tents or UMIAKS) from Strathcona Sound. There are a few other carvings with vaguely incised faces and also a few stick figures on combs, as well as a unique bow drill from the Arctic Bay area.

The Historical Period begins with the demise of Thule culture, as the climate became colder and the whales disappeared, and the coinciding arrival of the white man in the Arctic in the 16th century. The unified art style also broke down, though some Thule effigies persisted into the 20th century, such as the swimming figurines that turned into gaming pieces and the female statuettes into dolls. Certain women's utensils also continued, but carved in much cruder and less stylish forms.

At the start of the 19th century the dolls, toys and animal carvings that were exchanged with whalers, sailors and explorers (who had then begun to visit on a more or less regular basis) gradually turned into trade and souvenir art, often quite exquisite. In fact, the trade carvings



Worshipping the Rising Sun by Agnes Nanogak (*courtesy Holman Eskimo Co-operative, Holman Island, NWT*).

display a much greater skill than carvings made by the Inuit for themselves. By 1920 trade art (which was largely made out of ivory or bone) had lost all of its indigenous magico-religious meanings, and many carvings became replicas of tools and weapons of both Inuit and white men. In several areas liturgical art (replicas of Roman Catholic figurines) were produced regularly, as were inlaid or incised cigarette boxes, match holders, cribbage boards and sailing vessels. Even though the Inuit had lived a largely traditional life-style before WWII, their art forms — but not the techniques or processes for making their objects (*pinguaq* or "toy-like representations") — became increasingly oriented to the white man's tastes and uses.

The Contemporary Phase was a logical outcome of the transitional and acculturated art forms of the historic period, and coincided with the gradual "opening up" of the North after WWII, with the launching of the DEW Line (Distant Early Warning system) and, most of all, with the emerging interest of Western nations in the art and culture of preliterate societies. Largely owing to the insights and promotional energy of James A. HOUSTON, a young artist from Toronto, "Eskimo art," or "Inuit art" as we know it today, came into existence in 1948-49. He encouraged the Inuit to use their "natural talents" in creating art objects to help solve their economic problems. In this regard they were assisted by the INUIT CO-OPERATIVES.

Soapstone and ivory carvings from Povungnituk and Port Harrison (Inukjuac) in Nouveau Québec were the first art forms to appear for sale in the south. Sugluk (Saglouc), Cape Dorset and Repulse Bay followed, and soon the entire central Arctic was covered, from Coppermine to Arctic Bay, with other areas to join later in the 1960s and 1970s. The whole enterprise resulted largely from the support Houston and the Inuit received from the federal government, the former Canadian Handicrafts Guild and the Hudson's Bay Company. In 1957-58 Houston also introduced printmaking into Cape Dorset; in the next 20 years, this craft spread to Povungnituk, Holman I, Baker Lake, Pangnirtung and, to a lesser extent, into several other arctic communities. The role of economics in contemporary art production is of great importance.

In these new carving activities the emphasis is largely on soapstone and serpentine, which have become increasingly scarce, and stone is often imported from the south. Stone differs greatly from the organic materials used in prehistoric and historic times. Ivory is still used in several areas, especially at Pelly Bay and Repulse Bay, where miniature carvings predominate. Beached whale's bone was first used at Arctic Bay but had largely disappeared by the mid-1970s. Instead, large whale's bone fragments from prehistoric Thule culture sites became extremely popular in the late 1960s and early 1970s, especially at Pangnirtung and Spence Bay. By 1983, largely because of the US embargo on endangered species, the use of this material had steadily declined.

Though carving is still the largest art activity, printmaking has become the most steady and the one providng the greatest financial returns for southern collectors and "art investors." Drawings and paintings are also produced in quantity, but they have never enjoyed the popularity of the prints. Every printmaker draws, but only a few artists paint (notably PUDLO PUDLATT from Cape Dorset and Davie Atchealak from Pangnirtung). Wall hangings (embroidered, appliqué or woven) are probably the most impressive of the new 2-dimensional art forms but, though highly valued by connoisseurs, they have not achieved the wide acceptance of the prints either.

These new art forms do not have the uniform style and content characteristics found in Dorset and Thule art, but rather exhibit local and individual characteristics. Inuit art is easily recog-

The Enchanted Owl by Kenojuak Ashevak (*courtesy West Baffin Eskimo Co-operative, Cape Dorset, NWT*).





Sliding in the Sun by Peter Aliknak (*courtesy Holman Eskimo Co-operative, Holman Island, NWT*).

nizable as such, but only because of a predictable subject matter or a definite personal or local style. All Inuit art shares a predominantly narrative or illustrative content that depicts the traditional life-style and techniques of survival, the animals of the North, the spirits of those animals, or the shamans and mythologies which were the links to that spirit world. But here the similarity ends. In Baker Lake, for instance, MAKPAAQ and Ekoota have initiated a style of massive stone carving, whereas Ikseetaryuk developed out of the antler characteristic images and compositions of his own which have no stylistic relationship to the stone carvings. Baker Lake printmakers and producers of wall hangings such as OONARK, Tulluq, ANGUHADLUQ, William Noah and Simon Tookoome also have their own individual styles, as have at least 10 others.

A similar situation exists at Cape Dorset, where all the well-known artists are highly individualistic, including carvers AQJANGAJUK SHAA, QAQAQ ASHOONA, KIUGAK ASHOONA, Kumwartok, Latcholassie, OSUITOK IPEELEE and PAUTA SAILA, and printmakers PARR, PITSEOLAK and Pudlo. Collectively, however, they are typical of Cape Dorset art, and it is possible to speak of a Cape Dorset style with its definite and crisp shapes and often quite original ideas.

In Povungnituk, too, the principal artists all have their own style and subject matter. The stylistic individuality of artists such as DAVIDIALUK, Joe Talirunili and Josie Paperk is noticeable in both carvings and prints. These 3 artists were seldom imitated, and ideas of Charlie SIVUARAPIK, Isapik and Eli Sallualuk were followed by many of the lesser artists. These multiple Povungnituk styles have one common feature — high finish and craftsmanship. This characteristic applies to both the highly representational and the fantastic art of Povungnituk, but not to the works of Davidialuk, Talirunili and Paperk, which, though also narrative, have retained a definite feeling of simple rawness and forceful expression.

Comparisons could be drawn between Pelly Bay, Repulse Bay and Eskimo Point, all of which have styles that could easily be related to FOLK ART, but here too there are many subtle and individual exceptions. In general, Eskimo Point carvings of stone and antler are carved more crudely than the stones and ivories of the other 2 communities, yet PANGNARK's abstract work from Eskimo Point is elegant and sophisticated. Artists using whale's bone, especially the vertebrae, which have naturally fantastic shapes, have a certain advantage, leading often to unusual sculptures. This applies particularly to Spence Bay artists such as KAROO ASHEVAK and Anaija, but interesting work has also been coming out of the eastern and northern regions of Baffin I.

The contemporary phase is rapidly evolving and changing. Collectors and museums are starting to pay extremely high prices for older pieces or prints, and the production of new art has increased frighteningly, accompanied by a general decline in quality. Although a great deal of good art is still produced, the collective standard of quality can only be maintained if the creation of art is limited to those of real talent. The Inuit and their co-operatives are fully aware of this danger, but only they can remedy it.

GEORGE SWINTON

Reading: The Eskimo World, *artscanada* 27 (Dec 1971-Jan 1972); *The Beaver* (autumn 1967), Eskimo Art Issue; Canadian Eskimo Arts Council, *Sculpture/Inuit* (1971); S. Cole, ed, *We Don't Live in Snowhouses Now* (1976); H. Goetz, *The Inuit Print/L'Estampe inuit* (1977); George Swinton, *Sculpture of the Eskimo* (1972).

Inuit Co-operatives were initiated in the NORTH by the federal government as a way of introducing the Inuit of the eastern Arctic to a money economy. The first co-operative was established in 1959 at George River in Nouveau-Québec as a logging and fishing operation. Others followed rapidly, the best-known being the West Baffin Co-operative at Cape Dorset, which began as a PRINTMAKING organization and then became involved in Inuit carvings.

The first co-operatives were involved in the production of northern goods for local consumption or export; from this beginning it was a natural expansion to consumer co-operatives, importing goods from the south for retailing in the north. Many co-operatives have also undertaken various municipal services, and have operated fishing lodges and hotels. The first co-operative conference was held in Frobisher Bay in 1963 with 16 co-operatives represented, 11 from the NWT and 5 from northern Québec.

In 1966 representatives of 24 co-operatives met in Povungnituk and decided to form a federation to provide central services, information and advice. La Fédération des co-opératives du Nouveau-Québec was organized in 1967 by the co-operatives in northern Québec, but it was not until 1972 that the Canadian Arctic Co-operatives Federation was established in the NWT. In the meantime, Canadian Arctic Producers had been set up with government encouragement as a central marketing agency for INUIT ART and crafts. In 1983 Canadian Arctic Producers merged with the Canadian Arctic Co-operatives Federation to form Arctic Co-operatives Ltd.

The CO-OPERATIVE MOVEMENT in the North, as might have been expected, has suffered from inexperienced management, both among the Inuit and the staff hired from southern Canada, and from being undercapitalized. It has known failures as well as successes. Government assistance has frequently been necessary, but co-operatives are, after governments themselves, the largest employers of native people in the North. They have been an important influence in education and commerce, as well as in increasing self-confidence. There were 46 co-operatives, 11 in the Fédération des co-opératives du Nouveau-Québec and 35 in the NWT in 1984 with a total gross business volume of $35 million.

GEORGE SWINTON

Inuit Myth and Legend A myth is usually defined as a poetic attempt to explain some phenomenon of nature or ancient tradition that cannot be understood rationally. A legend is a story handed down by tradition but loosely based on history. Both these forms are widely used by preliterate societies. The INUIT were just such a society until the mid-20th century.

Inuit who make their homes across the vastness of Canada's Arctic belong to a much larger Eskimoid family that extends from the Bering Sea through Alaska and northern Canada to Greenland (*see* ESKIMO). These imaginative, hardy and resourceful people are linked not only linguistically but by a distinctly similar culture and way of life. Songs, dances, myths, legends and art forms all link these widely flung, seminomadic people (*see* INUIT ART). Their earliest myths and legends, along with their hunting techniques, must have travelled with them out of Asia (*see* PREHISTORY). Their songs and story forms of myths and legends, linguistically as well as stylistically, relate most closely to Siberian, Finno-Ugric and early Hungarian (Magyar) traditions. Language and legend may give clues to ancient routes of migration.

Inuit myths and legends perform a useful function by answering, at least in part, many puzzling questions. The Inuit designated the powers of good and evil to deities living in a spirit world (*see* NATIVE PEOPLE, RELIGION). For the Inuit that spirit world was closely entwined

Keeviak's Sea Journey by Nancy Pukingrnak (*courtesy Sanavik Co-operative, Baker Lake, NWT*).



with the starkly beautiful northern world in which they lived.

The ancient Inuit oral traditions were employed as the most important method of conveying and preserving ideas, augmented sometimes by small carvings that may have served as illustrations for events. Songs and dances also enhanced the meanings of myths and legends which upheld the existing system, bolstered the traditional customs of Inuit society and verbalized a sense of right and wrong. These early tales may have preceded the priesthood that grew around them, developing into Siberian and Eskimo shamanism (*see* SHAMAN).

Inuit myths and legends are usually short dramatic forms dealing with the wonders of the world: the creation, the heavens, birth, love, hunting and sharing of food, respect for the aged, polygamy, murder, infanticide, incest, death and the mystery of an afterlife. Even in recent times Inuit storytellers will remodel old myths and create new legends, subtly disguising the true identities of the persons involved.

Inuit myths are rarely simple, usually abounding with curious behavioural codes that may only be fully understood by those living within that society. Inuit believe that they have a close relationship with all of nature and that animals have the magical power to hear and understand the human word. For this reason, hunters in their camps, when singing or speaking of walrus or seal, may carefully refer to them as maggots or lice, or call caribou lemmings, thus confusing the animals that are necessary for their survival.

Until modern times Inuit agreed that there were other worlds beneath the sea, inside the Earth, and in the sky where some gifted *angakoks* (shamans) had the power to journey in trances and in dreams, visiting places that ordinary mortals would only experience in some afterlife.

Dreams have always played an important part in the lives of Inuit, perhaps serving as the basis for some myth forms. Dreams are interpreted with care. Dreams of white bears are said to have sexual overtones. Dreams of weasels suggest troubles. Bird dreams forewarn of blizzards.

Some Inuit myths are thought provoking in any language. Here is one extremely short example: Onto a boy's arm came a mosquito. "Don't hit! Don't hit!" it hummed, "Grandchildren have I to sing to." "Imagine," the boy said, "So small and yet a grandfather."

Among the most famous of the vast array of myths is the legend of the sea goddess who has various names (Sedna, Nuliayuk, Taluliyuk), the legend of Lumiuk (Lumak, Lumaag), the legend of Kiviok and the legend of Tiktaliktak.

Once, on south Baffin Island, I saw a myth come alive. I witnessed some young children playing near a tidal ice barrier with many dangerous hidden cracks. Their grandmother crept with great care down among the ice hummocks and from a hidden position called out, "Oohhwee, Oohhweeee!" The children ran back onto the land and said the sea goddess Talulijuk had frightened them. Later, the grandmother said, "I told them about the woman who lives under the sea. Now she will keep them away from the dangerous places." The grandmother was referring to the powerful sea goddess in this central arctic song:

That woman down there beneath the sea,
She wants to hide the seals from us.
These hunters in the dance house,
They cannot mend matters.
They cannot mend matters.
Into the spirit world
Will go I,
Where no humans dwell.
Set matters right will I.
Set matters right will I.



The Woman that Lives in the Sun by Kenojuak Ashevak (*courtesy West Baffin Eskimo Co-operative, Cape Dorset*).

The legend of the sea goddess, though known in various regions by different names, is one of the most widespread. One version is that some time ago, during a violent blizzard, a handsome young stranger entered a family IGLOO. He was wearing a necklace with 2 large canine teeth. He was welcomed into the bed and slept with the entire family. When they awoke next morning, the young man was gone. The father, seeing only animal tracks outside, said, "We were deceived. That must have been my lead dog disguised as a man." When his daughter became pregnant, the father was ashamed of what she might produce. He made his daughter lie on the back of his kayak while he paddled her out to a small island where he abandoned her. His lead dog secretly swam to the girl, leaving her tender pieces of meat. Thus she remained alive and gave birth to 6 young. Three of them were Inuit children, but the other 3 had bigger ears and snoutlike noses. The young mother did not know how to build a kayak. Instead, she sewed some sealskins into one large slipper, and placing the 3 strange children inside, she pushed them off toward the south, calling out, *"Sarutiktapsinik sanavagumarkpusi"* (You shall be good at making weapons). Some Inuit say that all white men and Indians are descended from those 3 dog children and only through them are they related to Inuit.

The second part of the story, usually told on the following night, tells of the father going in an UMIAK, a large skin boat, and taking his daughter off the island. On their way home a storm rose and it was feared that the overloaded boat would capsize. The boatmen decided that to lighten the load they must throw the daughter overboard. When she tried to climb back into the boat, her father cut off her fingers. These became the seals in the sea. She tried again and he cut off her hands and they became the walruses. She made one last attempt and he cut off her forearms which became the whales of the oceans. After that she sank into the depths and became Sedna, or Taluliyuk, the woman who controls all the sea and became half woman and half fish. Many songs are sung to this powerful goddess. In new seasons, pieces of liver of the first killed sea mammal are returned to the waters, imploring Sedna to release her bounty to the hunters so that they might feed their families.

A number of anthropologists agree that although many ethnic societies wished to preserve their history, they preferred to record it in myths and legends. Perhaps this was because these were close societies where every man knew his neighbour well. Until recently Inuit had no need for last names. This also suggests that to repeat the tale of a wife-stealing or a feud leading to a massacre within a tribal group would be not only socially unacceptable but dangerous. But by transferring enemies into mythical beasts and family members into heroes, the story might travel safely down within the tribe through many centuries.

Ancient tools and art objects may lie preserved in the permafrost unharmed for countless centuries waiting to be discovered. But oral myths and legends, and songs and dances that are parts of Inuit culture, represent a valuable intellectual possession. Once lost, they have no way of returning. For this reason, every effort should be made to record the important Inuit myths and legends that are a part of the priceless heritage of Canada before they slip away. In the past, explorers and anthropologists performed this task, but in recent years Inuit have become concerned with preserving their traditions. JAMES HOUSTON

Reading: Z. Nungak and E. Arima, *Eskimo Stories: Unikkaatuat* (1969).

Inuit Tapirisat of Canada (ITC, formerly the Inuit Brotherhood) was founded in 1971, when an organizing committee of Inuit decided it was time to speak with a united voice on various issues concerning development of the Canadian NORTH and preservation of INUIT culture. Headquarters were first established in Edmonton, but in 1972 the offices were moved to Ottawa, for closer access to the federal government. In 1983 ITC was a national organization representing over 25 000 Inuit in the NWT, northern Québec and Labrador, as well as 6 regional associations: the Committee for Original People's Entitlement (COPE) in the western Arctic, the Baffin Region Inuit Assn, the Kitikmeot Inuit Assn, the Keewatin Inuit Assn, the Makivik Corp in Québec and the Labrador Inuit Assn. The presidents of the regional associations constitute ITC's board of directors, along with 4 other members who are elected for 2-year terms at the annual general meetings. All Inuit over 18 years of age are now eligible to vote, though in the past elections were only open to those delegates attending the meeting.

The goals of ITC are to preserve Inuit language and culture; to promote a sense of dignity and pride in the Inuit heritage; to provide a focal point for determining the needs and wishes of all Inuit; to represent Inuit on matters affecting their well-being; to improve communications to and between Inuit communities; and to help Inuit achieve full participation in Canadian society. ITC is a nonprofit organization; its funding sources are mainly government agencies and private foundations in Canada.

MINNIE AODLA FREEMAN

Inukpuk, Johnny, sculptor (b at Inoucdjouac, Qué 1911). Anecdotal Inuit sculpture reflects an austere, sometimes violent way of life. By contrast, Inukpuk's balloon-breasted mothers nurse plump contented babies, assuring them and the viewer a life of love and abundance. An anachronic flaw, a harelip, is invariably shared by both figures. His explanation, probably tongue-in-cheek, is that "white people think Eskimos look like that." MARY M. CRAIG

Inuvik, NWT, Town, pop 3147 (1981c), inc 1970, is located on the MACKENZIE R Delta, 97 km S of the BEAUFORT SEA and 1086 air km NW of YELLOWKNIFE. The name is from the Inuit and means "place of man." The community was constructed in the late 1950s and early 1960s to replace the existing settlement of AKLAVIK, which was threatened by floods and erosion. Inuvik is the administration, communications and fur-trading centre of the lower Mackenzie R





Inuvik, NWT, is the administrative and communications centre of the lower Mackenzie area and the largest community N of the Arctic Circle (*photo by John deVisser*).

area and is the largest community N of the ARCTIC CIRCLE. Much of its economy is centered on nearby oil and gas exploration. ANNELIES POOL

Inventors and Invention Thomas AHEARN; Alexander Graham BELL; J. Armand BOMBARDIER; Gerald Vincent BULL; Karl Adolf CLARK; William Harrison COOK; Georges-Edouard DESBARATS; Charles FENERTY; Ivan Graeme FERGUSON; Reginald Aubrey FESSENDEN; Robert FOULIS; Abraham GESNER; William Wallace GIBSON; Frederick Newton GISBORNE; Sir Charles Frederick GOODEVE; Uno Vilho HELAVA; INDUSTRIAL RESEARCH AND DEVELOPMENT; George KLEIN; George Craig LAURENCE; Eric William LEAVER; Lloyd Montgomery PIDGEON; Frank Morse ROBB; Edward Samuel ROGERS; SCIENTIFIC RESEARCH AND DEVELOPMENT; Sir William Samuel STEPHENSON; Wallace Rupert TURNBULL; Thomas Leopold WILLSON.

Reading: J.J. Brown, *Ideas in Exile* (1967); J. Nostbakken and Jack Humphrey, *The Canadian Inventions Book* (1976).

Invermere, BC, Village, pop 1969 (1981c), inc 1951, is located on the NW shore of Windermere Lk in the ROCKY MOUNTAIN TRENCH, 130 km N of Cranbrook and 120 km SE of Golden. Prehistoric KOOTENAY located here to net and spear salmon. David THOMPSON built the first trading post in the Columbia Dist near here 1807. In 1862 the first placer-gold miners arrived, and mining continued with the Paradise and Mineral King mines. Invermere became a centre for mountaineers in the Purcell Mts 1900-30, after Conrad Kain, a prominent guide, made the area his home. Agriculture was established, along with beef production. Forestry is now the leading resource industry, but tourism also plays an important role, particularly at nearby Radium and Fairmont hot springs, and at Panorama Ski Resort. WILLIAM A. SLOAN

Inverness, NS, UP, pop 2013 (1981c), is located 150 km W of Sydney, Cape Breton I. Inverness was settled in 1803 by Scottish immigrants who landed at Pictou, NS, and later drifted east to Cape Breton I in search of unoccupied farmland. During the 1800s it grew as an agricultural settlement. After the discovery of coal in 1863, Inverness came to depend more and more on mining. American industrialist William Penn Hussey formed the Broad Cove Coal Co in 1894 and put his expertise into developing the Inverness mines. The mines were sold to Inverness Ry and Coal Co 1899, and the town, known as Broad Cove Mines, Broad Cove Shore, Lochleven and Broad Cove Shean, prospered. It was named Inverness in 1904 (pop 3000) for the Scottish home of many of its settlers. The mines reached peak production just after 1910, with an average annual output of almost 300 000 tonnes, but decreasing demand, rising costs and hazardous underground problems drove the company into receivership by 1915. The NS government attempted to revive the dying industry, which finally ceased operations in the 1950s; mining was completely abandoned by 1965. Today, Inverness serves as a minor regional centre for rural western Cape Breton I. DEBRA MCNABB

Invertebrate, ANIMAL without a vertebral column (backbone). As a group, invertebrates are extremely diverse, differing as much among themselves as they do from the VERTEBRATES, which they greatly outnumber. Some 95% of all animal species are invertebrates, 85% being arthropods. They populate all major environments: marine, freshwater and terrestrial; some are parasites in other animals. Invertebrates may be carnivores, herbivores or omnivores. Some even culture bacteria or plant cells in their tissues (in symbiosis), making use of the byproducts. There are invertebrates that swim, float, fly, walk, crawl or burrow, and others that are fixed in one spot. Some of these sessile forms have no power of movement (eg, the glass SPONGES). Endless variations exist in the mechanisms whereby physiological functions (respiration, excretion, movement, co-ordination, etc) are carried out. Some groups (eg, INSECTS, NEMATODES) have developed extraordinarily successful designs. Other designs, though simple, have endured virtually unchanged for hundreds of millions of years (eg, BRACHIOPODS).

While invertebrates are certainly conspicuous on land, they are far more so in the sea. The most elaborate of all marine communities, the coral reef, is dominated by invertebrates. Marine PLANKTON includes representatives of all major invertebrate phyla. The copepod CRUSTACEANS, in both numbers of species (7500) and numbers of individuals, exceed all the rest of metazoan multicelled plankton combined. Some invertebrates, eg, crabs, shrimp, mussels, oysters and squid, are of economic importance. While shellfish cannot compete with fish in sheer volume caught, they are important in cash value. In eastern Canada in 1981 the landed value of lobsters and scallops combined was $194 million — more than the combined value of the 2 major fish species, cod and haddock.

The origins of most invertebrate groups are buried in early GEOLOGICAL HISTORY. Surprisingly advanced forms, including ANNELID worms and MOLLUSCS, have been found in rocks from the Canadian Arctic dating from the Precambrian period (620 million years ago). Many once-important groups have dwindled; others have become extinct as new forms emerged. Because of the patchiness of the FOSSIL record, it is often hard to decide on evolutionary relationships in different invertebrate groups, but comparison of structure and development of existing forms may give clues to their ancestry. Thus, the annelids and molluscs, though seemingly very different as adults, show remarkable similarities in their development; both are considered offshoots from the line of evolution leading to the arthropods. Specialists are fairly well agreed upon the broad outlines; however, classifications change continually as new facts come to light.

Phylum	*Habitat*	*Examples*
Cnidaria (9 000 species)	mainly marine	sea anemone, hydra coral, jellyfish
Ctenophora (50 species)	marine plankton	comb jelly, sea gooseberry
Platyhelminthes (12 700 species)	mainly parasitic	flatworm, fluke, tapeworm
Nemertea (600 species)	mainly marine	ribbon worm
Acanthocephala (500 species)	parasitic	spiny-headed worm
Rotifera (1 800 species)	marine and fresh water	wheel animal
Nematoda (10 000 species)	all habitats many parasitic	round worm
Brachiopoda (280 species)	marine benthos, and intertidal	lampshell
Bryozoa (4 000 species)	aquatic	moss animal
Pogonophora (80 species)	deep-sea benthos	beard worm
Mollusca (100 000 species)	all habitats	clam, snail, octopus, squid
Annelida (8 700 species)	aquatic or in damp soil	earthworm, leech, tube worm
Arthropoda (923 000 species)	all habitats	insect, spider, crustacean
Chaetognatha (50 species)	marine plankton	arrow worm
Echinodermata (6 000 species)	marine benthos and intertidal	sea urchin, starfish
Protochordates	marine	sea squirt

Invertebrates in Canada Canada's climatic and ecological diversity is matched by an equivalent diversity of invertebrate types. Scorpions and sun spiders live in the hot, dry country around Medicine Hat, ICE-WORMS in the Columbia Icefields; midges and mosquitoes plague the inhabitants of many regions; leeches and flatworm larvae bother bathers in prairie lakes ("swimmers itch"); starfish and sea anemones delight the eyes of wanderers along the seashore; and the invertebrate fossils of the BURGESS SHALE are famous throughout the world. In Canada research on invertebrates is largely concentrated on insects important to agriculture and forestry, eg, spruce budworm, parasites of fish and domestic animals; and on edible marine molluscs and crustaceans (shellfish), copepods and other marine planktonic invertebrates. However, specialists in most of the invertebrate groups are scattered across the country in government laboratories, research institutes and universities. Published works on invertebrate species in Canada are generally regional in nature and of interest primarily to specialists. Although the National Museum of Natural Sciences and the Department of Fisheries and Oceans have published material on specific groups, no general reference work on Canada's invertebrate fauna exists. Invertebrates are far less well known than are higher animals. Of the 2000-4000 new animal species discovered annually, most are invertebrates from remote places (eg, the Alpha Ridge of Canada's ARCTIC ARCHIPELAGO).

G.O. MACKIE

Iranians Iran, formerly known as Persia, is a predominantly Muslim country in southwestern Asia with a population of more than 42 million. About 90% of the population is Shi'ite Muslim; 8% Sunni Muslim; and 2% is made up of diverse religious groups including Zoroastrians (the most ancient of all Iranian minorities), Jews, Assyrians (eastern Christians), Armenians and Bahais.

There is no record of Iranian immigration to Canada prior to WWII. Between 1946 and 1965, less than 300 Iranians immigrated to Canada; many of them were students who remained in Canada after their studies. From 1966 to 1981, 6382 Iranian immigrants arrived, including 1730 in the 1966-75 period and 4652 in the 1976-81 period. Other Iranians came from the US and from Britain, Germany, France, Italy and Spain. Many factors have contributed to Iranian immigration, but the most significant are economic and educational opportunities in Canada and estrangement from the Islamic regime.

Like many immigrants from other parts of the world, Iranian immigrants to Canada are a youthful group, with a slight male majority. They have come as individuals or as individual family units. Most possess exceptionally high educational or occupational qualifications.

It is estimated that by 1983 the Iranian community in Canada numbered 10 000-12 000, the majority in urban centres in Ontario (50%), Québec (20%) and BC (20%). The majority of Iranian immigrants are Muslim, but the eastern Christians and Bahais are overrepresented proportional to their distribution in Iran. The Iranian Canadian community is one of the newest additions to Canada's ethnic mosaic, but it is in the process of development and will doubtless soon establish its own institutions and distinctive mode of adaptation to the new environment. BAHA ABU-LABAN

Irish While it has been argued (with little supporting evidence) that Irish explorers such as Brendan the Bold preceded the Norse to Canada, such wishful thinking is not necessary to establish the significance of the Irish contribution to Canada. Since the 17th century, because of political and military links between France and southern Ireland, the Irish have lived in what is now Canada. The Irish may have constituted as much as 5% of the population of NEW FRANCE. Indeed, some "French Canadian" and "Acadian" surnames derive from a corruption of Irish names, eg, Riel (from Reilly) and Caissie (from Casey). There have also been Irish in NEWFOUNDLAND since the early 18th century, if not before. "Bristol" fishing vessels habitually stopped at Wexford and Waterford to take on provisions and an Irish crew and labourers for the Newfoundland fishery. There is some indication from New France and Newfoundland that among the Irish at this time there existed a measure of group consciousness, especially in Newfoundland where the Irish population continued to increase until the middle of the 19th century. During the 18th century, smaller groups of Irish began to arrive in the new British colonies. During the 1760s a group of Ulster Presbyterians settled at TRURO in Nova Scotia, and an undetermined number of Irish were part of the LOYALIST migration.

All of the above were precursors of the main waves of Irish immigrants that arrived during the first half of the 19th century. By the 1850s, over 500 000 Irish had immigrated to British N America, although many of them had moved on to the US (in NY and Boston there were 4 million Irish out of a total population of 24 million) or elsewhere. Today the descendants of these Irish immigrants comprise more than 10% of the Canadian population and have helped define the meaning of "Canadian." Because they spoke English, the Irish could participate more directly in Canadian society than many non-English-speaking immigrants, and they brought to bear on Canadian life many values that were Irish in origin. In particular, education, law and politics have felt the impact of the Irish mind. Well-known Irish in Canada have included Edward BLAKE, Edmund BURKE, Sir Guy CARLETON, Benjamin Cronyn, John Joseph LYNCH, D'Alton MCCARTHY, John O'Conner, Eugene O'KEEFE, Michael Sullivan, Thomas D'Arcy MCGEE, and Brian MULRONEY.

Migration and Settlement The migrations of the 17th and 18th centuries had little permanent impact on Canada, except in Newfoundland where many Irish worked as fishermen and lived in the kind of dire poverty they had hoped to escape by migration to the New World. Newfoundland had acquired a name in the Irish language — Talamh an Eisc — a singular distinction in the New World. In the 19th century, the growing population and deteriorating economy of Ireland forced a growing stream of Irish to emigrate, particularly after 1815. Simultaneously the economy of the mainland colonies of British N America expanded, offering better opportunities for immigrants. However, because they were relatively poor immigrants with little money for moving across Canada, the Irish tended to settle in the Maritimes.

By the 1830s Nova Scotia, New Brunswick, PEI and Upper and Lower Canada had significant Irish populations. Some immigrants spread throughout the countryside, because land from recent timber operations was cheap, but generally the Irish tended, unlike the SCOTS or ENGLISH, to remain in the ports, such as Halifax, and Saint John, where they provided cheap IMMIGRANT LABOUR. Even in rural districts, many Irish preferred to seek employment instead of, or in addition to, setting up farms. By the 1830s Cumberland County in Nova Scotia; Kings, Queens, Carleton and Northumberland counties in New Brunswick; Queen's in PEI; and virtually the whole of Upper Canada E of Toronto and N of the older Loyalist settlements were notably Irish in character.

The Great Famine of the late 1840s drove 1½ to 2 million destitute Irish out of Ireland, and hundreds of thousands came to British N America. This wave was so dramatic that most Canadians erroneously think of "1847" as the time "when the Irish came." The famine immigrants tended to remain in the towns and cities and by 1871 the Irish were the largest ethnic group in every large town and city of Canada, with the exceptions of Montréal and Québec City.

The "Famine Irish," who supplied a mass of cheap labour that helped fuel the economic expansion of the 1850s and 1860s, were not well received. They were poor and the dominant society resented them for the urban and rural squalor in which they were forced to live. But the Famine Irish had another characteristic: the propensity to emigrate to the US. Thousands had left for the US by the 1860s, establishing a tradition that remained unbroken well into the 20th century. As a result, in Canada today "Irish" districts and communities are generally those that were established before the famine. For example, in the Maritimes, only Saint John has a significant Famine Irish element. Today, Ontario has the largest population of Irish outside the Atlantic provinces. By the 20th century, there was a significant Irish community in Winnipeg and in a few rural districts of Manitoba, but the impact of the Irish in the West has not been as important as in the East.

Social and Cultural Life The most important single feature of the Irish, both in Ireland and in Canada, is that they have been divided into 2 different and mutually hostile groups. This division is so fundamental that the Irish might be considered 2 ethnic groups. Although it is common practice to refer to Irish people as either Catholic or Protestant, religion itself has never been much more than the easiest determinant of a group affiliation that consists of many factors. The Catholics perceive themselves to be the representatives of the original inhabitants of Ireland, while the Protestants represent the Scots and English colonists who arrived in Ireland when it was under British rule. Because the Catholics were socially and politically disadvantaged in Ireland, they arrived in Canada with few advantages other than a familiarity with the English language and British institutions. They lacked the means to establish themselves securely within the economy and had little impact on the business community. The Catholic Church, an important institution for the Catholic Irish in Ireland, was shared by the Irish in Canada with the Highland Scots and the French, and helped the Irish in the difficult process of integration into Canadian society.

The Protestant Irish, in contrast, generally had more money and found it significantly easier to re-establish themselves as farmers. They became one of the most agrarian of groups in 19th-century Canada. Because their religion made them more acceptable to the dominant society, they were able to move much more freely in Canadian society.

Both groups were rich in cultural traditions, but with significant differences. The Catholic Irish tended to keep alive traditions of being Irish whereas the Protestants tended to glory in their contributions to British civilization. Neither group has preserved much lore about the actual migrations, even the trauma of the famine, but both groups tend to be aware of the more recent experiences in Canada.

Group Maintenance The Protestant Irish tended to stress the importance of the British connection in order to distance themselves from their Catholic compatriots. The ORANGE ORDER, the original purpose of which in Ireland was to preserve British rule (at least in Ulster), was essential in Canada as a vehicle by which the Protestant Irish could gain acceptance from their Scots and English neighbours. Individual Orange Order lodges existed in New Brunswick and in Upper Canada from the early part of the 19th century, and the order was consolidated in 1829 as the Grand Lodge of British N America. Whenever British institutions in Canada seemed to be in peril, Orangemen were fond of bringing up the Protestant victory over the Catholics at the River Boyne in 1690, and the anniversary of that battle (12 July) remains the great Orange celebration. During the latter half of the 19th century, the lodge became increasingly nativist, and today it is difficult to detect a specific Protestant Irish tradition that is distinct from a broad British tradition.

Over the past 150 years, the term Irish has acquired a Catholic connotation. The Catholic Church, the institutional bedrock of the Catholic Irish community in Canada, laboured to gain acceptance for its people, which meant that Irish priests and bishops were often opposed to any manifestations of sympathy for nationalism in Ireland. For the Irish in the US, there was no such problem, because there it was possible to be a good Irishman, a good Catholic and a good American. But in Canada, where citizenship remained British for so long, it was extremely difficult to be Irish politically and a good citizen as well. It was also difficult at times to be Irish and a good Catholic. For example, the Fenian Brotherhood, whose aim was to free Ireland by force of arms, was very popular among the Irish in the US, but in Canada the Fenians (though few in number) were considered seditious by the government, considered dangerous by the Protestants, and were viewed as an embarrassment by the Catholic Church and by respectable Catholic Irish. FENIAN RAIDS from the US against British N America inspired hostility towards the Catholic Irish and provoked attestments of loyalty from the church and from respectable Catholic Irish. The later and more benign Ancient Order of Hibernians was also dedicated, if less violently, to the cause of Irish nationalism, but it too fell afoul of the Catholic Church.

As English-speaking Catholics, the Catholic Irish in Canada found themselves at odds with French-speaking Catholics as well as with the Protestant majority. Because of the sense of isolation among the Catholic Irish, a sense of identity was stronger among them than among the Protestant Irish.

The Protestant Irish have sustained a powerful belief in institutional strength, and have clung to structures tenaciously. Stability is seen to be their greatest virtue. By contrast, the Catholic Irish define power in personal terms to a degree which may seem anarchistic, but which represents a survival of the patron-client relationship, the basis of politics in rural Ireland. The talent of the Catholic Irish in Canada and elsewhere has been that they could translate this personal approach to politics and to power brokerage in the modern setting. PETER TONER

Reading: C.J. Houston and W.J. Smyth, *The Sash Canada Wore* (1980); W.S. Neidhardt, *Fenianism in North America* (1975).

Irish Moss is the common name for a red ALGA (*Chondrus crispus*), but may also refer to 1 or 2 other red SEAWEEDS (*Gigartina stellata* and *Furcellaria lumbricalis*). *C. crispus*, the only species of the genus in the Atlantic Ocean, occurs from New Jersey to Labrador, and is most abundant in NS and the lower Gulf of St Lawrence. The plants are perennial, grow on rock in lower tidal and subtidal zones, and arise from disclike "holdfasts." Commonly, the fronds are up to 15 cm high, branched (usually in one plane only) and fan-shaped. The colour varies (dark red, purple, yellow-green), depending on physiological conditions. Dried plants are nearly black. A life cycle consisting of 2 independent and structurally similar phases (sexual and asexual) has been demonstrated in the laboratory. Irish moss is Canada's most valuable commercial seaweed. Originally used in blancmanges and milk jellies, it is still available in "natural food" stores. The dried plants are used to clarify beers, wines, coffee and honey. Since WWII, major exploitation has been for extraction of hydrocolloids (substances yielding gel when water is added, eg, carrageenans) used in convenience foods. Carrageenan is not processed in Canada, and thousands of t of Irish moss are exported annually. AQUACULTURE trials, in tanks and pools, have been carried out in NS. J. McLACHLAN

Iron and Steel Industry includes establishments involved in smelting IRON ORE, in steelmaking (ie, alloying iron and carbon) and in using these materials to fabricate a range of products essential to an industrialized society. Iron is the fourth most plentiful element in Earth's crust, after oxygen, silicon and aluminum. It occurs as iron-ore minerals, the most important, in order of iron content, being magnetite, hematite, goethite, pyrrhotite, siderite and pyrite. Steel is primarily an alloy of iron and carbon in which the carbon content varies from about 0.02% (eg, sheet metal, wire) to 1.5% (tool steels). Alloy steels contain additional elements (eg, manganese, nickel, chromium, vanadium, molybdenum) which give them greater strength and specific properties (eg, chromium makes steel stainless).

Canada is the world's sixth-largest producer and third-largest exporter of iron ore. In 1982 iron ore was produced by 10 companies, directly employing about 14 000 people and supporting 10 communities. In 1981 Canada shipped 49.8 million t of iron ore valued at $1.9 billion, of which some 41.5 million t valued at $1.4 billion were exported. Canada imports about 6 million t annually, mainly from the US, and consumes some 15 million t annually to produce iron and steel. The Québec-Labrador region accounts for most of Canada's total production; Ontario and BC produce the remainder.

During the period 1939 to 1970, annual Canadian steel production increased from just over one million to 11 million t. The Canadian steel industry is now made up of 5 major, fully integrated iron and steel producers and about 15 smaller steel producers. In 1980 these companies produced over 15 million t of raw steel, making Canada the world's ninth-largest steel producer. Most of Canada's steel output is concentrated in Ontario in the "Big 3" steel companies: Stelco, Dofasco and Algoma. These companies are recognized as among the most efficient and innovative steelmakers in the world.

In Canada iron was first made in 1733 at the FORGES ST-MAURICE, near Trois-Rivières, Qué, which produced iron from local bog iron ore and charcoal to supply settlers and the military (*see* BLACKSMITHING). The first ironworks in Upper Canada, the Marmora Ironworks, near Peterborough, Ont, began production in 1822. It consisted of 2 charcoal-fired blast furnaces, a forge with 2 sets of water-powered hammers and special hearths for the production of iron



Stove from the Forges Saint-Maurice at Trois-Rivières, Canada's first ironworks, which began production in the 1730s (*courtesy National Museums of Canada/National Museum of Man*).

bar. At the time it was the largest ironworks in Canada and probably the most advanced in N America. In the late 19th century both the Marmora and the St-Maurice ironworks were closed. They could no longer compete with more modern ironworks in Ontario and NS, which employed coke-fired blast furnaces.

Steel products were first manufactured in Canada in the 1880s. By the early 1900s steelmaking centres had been established in HAMILTON and SAULT STE MARIE, Ont, and in SYDNEY, NS. These centres had easy access to iron-ore deposits recently discovered near Lk Superior and on Bell I, Nfld, and to coking coals from the Appalachians and Cape Breton. Iron and steel production grew slowly until WWII and the postwar economic boom created a tremendous demand for steel.

Processing

Iron and steel production first involves bringing together the required raw materials: iron ore, coal, limestone, and iron and steel scrap. The iron ore is then smelted to produce an impure metal called hot metal, if liquid, or pig iron, if solid. The hot metal is refined to remove impurities and to develop the required composition. The liquid steel is then cast in sand or ingot molds, or continuously cast into blooms, slabs or billets. Finally the ingots, blooms, slabs and billets are processed into the desired shapes in rolling mills or by forging.

Large integrated steel plants are located wherever it is convenient to bring together the large quantities of raw materials required. The big steel plants in Canada have been built at Sault Ste Marie (ALGOMA STEEL CORPORATION LTD) and Hamilton (STEEL COMPANY OF CANADA LTD, DOMINION FOUNDRIES & STEEL, LTD), Ont; Contrecoeur (SIDBEC-DOSCO LIMITÉE), Qué; and Sydney (SYDNEY STEEL CORPORATION), NS, ie, along the Great Lakes-ST LAWRENCE SEAWAY system and the Atlantic seaboard. These are areas to which iron ores from northern Ontario, Québec, Labrador, Minnesota, Wisconsin and Michigan, and COAL from Pennsylvania, West Virginia and Kentucky can be transported most economically. Scrap iron and steel, which are collected for recycling, require adjustment of composition and casting before the finishing operations. Thus, many small steel plants, each making a few thousand tonnes of steel annually, have been built throughout the country where scrap is available and a ready market for the finished steel exists. Examples of such facilities include Western Canada Steel Ltd, Vancouver; Stelco, Edmonton; Western Canada Steel Ltd, Calgary; Interprovincial Steel and Pipe Corp Ltd, Regina; Manitoba Rolling Mills (Canada) Ltd, Selkirk, Man; Burlington Steel Division of Slater Steel Industries Ltd, Hamilton, Atlas Steels, a division of Rio Algom Ltd, Welland, Lake Ontario Steel Co Ltd, Whitby, and Ivaco Ltd, L'Orignal, Ont; and Atlas Steels, Tracy, Qué.

Iron Making Iron ores consist primarily of hematite or magnetite, associated with variable amounts of other unwanted minerals (eg, quartz), which are collectively known as gangue. An ore may be high- or low-grade, depending on the relative proportions of iron minerals and gangue. High-grade ores (in excess of 50% iron) may often be smelted in blast furnaces without preliminary preparation, other than crushing and sizing. Low-grade ores must be upgraded to remove excess gangue before smelting. This operation requires fine grinding of the ore to liberate the iron minerals from the gangue, followed by a concentrating process that separates out the iron minerals. Magnetite ores are particularly suitable for concentration because of their magnetic properties. Ground concentrates must be agglomerated into larger particles before smelting, either by rolling them into small pellets ("pelletizing") or by heating the fine particles until they stick together ("sintering"). Ores containing siderite (the iron carbonate mineral) are less often used because they must be heated by sintering before smelting in order to convert the iron carbonate to an iron oxide. Since 1939 Algoma Steel Corp Ltd has operated one siderite mine at Wawa, northern Ontario. Pyrite and pyrrhotite, although plentiful, are rarely used as iron ores because of the objectionable amounts of sulphur they contain (*see* ACID RAIN).

Following WWII, MINING and processing of iron ores expanded greatly in Canada. The Iron Ore Co of Canada now operates mines in Québec and at Carol Lk, Labrador, with concentrating and pelletizing plants at Labrador City and Sept Îles. In Labrador, Wabush Mines carries out mining and concentrating operations at Wabush Lk and pelletizing at Pointe Noire. Dofasco produces pellets at Adams Mine, Kirkland Lake, Ont, and Sherman Mine, Temagami, Ont. Stelco produces pellets at Griffith Mine, Red Lake, Ont. The Québec-Cartier Mining Co mines and concentrates at Lac Jeannine, Qué; Sidbec-Dosco Limitée has iron mines in the same area.

Blast furnaces are heated by burning high-quality coke, a substance high in carbon and low in ash and sulphur, which is distilled from coal. The future of the blast-furnace process is largely dependent on adequate resources of suitable coking coals. A blast furnace is a tall, cylindrical shaft furnace in which ore, coke and limestone are charged to the top and liquid iron and slag are tapped at regular intervals from the hearth at the bottom. The iron melts and dissolves carbon from the coke. The carbon content of the hot metal is about 4.5%. Limestone is added to the charge to provide basic lime, which reacts with the acidic gangue to form slag. Proper proportioning of the acidic and basic constituents forms a low-melting, free-running liquid slag that absorbs most of the sulphur in the charge. Liquid slag does not mix with liquid iron and is separated during furnace tapping.

In recent years, several solid-state reduction processes have been developed in which iron ore is converted to metallic iron without melting. There is no separation of iron from gangue and the use of high-grade ores or concentrates is essential. Many of these processes use natural gas, avoiding the use of expensive coke. Sidbec-Dosco operates such a process at Contrecoeur, Qué, and Stelco has a solid-state reduction plant at the Griffith Mine. Solid-state reduced ore and pellets are melted in electric furnaces and converted to steel in the same way as scrap metal. Separation of the gangue takes place at this stage. Reduced pellets are superior to scrap in purity and uniformity of composition but are not economically competitive with scrap.

Steelmaking Hot metal and pig iron contain silicon, phosphorus, sulphur and often other elements in addition to carbon. These must be removed during steelmaking and the carbon

level adjusted by oxidation. The Bessemer process, invented in England in 1856 and used extensively in Europe until the 1960s, was the first large-scale steelmaking process. This method was followed by the invention, a few years later, of the open-hearth process, which from about 1900 to the early 1960s accounted for most of the steel production in the Western world. The open-hearth process is now rapidly disappearing in favour of the basic oxygen process that originated in Austria, where the first plants were built in 1952-53, and was introduced to N America in 1954 by Dofasco in Hamilton, Ont. In this process oxygen gas is blown into a bath of hot metal. Lime is added to produce a slag with the oxidized silicon and phosphorus and to absorb the sulphur. Carbon burns to carbon monoxide. Scrap metal is added to control the temperature. When the carbon content reaches the desired level, alloying elements are added as required, and the liquid steel is cast into molds and solidified.

In the early 1960s, Guy Savard and Robert Lee of Canadian Liquid Air designed an injector that made it possible to introduce pure oxygen through the bottom of vessels normally used for the Bessemer process. This method was developed to industrial scale in West Germany. The first industrial plant was converted in 1968. The conversion of all remaining Bessemer plants in Europe was completed in the next 4 years. It thus became possible to make all grades of high-quality steel and to increase the scrap charge from 5% to 25%.

In 1981 a total of 449 million t of steel were produced in non-Communist countries: 301 million t (67%) by oxygen processes; 121 million t (27%) by the electric-furnace process; and 27 million t (6%) by the open-hearth process.

Products The greatest tonnage of liquid steel is formed into large ingots or continuously cast. Ingots are large, rectangular blocks of steel, most of which are shaped into finished products by rolling mills. The first finishing step is the hot rolling of ingots into blooms, slabs or billets. Continuous casting eliminates this stage: liquid steel is poured into the top of the mold and the bloom, slab or billet is discharged continuously from the bottom. The first successful continuous casting machine for steel in N America was developed by Atlas Steels, Welland, Ont, in 1954. For the most part, blooms, slabs and billets are reduced in rolling mills to finished products such as sheet, plate, strip, rail, structural steel, bar, pipe and wire products. Most shapes are hot-rolled at temperatures above 800°C. Some steels (eg, sheet, strip) are finished by cold-rolling at room temperature to obtain close dimensional tolerances, high-quality surface finish and an exact degree of hardness. *See* MINERAL RESOURCES.

H.U. ROSS AND J.G. PEACEY

Reading: A.R. Dunn, *The Early History of Iron in Canada* (1980); C.S. Russell and W.J. Vaughan, *Steel Production* (1976).

Iron Ore, is a MINERAL substance that yields metallic iron (Fe) when heated in the presence of a reducing agent such as COAL. Iron ore usually consists of iron oxides. Its most important mineral forms are magnetite (Fe_3O_4, 72.4% Fe), hematite (Fe_2O_3, 69.9% Fe) and goethite or limonite ($Fe_2O_3.3H_2O$, 62.9% Fe). When mined in its natural state, iron ore is called crude ore; when slightly processed by crushing and screening, it is called direct-shipping ore. Concentrates result from processing an ore to raise its iron content. Concentrates and finely divided ores must be agglomerated into pellets, sinter or briquettes before being reduced to iron in blast furnaces. Almost all iron ore mined in Canada must be concentrated to produce a commercial product, because Canadian crude ores are low-to-medium grade. The major steps in processing include crushing, screening and the use of gravitational, magnetic and flotation concentration methods. Concentration increases the iron content from an average of 36% to 63%. Iron was among the first ores mined in Canada (*see* FORGES ST-MAURICE). In 1981 Canada shipped 49.6 million t of iron ore valued at $1.75 billion.

M. BOUCHER

Iroquois is a term which designates a confederacy of 5 tribes originally inhabiting the northern part of New York state, consisting of the SENECA, CAYUGA, ONEIDA, ONONDAGA and MOHAWK, also known as the League of the Five Nations or the League of the Iroquois. When the Tuscarora joined the confederacy early in the 18th century, it became known as the Six Nations. The 5 tribes of the Iroquois League occupied an area from the Genesee R on the W, through the Finger Lks regions, to the Hudson R on the E. They used the metaphor of the LONGHOUSE to describe their political alliance; hence the Seneca, as the most westerly, were known as "keepers of the western door," and the Mohawk have been called the "keepers of the eastern door." A very rough estimate of the Iroquois population at the time of European contact would be approximately 10 000-15 000 people.



The False Face Society was the best known of the Iroquois curing societies. The masks played an important role in curing ceremonies (*courtesy National Museums of Canada/National Museum of Man/S75-641*).

The Iroquois were linguistically related to neighbouring tribes, such as the HURON, PETUN and NEUTRAL, and to more distant tribes including the Cherokee and Tuscarora. There are also suggestions of ancient relationships to the Siouan and Caddoan language families of the Great Plains.

The ancestors of the Iroquois can be traced backwards in New York state by archaeological evidence to at least 500 BC, and possibly as far back as 4000 BC. The distinctive Iroquois culture of the historic period seems to have developed by about 1000 AD. Archaeology suggests that during the 15th century individual villages joined together to form the 5 historic tribes, and that by the 16th century the continuation of this process had resulted in the formation of the League of the Iroquois. With the coming of the FUR TRADE in this historic period, the Five Nations embarked on successful campaigns to subjugate or disperse neighbouring groups. The Huron were forced to abandon their homeland after 2 villages were destroyed in 1649; the Petun, Neutral and Erie all succumbed to Iroquois arms in the next decade. Their military reputation was well respected in territory as distant as the Maritime provinces and the western Great Lakes.

The French maintained trading and military alliances with many of the enemies of the Iroquois, hence Iroquoia and NEW FRANCE were often at war (*see* IROQUOIS WARS). During periods of peace some Iroquois were converted to Catholicism and persuaded to settle on the St Lawrence. The Iroquois remained firmly tied to the Albany, NY, trade and rivalry between the French colony and the Dutch and English at Albany precluded a lasting peace between New France and the Iroquois. The Iroquois frequently raided French settlements on the St



To reach the iron ore beneath a lake at Steep Rock, Ont, the entire lake was drained. Here the successive levels of mining show on the face of the rock (*photo by John deVisser*).

Lawrence and, in 1660 at the Long Sault and in 1689 at Lachine, Qué, sent large armies to attack the colony. France successfully attacked Iroquois towns in 1666, 1687, 1693 and 1696.

Treaties with both the French and English in 1701 marked a shift in Iroquois policy toward neutrality with European powers in N America. At this time population losses for the league, owing to both disease and war, had been considerable, even though the Iroquois had absorbed large numbers of war captives and refugees and incorporated them into their society. Despite official neutrality, the Mohawk under the influence of Sir William JOHNSON did on occasion take the field as English allies, and the Seneca at times fought beside French armies, as at the defeat of General Braddock in 1755.

Except for the Oneida, who fought for the American cause, the Iroquois supported the LOYALISTS and British in the American Revolution, joining that conflict in 1777. The Mohawk lost their homes to neighbouring rebel settlers, and most Seneca, Onondaga and Cayuga towns were burned in 1779. In turn the Iroquois and their allies, under the leadership of Joseph BRANT and others, repeatedly attacked and burned rebel forts and settlements, driving the frontier E to Schenectady, NY. After the war, many Iroquois followed Brant to settle on a grant secured for them by Gov Frederick HALDIMAND on the Grand R and others settled on the Bay of Quinte.

Before the disruption of their culture by the events of the historic period, the Iroquois were horticulturalists, living year-round in stockaded villages of several hundred people. Social structure was based on matrilineal principles. The basic unit was the matrilineage, consisting of the descendants, through females, of a single woman. Female members lived together with their husbands (who belonged to other matrilineages) in a single longhouse; a village would contain anything from a few small longhouses to as many as 50. Several matrilineages formed the matrilineal clan which, besides being of symbolic and ceremonial importance, served to regulate marriage patterns. Marriage was forbidden between members of a clan. The Mohawk and Oneida had 3 such clans; the other Iroquois nations had from 8 to 10 clans. For the most part these clans bore animal names (eg, Bear, Wolf, Turtle, Hawk). The league was governed by a council of 50 sachems, with each of the 5 founding members of the confederacy represented by a delegation of 8-14 members. Each of these positions was hereditary within a matrilineage. The individual tribes and villages were governed by councils of their own sachems and chiefs.

Today, some 50 000 Iroquois are dispersed among several reserves in the US and Canada. Among the largest concentrations of Iroquois in Canada are the Six Nations Reserve near Brantford, Ont, the St Regis Reserve near Cornwall, Ont, and Caughnawaga outside Montréal. *See also* general articles under NATIVE PEOPLE.

PETER G. RAMSDEN

Reading: L.H. Morgan, *League of the Ho-dé-no-sau-nee* or *Iroquois* (1861, repr *League of the Iroquois*, 1962); A.A. Shimony, *Conservatism among the Iroquois at the Six Nations Reserve* (1961); B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

Iroquois Falls, Ont, Town, pop 6339 (1981c), inc 1915, is located NW of NORTH BAY. The town received not only its name but its *raison d'être* from its location at the falls on the Abitibi R, which supplies hydroelectrical power for the community's economic lifeline, the pulp and paper industry. Area timber rights were first granted to the Abitibi Power and Paper Co (today ABITIBI-PRICE INC) in 1912. Abitibi constructed a carefully planned, model COMPANY TOWN 1915-20, the first of its kind in northern Ontario. In the 1920s company president Frank Anson initiated a beautification program that transformed Iroquois Falls into the "Garden Town of the North." The closed company-town phase ended in the 1950s. Historically paralleling the growth of Iroquois Falls was the development of the neighbouring noncompany communities of Ansonville and Montrock, and in 1971 these were amalgamated with Iroquois Falls.

MATT BRAY

Iroquois Wars, a series of 17th-century conflicts involving the Five Nations IROQUOIS confederacy (MOHAWK, ONEIDA, ONONDAGA, CAYUGA and SENECA), numerous other Iroquoian groups and the French. As the Iroquois grew dependent on European trade goods, pressure was exerted on the rich beaver producing areas S of the Canadian SHIELD. After Dutch traders on the Hudson R [NY] provided them with firearms, the Iroquois grew more militant. In 1628 they pushed the Mohicans E, and in the 1630s the Mohawk began to raid the ALGONQUINS in the Ottawa Valley. By the early 1640s the Mohawk and Oneida were attacking NEW FRANCE and raiding the colony's Algonquian and MONTAGNAIS allies throughout the St Lawrence Valley.

By 1642 the French had begun to halt these raids by building a chain of fortified settlements as far upriver as Montréal. The French tried to counter the Mohawk acquisition of muskets by giving muskets to their HURON and Algonquian allies, but the Jesuits persuaded officials to restrict their sale to reliable Christian converts. As a result, the Iroquois had a numerical and psychological advantage.

One of the profound effects of the Iroquois Wars was the dispersal of numerous native groups. The policy of the Seneca was to disperse the Huron, which would leave themselves free to raid the hunting peoples to the N. Their raids, beginning in 1642 with the more isolated Huron villages, culminated in 1649 with over 1000 Seneca and Mohawk attacking 2 main villages. Some Huron tried to hold out on a nearby island but were forced to disband; some fled to Québec and others joined the NEUTRAL. In the winter of 1649-50 the Iroquois attacked the Nipissing and the PETUN. The Neutral were decisively defeated in 1651. With the Huron nation destroyed and the Neutral crushed, the Iroquois increased their raids on the Mohican, Sokoki and ABENAKI, while in Québec they raided as far E as Tadoussac and N beyond Lac MISTASSINI. Faced with stiff resistance from the Susquehannock and the Erie, the Iroquois confederacy entered into peace with the French in 1653. After concentrated Iroquois attacks, the Erie were absorbed in 1657. Renewed hostilities in 1659-60 on a wide front greatly strained the confederacy, and the Iroquois again sought peace with the French. But a treaty embracing all groups was not arranged until 1667, after the CARIGNAN-SALIÈRES REGIMENT had burned Mohawk villages and food supplies. By 1675 the Susquehannock to the S had been absorbed and the Iroquois moved westward into the Ohio Valley, where they fought the Illinois and Miami nations.

The Iroquois succeeded in breaking every one of the groups that surrounded the confederacy. However, the victories did not bring them the prosperity they sought. The treaty of 1667 had allowed the French to extend their trade in the N and, with Louis JOLLIET, they advanced through the Great Lakes to the Mississippi R. In Sept 1680 a large Iroquois force attacked a small French party under Henri de TONTY which was trading in an Illinois village; the Iroquois were persuaded to desist on condition that the French leave the Illinois country. As part of a broader conflict between French and English, the Iroquois attacked Lachine in force in 1689 (*see* LACHINE RAID). However, with the aid of some 1500 TROUPES DE LA MARINE, the defenders eventually forced the hard-pressed Iroquois to make peace. In a treaty ratified July 1701 at Montréal they agreed to remain neutral in wars between the English and French.

Irrigation is warranted where the CLIMATE is essentially arid or semiarid and is characterized by low and unpredictable precipitation (*see* RAIN). In certain areas, such as the southern PRAIRIES, southern BC and SW Ontario, irrigation can be used to supplement limited rainfall to achieve desirable crop yields. In Canada irrigation is a relatively recent phenomenon. Before the 1890s, all irrigation was developed by private individuals. From 1898 to 1915, the major incentive was provided by private investment companies and corporations, including the CANADIAN PACIFIC RAILWAY. Since 1915 provincial governments have helped local communities organize irrigation developments, resulting in rapid increases in irrigated areas. In 1935, the federal government, through the PRAIRIE FARM REHABILITATION ADMINISTRATION, initiated a program to provide technical and financial assistance for the development of individual farm, community or large-scale WATER storage projects throughout the plains area.

About 596 392 ha (1.4%) of Canadian farmland was irrigated in 1981. Statistics Canada reports the total by region as follows: Atlantic provinces, 983 ha; Qué, 5989 ha; Ont, 32 127 ha; Prairie provinces, 456 818 ha; BC, 100 475 ha. The most intensive irrigation development has taken place in southern Alberta where, in 1968, the "cost sharing" phase of irrigation was introduced. The cost of rehabilitation of irrigation systems is now shared; 86% is a provincial responsibility and 14% that of irrigation districts. Other provinces have established different policies.

EGON RAPP



Irrigation ditch near Lethbridge, Alta. Irrigation is necessary on the drier parts of the prairies to ensure desirable crop yields (*photo by Jim Merrithew*).

Irvine, Acheson Gosford, soldier, police officer, prison warden (b at Québec C 7 Dec 1837; d there 9 Jan 1916). The third commissioner of the NWMP, Irvine's reputation was ruined by the NORTH-WEST REBELLION. A businessman active in the militia, he served with the Québec Rifles on the WOLSELEY Expedition. He remained in Manitoba in command of the Provisional Battalion of Rifles until he joined the police in 1875. As assistant commissioner (1876-80) and commissioner (1880-86), he was responsible for policing the Indian tribes while they were settled on reserves. His warnings that the harsh Indian settlement policy could lead to rebellion were ignored. When rebellion broke out in 1885, he led a column of police to Prince Albert where he remained until the end of the fighting. His inaction was widely criticized and he resigned. Subsequently, he was warden of Stony Mountain Penitentiary (1892-1913) and Kingston Penitentiary (1913-14).

A.B. MCCULLOUGH

Irvine, William, Unitarian minister, MP, journalist, political organizer (b at Gletness, Shetland, Scot 19 Apr 1885; d at Edmonton 27 Oct 1962). Irvine played a significant role in

Canadian politics for 50 years, 17 as an MP. He organized Alberta farmers and labour to enter the political arena, and in 1921 was first elected to public office as the federal labour representative from Calgary E. Along with his close friend J.S. WOODSWORTH, at that time the only other labour MP, Irvine conducted a vigorous campaign against the economic power of large corporations and financial institutions. Irvine, Woodsworth and others in the radical GINGER GROUP advocated a form of democratic socialism. Their efforts culminated in the founding of the CO-OPERATIVE COMMONWEALTH FEDERATION (1932). In his later years, Irvine worked tirelessly for world peace and urged the necessity of coexistence among world powers despite differences in ideology. ANTHONY MARDIROS

Reading: Anthony Mardiros, *William Irvine* (1979).

Irving, Kenneth Colin, industrialist (b at Buctouche, NB 14 Mar 1899). Founder of an empire that ranges from pulp and paper and oil refining to publishing and broadcasting, he has been called New Brunswick's first modern entrepreneurial industrialist. He was born into a wealthy Scots Presbyterian family in Kent County, where his father ran a lumber business, and he attended Dalhousie and Acadia universities for short periods before going to England for service in the Royal Flying Corps. After WWI Irving took charge of a Ford motor agency and gas station, and in 1924, after a dispute with Imperial Oil, he borrowed enough money to establish the Irving Oil Co. He expanded rapidly into service stations and garages for storing and repairing cars, and in the 1930s took over bus and trucking companies that were heavily in debt to Irving Oil. By 1936, from his office in the Golden Ball Building in Saint John, he was directing the manufacture of buses and trucks and the purchase of ships and tanks for the transportation of his oil.

On the death of his father in 1933, Irving acquired J.D. Irving Ltd, the family lumber business, and in 1938 he bought Canada Veneers, which thrived on wartime sales to become the world's largest supplier of aircraft veneers. The growth of this company led to the acquisition of the New Brunswick Railway Co for its huge tracts of timberland. With the establishment in 1951 of Irving Pulp and Paper Ltd, Irving dominated the NB timber industry. By then, he also owned a number of Maritime newspapers.

Controversy surrounds the Irving empire. His decision to invest in NB industry has altered the course of that province's development, but his critics claim that his interests have often been served at the expense of the taxpayers and the environment. Irving's domination of the NB media symbolizes for many the negative aspects of the power he wields. Although he settled in Bermuda in Dec 1971, many in the province would still agree with the statement that "K.C. Irving *is* New Brunswick." MARY HALLORAN

Kenneth Colin Irving, founder of an industrial empire that ranges from pulp and paper and oil refining to publishing and broadcasting (*courtesy Canapress*).



Irving Group, controlled by the K.C. IRVING family, dominates 90% of English-language NEWSPAPER circulation in NB. The New Brunswick Publishing Co Ltd, led by K.C. Irving and sons Arthur and James, is the owner and publisher of the *Telegraph Journal* and the *Evening Times-Globe* in Saint John. Another son, John, controls the Moncton Publishing Co Ltd, publisher of the Moncton *Times-Transcript*, and University Press New Brunswick Ltd, publisher of the Fredericton *Gleaner*. The New Brunswick Publishing Co Ltd also owns and controls New Brunswick Broadcasting Co Ltd, which owns and operates CHSJ-TV in Saint John and, through rebroadcasters, provides CBC English-language television to almost all of NB.

This concentration of ownership has been the focus of court action and a CRTC investigation. In 1972, K.C. Irving, Ltd. and associated companies were convicted under the merger and monopoly provisions of the Combines Investigation Act after members of the Irving family had acquired controlling interest in all 5 of NB's English-language newspapers. An appeal in 1975 overturned the conviction and in 1978 the Supreme Court of Canada upheld the appeal decision. In 1983 the CRTC renewed CHSJ-TV and associated licences for only 27 months instead of the normal period of 5 years.

PETER S. ANDERSON

Isaac Todd, a 350-ton ship built in 1811 at Québec for John McTavish, a partner in the NORTH WEST COMPANY. This vessel's mission was to secure Astoria at the Columbia R mouth from the American PACIFIC FUR COMPANY, to annihilate American fur-trade competition on the NORTHWEST COAST, and to initiate NWC trade with China. The *Isaac Todd* sailed 25 Mar 1813 from Portsmouth, Eng, escorted by Royal Navy ships which were assigned to protect her from US warships, since the WAR OF 1812 was in progress. But she was a slow sailer and fell behind her escort. Thus HMS RACOON reasserted British control over Astoria on 30 Nov 1813, about 6 weeks after Nor'Westers approaching overland had purchased the fort from Pacific Fur Co traders. The *Isaac Todd* arrived 23 Apr 1814. She sailed for China Sept 26, initiating the first Anglo-Canadian transpacific trade with China, and she took tea back to England for the EAST INDIA COMPANY. BARRY M. GOUGH

Isbister, Alexander Kennedy, schoolmaster, explorer, lawyer (b at Cumberland House, Rupert's Land [Sask] June 1822; d at London, Eng 28 May 1883). A Métis whose maternal grandmother was Indian, Isbister explored the Mackenzie R basin (1838-42) while employed by the HBC. He published a much-quoted treatise on the geology of portions of the Arctic and northwestern N America. This included the first chromolithograph map produced in England (1855). In 1842 Isbister left for Britain to become a schoolmaster and barrister championing the rights of Métis and country-born against the HBC monopoly. He willed a personal fortune and 5000 books to U of Manitoba. W.O. KUPSCH

Iseler, Elmer Walter, choir conductor (b at Port Colborne, Ont 14 Oct 1927). Iseler is considered the foremost Canadian choir conductor of his time. His international reputation was earned as founding conductor (1954-78) of the FESTIVAL SINGERS, a highly versatile group noted for virtuoso technique and beautifully blended voices, which in 1968 became Canada's first professional choir. Also conductor of the Toronto Mendelssohn Choir from 1964, Iseler has appeared widely in Canada and Europe with both ensembles, performing music of all periods and showing special dedication to the promotion of contemporary Canadian music. In 1978 he founded a new professional choir, the Elmer Iseler Singers. BARCLAY MCMILLAN

Iskowitz, Gershon, painter (b at Kielce, Poland 1921). A survivor of concentration camps at Auschwitz and Buchenwald, Iskowitz studied painting briefly with Oscar Kokoschka in Munich. In 1949 he emigrated to Canada. His first paintings after his arrival in Toronto were dark memories of his past, but gradually he began to paint landscapes, first around Toronto, then in the Parry Sound area. Though his works were at first representational, the landscapes that later developed were abstracted from nature. After a Canada Council grant in 1967 enabled him to take a helicopter ride over Churchill, Man, his abstract paintings became reminiscent of aerial views of the landscape. Building layer on layer of oil paint, Iskowitz delighted in the experience of making the paintings and the joy of the landscapes and the colours. MARILYN BURNETT

Reading: D. Burnett, *Iskowitz* (1982).

Islam, one of the major religions of the world. Its adherents are estimated at over 900 million people concentrated in S and W Asia and N and E Africa. It is the fastest-growing religion, with believers found worldwide. The word "Islam" is derived from the Arabic *silm*, meaning submission, obedience, surrender and peace. Followers of Islam, called Muslims (Moslems), believe that Islam is the religion of God (Allah), which he ordained for the guidance and benefit of humanity. To accept Islam is to choose to live life according to the revealed will of God, to surrender the self to his mercy and strive to maintain righteousness in the world. Individual and communal obedience to the tenets of the faith, coupled with Islam's message that all men are equal, leads to the elimination of discord. The teachings of Islam are grounded in the Qur'an (Koran), the scripture Muslims believe to have been revealed by God through the angel Gabriel, in Arabic, to the Prophet Muhammad between 610 (when he was 40 years old) and 632 AD (the year of his death). These teachings distinguish between the practice and the beliefs of Islam. For although Islam has no clergy and no sacraments, it does require certain ritual practices in obedience to God's commandments. Often referred to as the "Pillars of Islam," there are 5 acts of worship incumbent on all believers at appropriate times. To avoid formalism, each is to be approached with a conscious purification of intent that recognizes God's lordship over the world.

All acts of worship are Islam. The *Shahadah* (affirmation of faith) is repeated daily: "I bear witness that there is no god but God and that Muhammad is the Messenger of God." It attests commitment to a radical monotheism, specifying that the revelation to Muhammad is the final truth. It is whispered in the ear of the newborn to remind him of a primordial covenant made by each individual with God and in the ear of the deceased in preparation for the questioning of the grave. *Salat* (ritual prayer) is prescribed for all believers 5 times a day (at dawn, noon, afternoon, at dusk and evening). Its performance stamps daily life with a steadfast devotion to God. It is to be preceded by ablutions requiring the washing of hands, mouth, nostrils, face, arms (up to the elbow), head, ears, neck and feet (up to the ankle). The believer must remove his shoes and be properly clad: women must cover the whole body except for face and hands, and men must cover at least



Islamic temple in London, Ont. In 1981 there were 98 000 Muslims in Canada, from over 60 countries (*courtesy Canapress*).

from the navel to the knees. The prayer involves standing, bowing, kneeling and prostration.

Zakat (the tithe) is perceived as an act of purification. The Qur'an teaches that prayer and tithing are irrevocably bound together. One's commitment to God is incomplete without the fulfilment of responsibility toward the community. The tithe is assessed at 2.5% of one's total assets and is to be given to the poor, orphans and widows. During *Sawm* (fasting the lunar month of Ramadan, 29-30 days) believers refrain from food, drink and sex from before dawn (when one cannot distinguish a white thread from a black thread) to dusk. Fasting is a time of repentance and discipline; it binds the community together in a shared experience of deprivation as well as gratitude and celebration at the end of the day. *Hajj* (pilgrimage to Mecca) is incumbent on believers who can afford it at least once in their lifetime. It commemorates Abraham's obedience to God and his willingness to sacrifice his son. The ceremony begins with repentance and the donning of 2 pieces of white cloth; it includes abstention from worldly pleasures, meditation at Mt Arafat, pelting the devil, offering a blood sacrifice, cutting the hair and nails and circumambulation of the Kaaba, the central building of the mosque at Mecca.

The essential credal statement of Islam as it appears in the Qur'an specifies belief in God, his messengers, his books, the angels and the Last Day. God is the Lord of the world who reveals himself in nature and history. He has provided humanity with guidance through prophets and messengers beginning with Adam and ending with Muhammad. Each messenger was entrusted with a book (eg, Moses with the Torah, Jesus with the Gospel), all of which were falsified by their followers. The Qur'an, God's revelation to Muhammad, is preserved in perfect form; it stands in judgement of all previous scriptures.

The Qur'an teaches that God created the angels, his servants, out of light. Gabriel brings revelation, Izrail causes death, Munkar and Nakir question the dead, Michael blows the trumpet announcing Resurrection. Muslims believe that on the Day of Judgement all humans will give account for every intent, thought and act. The righteous will be rewarded in the Garden while the wrongdoers will be consigned to fire.

Islam in Canada The 1981 census shows over 98 000 Muslims in Canada, from over 60 countries, speaking a variety of languages and adhering to their respective ethnic cultures. This Islamic mosaic is the consequence of various factors, including changes in Canadian IMMIGRATION policies as well as the economic and political upheavals affecting Muslims in their home countries. Over 60% of Muslims in Canada are foreign-born, having immigrated during the last 20 years. The 1871 census recorded only 13 Muslims. Their number had increased to 645 by 1931, mostly from Lebanon, Albania, Syria, Yugoslavia and Turkey. The influx of immigrants after WWII raised the number to 33370 by 1971. The majority of this wave were highly educated, westernized professionals who came to settle in Canada to share in its economic prosperity. They were mostly from Lebanon, Syria, Indonesia, Morocco, Palestine, Egypt, Iraq and the Indo-Pakistani region. In 1966-70 those of Indo-Pakistani background became the majority as thousands of unskilled labourers came to Canada to escape discrimination in East Africa and Britain. More recently arrived Muslims include unskilled workers from S Lebanon, fleeing their war-torn country, and political REFUGEES from Iran and Afghanistan. Early settlements were concentrated in Ontario and Alberta, with a shift towards Québec in the 1930s. Those arriving in Canada since the 1960s have settled in urban areas. Two-thirds of all Muslims now live in Ontario, with others dispersed throughout the nation.

The first Canadian mosque was built in Edmonton in 1938. Other mosques and centres were not organized until the 1950s, in major urban areas including Hamilton, Toronto, Calgary, London, Montréal, Windsor, Vancouver, Ottawa and Halifax. Additional Islamic centres followed in the 1970s in Winnipeg, Thunder Bay, Sudbury, Brantford, Cambridge, Regina, Saskatoon, Waterloo, Kingston, Wellington, Niagara Falls, Lac La Biche, Dartmouth, Sault Ste Marie, Saint John, Kitchener, Sarnia and Truro.

The majority of Muslims in Canada are Sunnis with a substantial number of Shia and adherents of other sects. The differences among the groups reflect early political divisions in Islamic history. Sunnis are those who live according to the guidance of the Qur'an and the teachings of Muhammad. The Shia believe that Ali (Muhammad's son-in-law) was designated as his successor, and that leadership of the community is restricted to his descendants. Both groups believe that the revelation through prophets has ceased, the Shia, however, accepting Imams as divinely ordained leaders providing a continuing source of Muslim doctrine. The majority of the Shia in Canada are Ismailis (estimated at 22 000), whose present leader is the Agha Khan. The Twelver Shias believe that with the disappearance of the Twelfth Imam in 878 AD the



Muslims in Ottawa bow in prayer at the festival of thanksgiving that ends the month-long fast of Ramadan (*courtesy Canapress*).

leadership of the community is in the hands of the religious leaders, the Mujtahids. Their opinion is currently sought from the centres in Iraq and Iran. Other Islamic groups in Canada include Sufis (followers of the mystic traditions) and sects that are deemed non-Islamic by the majority, such as the Druze, the Alawis and the Qadyanis.

For Sunni Muslims Canada offered a special challenge since they lacked designated leadership. Efforts at organization are principally at the local level. The Federation of Islamic Associations of the US and Canada was formed in the 1950s by second-generation Muslims of Arab background. With headquarters in Detroit, it has sought ways to help American-born Muslims maintain their Islam. In 1962, the Muslim Student Assn was formed to instill Islamic consciousness in Muslim students in N America. A number of its alumni have opted to remain in Canada, forming the independent Council of Muslim Communities in Canada in 1972. The Council's early leaders were Pakistani professionals, who attempted to integrate Muslims of other ethnic and linguistic groups. Its objectives have changed, from forming links between Canadian Muslims and other national and international groups to organizing youth camps, providing scholarships for Muslims and publishing school textbooks and books on Islam for use by parents. The Council of Muslim Communities of Canada (CMCC) joined the Council of Masajid (with headquarters in Saudi Arabia) in 1982.

Attempts by second- and third-generation Muslims to integrate into Canadian society are not welcomed by recent immigrants. Islamic law has provided over the years a description of what constitutes Islamic behaviour to the minutest detail. This the immigrant finds hard to implement because of the pressures of what some consider to be a "Christian" and others a "materialistic" environment in Canada. There are no public reminders for prayer 5 times a day, nor are allowances made by employers for fasting. Some Muslims question the need to pay the tithe since the Canadian government takes care of the poor and the widows through tax money. Islamic prohibition of usury raises the fear that paying interest on purchases is disobeying God. Islamic dietary restrictions against consumption of improperly slaughtered meat, of pork and pork by-products and of liquor cause concern since they impede social integration, perceived by Canadians as necessary for professional promotion. The area of greatest stress appears to be in male-female relations, since Islam teaches that there should be a segregation of the sexes and that Muslim women cannot marry non-Muslims. Islamic laws respecting personal status (marriage, divorce, inheritance) are not in complete harmony with Canadian laws, a circumstance which leads to numerous problems.

The Islamic organizations are attempting to deal with these problems. The CMCC has sought support from other Canadian organizations for the implementation of certain Islamic laws in the Canadian settings. Efforts are also made to establish good relations with other religious organizations through Christian-Muslim and Christian-Muslim-Jewish dialogue. Islam West Associates aims at promoting mutual understanding between Muslims in Canada and all other Canadians. Efforts also focus on sensitizing Canadian society to the prejudicial content of educational material in textbooks and SUNDAY-SCHOOL texts.

There have been efforts recently to acquaint Canadian society with the Islamic contribution to culture, science and art. Travelling exhibits as well as videotape presentations have been prepared and a speakers' bureau has been organized. While welcoming the opportunities that Canadian human rights provide for Muslims, as well as the support of multiculturalism, Muslim leaders continue to voice concern over Canadian foreign policy in the Middle East and against prevailing social discrimination and underemployment of Muslims. YVONNE Y. HADDAD

Reading: S.A. Nigosian, *Modes of Worship* (1981); E.H. Waugh, B. Abu-Laban and R.B. Qureshi, eds, *The Muslim Community in North America* (1983).

Island, a piece of LAND surrounded by WATER. By custom it is agreed that this definition does not apply to the 5 largest pieces of land that form the continents (*see* PLATE TECTONICS). The largest island in the world is Greenland (2 175 596 km²); the largest in Canada is Baffin I (507 451 km²). Seventeen other Canadian islands exceed 10 thousand km² in area. The islands lying N of the mainland in the District of Franklin, NWT, are generally referred to as the Canadian ARCTIC ARCHIPELAGO. They include the QUEEN ELIZABETH ISLANDS, those lying N of the strait (known successively from W to E as M'Clure Str, Viscount Melville Sound, Barrow Str and Lancaster Sound) that extends E-W approximately along 74° N lat. MANITOULIN ISLAND (2766 km²), the largest island in the world located in a freshwater lake (as distinct from a flowing river), itself contains 17 lakes containing islands.

The total number of islands in Canada has never been established, but it is very large. It is estimated that there are some 30 000 islands along the eastern shore of GEORGIAN BAY alone (the Thirty Thousand Is). The *Canadian Gazetteer Atlas* (1980) records the names of 1016 individual islands and 129 groups or archipelagoes. Of these islands, 259 were recorded as inhabited in the 1976 Census of Canada. At that time, Île de Montréal had the greatest population (1 869 641); the 1981 census lists the population as 1 760 122.

Origin of Islands Islands are formed through a variety of geomorphic processes. Canadian islands fall into 2 categories: those resulting from the action of running water on an upland that has recently undergone GLACIATION, and those formed by the rise in sea level that normally follows an ICE AGE. GLACIERS and ice sheets are able to scoop hollows out of hard rock. If an ice age is followed by a humid period, the hollows will be filled with lakes; if the surface is sufficiently irregular, islands will occur within the lakes. The islands of the GREAT LAKES belong to this class. When large RIVERS flow over an irregular, glaciated surface, their channels may divide to form islands (eg, those on which the cities of Montréal and Laval are found, and also the Ile d'Orléans). Ice not only scoops out hollows by EROSION, it also deposits as till the material it has gathered up. The till can form natural dams impeding the flow of the rivers that drain a land surface where ice has melted. Irregularities left in glacial till may then form islands in the lakes ponded behind such dams (eg, those in Rice Lk, 95 km NE of Toronto). The second major group of islands, those formed by the rise in sea level following an ice age, include the uncounted islands of Canada's Pacific, Arctic and Atlantic coasts. In most cases, the erosional action of ice causes the irregularities in the land surface that result in islands as the margins of a continent are flooded. Some islands, however, result from the deposition of till (eg, those near LUNENBURG in Mahone Bay, NS).

Islands are also formed by the deposition of alluvium where the flow of water in a river is checked at or before the DELTA (eg, Lulu and Sea islands at the mouth of the Fraser R), and by the drifting of sand and gravel along seashores or lakeshores (eg, Toronto I). In some parts of the world, islands have been formed by the eruption of VOLCANOES and by the growth of CORAL. No examples of either type occur in Canada. Finally, islands can result from human action. One, René-Levasseur (2020 km²), was formed when the waters of Lk Manicouagan, rising behind the Daniel Johnson Dam, surrounded Mt Babel (elev 952 m). Approximately three-quarters the size of Manitoulin, it is the largest island in Canada formed by human activity, and may be the largest such island in the world. *See* COASTAL LANDFORM; PHYSIOGRAPHIC REGIONS; RIVER LANDFORM. O.F.G. SITWELL

Largest Canadian Islands

*Name**	*Area (km²)*	*General location*
BAFFIN	507 451	S Arctic Archipelago
VICTORIA	217 290	S Arctic Archipelago
ELLESMERE	196 236	Queen Elizabeth Is
NEWFOUNDLAND	108 860	Atlantic Coast
BANKS	70 028	S Arctic Archipelago
DEVON	55 247	Queen Elizabeth Is
AXEL HEIBERG	43 178	Queen Elizabeth Is
MELVILLE	42 149	Queen Elizabeth Is
SOUTHAMPTON	41 214	Hudson Bay
PRINCE OF WALES	33 338	S Arctic Archipelago
VANCOUVER	31 284	Pacific Coast
SOMERSET	24 786	S Arctic Archipelago
BATHURST	16 042	Queen Elizabeth Is
PRINCE PATRICK	15 848	Queen Elizabeth Is
KING WILLIAM	13 111	S Arctic Archipelago
ELLEF RINGNES	11 295	Queen Elizabeth Is
BYLOT	11 067	S Arctic Archipelago
CAPE BRETON	10 311	NS

* Small caps denote separate entries

Island Lake, 1222 km², elev 227 m, maximum length 97 km, is located in E-central Manitoba close to the Manitoba-Ontario border and about 200 km E of Lk WINNIPEG. Dotted with numerous small islands and having a heavily indented shoreline, it is fed by Bigstone and Cantin lakes and the Mainland, Isbister and Sagawitchewan rivers, and drains N, via Gods Lk and the Gods and HAYES rivers, into Hudson Bay at York Factory. The Hudson's Bay Co established a trading post on the lake as early as the 1820s. In the 1920s discoveries of gold-bearing ore were made in the lake's surrounding area. DAVID EVANS

Italian Writing From its beginning in the 1940s, Italian Canadian writing has existed in English, French and Italian. Mario Duliani's *La Ville sans femmes* (1945) appeared in both French and Italian. Gianni Grohovaz and Guglielmo Vangelisti, who published in the 1950s in Italian, were followed by authors who participated in both the growth of Canadian literature and the flowering of MULTICULTURALISM, thus making an impact on mainstream English and French Canadian writing. The bilingual tradition continued with Alexandre Amprimoz's *Selected Poems* (1979) and *Sur le damier des tombes* (1983), Filippo Salvatore's *Suns of Darkness* (1980), Romano Perticarini's *Quelli della fionda* (1981) and Maria Ardizzi's *Made in Italy* (1982). Poets, who outnumber novelists, have received awards and recognition through inclusion in major anthologies. Narrative verse in Pier Giorgio Di Cicco's *The Tough Romance* (1979), Mary Di Michele's *Mimosa and Other Poems* (1981) and George Amabile's *The Presence of Fire* (1982), and work by Len Gasparini and Antonio Corea show strong autobiographical elements.

In fiction the need to chronicle the immigrant experience is demonstrated; thus Frank Paci's *The Italians* (1978), *Black Madonna* (1982) and *The Father* (1984) are novels in the realist tradition. Caterina Edwards's *The Lion's Mouth* (1982) explores women's views on ethnic identity, whereas the anecdotal stories of C.D. Minni and Gianni Bartocci highlight the ironies and joys of life. Fiction is complemented by the historical studies of Robert Harney, Bruno Ramirez and Camillo Menchini.

Québec poets Fulvio Caccia, Mary Melfi, Antonio D'Alfonso and Tonino Caticchio focus on ethnic identity. Dominique De Pasquale's plays in French and Marco Micone's *Gens du silence*

(1982) explore linguistic and political relationships. The anthologies *Roman Candles* (1978, ed Di Cicco), *Quêtes* (1983, ed Caccia and D'Alfonso) and *Italian Canadian Voices* (1984, ed Di Giovanni) include many other Italian Canadian writers. *See* ETHNIC LITERATURE. JOSEPH PIVATO

Italians The earliest Italian contact with Canada dates from 1497, when Giovanni Caboto (John CABOT), an Italian navigator from Venice, explored and claimed for England the coasts of Newfoundland or Cape Breton I. In 1524 another Italian, Giovanni da VERRAZZANO, also explored part of Atlantic Canada for France. Under the French regime, the Italian Henri de TONTY acted as La Salle's lieutenant in the first expedition to reach the mouth of the Mississippi R in 1682. Italians served in the military of New France (eg, in the CARIGNAN-SALIÈRES REGIMENT), in which several distinguished themselves as officers. Some Italians also served with the DE MEURON and de Watteville Swiss mercenary regiments in the British army during the War of 1812. Following the example of Italian exsoldiers in New France who settled on the land in the late 17th century, some 200 or more of the mercenaries took up lots granted by Britain.

By the late 18th century, a small number of Italians, many in the hotel trade, resided in Montréal. In the mid-19th century, Italian craftsmen, artists, musicians and teachers, primarily from northern Italy, immigrated to Canada. By the 1860s, Italian street musicians (hurdy-gurdy men, street singers) were seen in Canada.

In 1897 Mackenzie KING, then a journalist, described the first street entertainer who lived in Toronto in the 1880s. This early Italian immigrant, King wrote, had worn out 5 street pianos and earned an average of $15 daily in his first years in Toronto. Some of the wandering street musicians eventually settled down to teach music or to organize bands and orchestras.

In the late 19th century, millions of peasants migrated to S America, the US and Canada. Professional recruiters and the example of successful migrants who returned to Italy encouraged Italians to set out for N America where work was available on the railways, in mining and in industry.

Although many Italians expected to achieve economic and social well-being by migrating to Canada, they were not always successful. In 1901 a series of articles appeared in a Milanese newspaper describing an unscrupulous system of recruitment from Chiasso on the Swiss-Italian border to Liverpool through Montréal to the Canadian North. Labourers were often misled through this system to permanent migration to labour camps in northern Ontario, or found themselves unemployed and destitute in Canada's major cities. In 1902 the General Commissariat for Emigration in Rome sent Egisto Rossi, a commissioner, to tour Canada and report on the situation of working Italians. Rossi documented even more common routes of recruitment through the US, especially New York, and confirmed that several powerful *padroni* (labour agents) in Montréal were in league with railway and steamship agents in Europe to recruit cheap labour for a quick cash return. Rossi concluded that the abuses suffered by Italians were grave enough that their migration should be suspended until the problem of exploitation was addressed.

Origins Over 75% of Italian immigrants to Canada have come from southern Italy, especially from the regions of Abruzzi-Molise and Calabria, and about 75% of these immigrants were small-scale farmers or peasants. Unlike northern Italy, which dominated the newly formed (1861-70) Italian state, and continued to industrialize, southern Italy remained rural and traditional. Overpopulation, the fragmentation of peasant farms, poverty, poor health and poor educational conditions, heavy taxation, political dissatisfaction resulted in heavy emigration. After WWII the number of immigrants from the war-devastated northeastern part of Italy increased. By 1881 almost 2000 people of Italian origin lived in Canada, particularly in Montréal and Toronto. Large numbers of Italian labourers began arriving at the turn of the century.

Early Migration and Settlement Italian immigration to Canada occurred in 2 main waves, from 1900 to WWI and from 1950 to 1970. During the first phase, 119 770 Italians entered Canada (primarily from the US), the greatest number in 1913. About 80% of these people were young males. The 1911 census of Italian-born in Toronto listed 2200 males and 800 females, most of them resident in "Little Italy." Many labourers eventually decided to settle permanently in Canada and by WWI, Italians were to be found not only in major urban centres but in Sydney (NS), Welland, Sault Ste Marie and Copper Cliff (Ont) and Trail (BC).

Thousands of Italian labourers, however, settled in the growing cities of central Canada, working as construction and factory workers and building tradesmen, as food and fruit merchants or artisans. Out of modest beginnings, a few, eg, Onorato Catelli of Montréal in the food-processing industry and Vincent Franceschini of Toronto in road construction, were highly successful.

While the great majority of immigrants settled in urban centres, agricultural colonies were established at Lorette, Man, and Hylo, Alta. In the Niagara Peninsula and Okanagan Valley Italian proprietors of orchards, vineyards and vegetable farms prospered. Many Italian truck farmers on the cities' outskirts grew small crops for local consumption.

Despite tighter immigration restrictions following WWI, over 29 000 Italians entered Canada by 1930. Many of them were farm labourers or wives and children sponsored by breadwinners in Canada. This movement, however, virtually ended with the Great Depression.

Throughout the 1930s strong family networks and thrift helped Italian Canadians absorb some of the economic shock of unemployment and deprivation. Their problems were compounded after 1935 when Canadian hostility towards FASCISM was directed against Italian Canadians, many of whom were sympathetic towards Mussolini. As a consequence of Italy's alliance with Germany in WWII, Italian Canadians were designated "enemy aliens" and were the victims of widespread PREJUDICE AND DISCRIMINATION. Men lost their jobs, shops were vandalized, civil liberties were suspended under the War Measures Act, and hundreds were interned at Camp Petawawa in northern Ontario. While some of these men had been active fascists many were not, and they, as well as their families, who were denied relief, bore the brunt of hostilities. As a result, many Italians later anglicized their names and denied their Italian background.

After WWII the widespread shortage of labour caused by a booming economy, as well as Canada's new obligations within NATO, once again made the country receptive to Italian immigration. Postwar immigrants comprise almost 70% of the Italian Canadian group. Many Italians initially immigrated under the auspices of the Canadian government and private firms. The Welch Construction Co, for example, which was founded at the turn of the century by 2 former navvies, Vincenzo and Giovanni Veltri, specialized in railway maintenance. Men often arrived under one-year contracts to do hard physical labour similar to their earlier compatriots, though now the great majority came as permanent settlers, later sponsoring wives, children and other relatives. Family "chain migration" from Italy was so extensive that in 1958 Italy surpassed Britain as a source for immigrants. Starting in 1967, new immigration regulations based admissibility on universal criteria such as education; this "points system" restricted the sponsorship of relatives, so that Italian immigration dropped significantly.

Settlement and Economic Life In 1981, 65% of Italian Canadians lived in Ontario, 22% in Québec and 7% in BC. About 95% of Italian Canadians live in towns and cities. The most significant concentrations are in Toronto, where in 1981 Italian Canadians numbered 297 205 (10% of the population), and in Montréal, where they numbered 156 535 or almost 6% of the population. Other cities in which Italian Canadians numbered 10 000 or more were (in descending order) Hamilton, Vancouver, St Catharines, Windsor, Ottawa, Sault Ste Marie, Calgary and Edmonton.

In cities where Italians have settled in sufficient numbers they have tended to create ethnic neighbourhoods. These "Little Italies," with their distinctive shops, restaurants, clubs and churches are easily recognizable, but have rarely been ghettos segregated from the rest of society. Over the years, these immigrant areas have decreased significantly in size, though they have generally survived as viable socioeconomic centres. While the movement out of immigrant neighbourhoods to more prosperous residential areas has been significant, even in the suburbs it is still common to find small concentrations of Italian Canadians who have chosen to live near one another because of kinship or village ties.

Three-quarters of post-WWII immigrants were employed in low-income occupations, but this changed dramatically with the second and subsequent generations. The children of immigrants have achieved a higher level of education, reflected in their increasingly important positions in professional and semiprofessional occupations. Also, by 1971, 77% of Italian immigrants owned their homes.

Community Life Mutual-aid societies, many of which grew out of village organizations, were among the earliest institutions established by Italian immigrants. The Order of Italy (the first Canadian branch was established in Sault Ste Marie in 1913) was open to all of Italian heritage. In 1926 some Québec lodges, opposed to the order's profascist leanings, broke away to form a parallel structure which in 1926 became the Order of Italo-Canadians. Wartime hostilities inhibited the work of the societies, but their decline was really made inevitable by the growing influence of the WELFARE STATE and insurance companies.

After WWII, numerous new clubs and societies organized around regional, religious, social or sporting functions were established. In the early 1960s the Centre for Organizing Technical Courses for Italians (COSTI) was founded in Toronto to provide technical education and upgrading, as well as English courses and counselling. In the mid-1970s, it also established a special program to meet the needs of immigrant women.

In 1971 the Italian Canadian Benevolent Corporation (ICBC) was founded in Toronto. Undertaking what was the largest project of its kind in N America, the ICBC built a multifaceted complex with senior citizens' housing and a community centre offering recreational, cultural and social services.

The founding in Ottawa in 1974 of the National Congress of Italian Canadians was an attempt to bring national cohesion to the group and increase its political influence. The congress co-ordinated the raising of millions of dollars from across Canada to provide relief for the victims of earthquakes that devastated Friuli in 1976 and Campania a few years later. Notwithstanding recent success in forging community-

wide cohesion, however, Italian Canadians are divided by rival regional, political and even religious organizations, and along class lines. The Canadian Italian Business and Professional Men's Association and the Italian Chamber of Commerce represent the interests of employers and professionals, while working-class Italian Canadians have sought to protect their interests through the various organized labour movements. Comprising a conspicuously large proportion of the labour force in both the construction and textile industries, they have been especially prominent in the International Labourers Union and the Amalgamated Clothing Workers of America.

Cultural Life Like the major community organizations, the Italian Canadian press and media have also promoted cohesion and mediated between their constituency and the wider society. The first Italian newspaper in Canada was published in Montréal in the late 19th century; by 1914 several others had been founded from Toronto to Vancouver. After 1950, dozens of Italian newspapers and magazines, many aimed at particular regional, religious or political markets, proliferated across Canada. By the mid-1960s, Italian-language publications had a readership of 120 000. Currently the most influential of these are *Il Corriere Italiano* of Montréal and *Il Corriere Canadese* of Toronto.

Since WWII, Italian has become, after English and French, the most widespread language in Canadian broadcasting. The owner of *Il Corriere Canadese* has launched a multilingual television station in Ontario which transmits in Italian (as well as other languages) daily.

Italian Canadians have altered society's tastes in architecture, fashion and recreation, thus helping to bring a new cosmopolitanism to Canadian life. They have also made important contributions to the arts. Mario BERNARDI of Kirkland Lake, Ont, for example, was appointed the first conductor of Ottawa's National Arts Centre Orchestra in 1970 and helped guide it to international stature. The avant-garde paintings of Guido MOLINARI of Montréal now hang in leading galleries. At the more popular level, Bruno Gerussi, a former Shakespearean actor, has become a well-known radio and television personality (*see also* ITALIAN WRITING; ETHNIC LITERATURE).

Education and Religious Life Dante Alighieri societies throughout Canada offer films, lectures, Italian-language courses and other programs to foster knowledge of Italy. In 1976 the Canadian Centre for Italian Culture and Education (*CENTRO*) was founded in Toronto to design and institute Italian-language programs in schools. Also important are the cultural institutes run by the Italian government, the Italian-language holdings of public libraries, and the many Italian clubs in high schools and universities. By the mid-1970s, almost half of Canada's 45 universities taught Italian.

Over 90% of Italian Canadians are Roman Catholic, and the church has involved itself in immigrant aid, education and recreation. Since there have been many Italian-speaking priests, especially in the national parishes run by orders such as the Servite or Fransciscan fathers, the church has also contributed toward the preservation of Italian Canadians' language and culture (*see* CATHOLICISM).

Politics In 1938 Hubert Badanai of Fort William (later called Thunder Bay) became the first mayor of Italian background and in the early postwar years was elected the first Italian federal member of Parliament. In 1952 Philip Gaglardi of Mission City, BC, appointed to the provincial Cabinet, was the first Italian Canadian to become a minister. In 1973 Laura Sabia, a former St Catharines alderwoman, became chairperson of the Ontario Status of Women Council and a leading activist in the women's movement. In 1981 Charles Caccia was appointed minister of labour, the first federal Italian Canadian minister. Italian Canadians have been most successful federally as candidates for the Liberal Party, and in Ontario as candidates for the New Democratic Party. In the 1984 federal election the Progressive Conservative Party made gains among the group, especially in Québec where 2 Montréal candidates of Italian background were elected.

Group Maintenance The most immediate and significant social institution among Italian Canadians has been the extended family. In the traditional family in Italy, the husband was considered family head and provider; the wife was expected to be a good homemaker and mother. Children were to show obedience and respect towards their parents. Each member was to act for the betterment of the whole family rather than for his or her individual interest. Many Italian immigrants have attempted to maintain such family patterns. Because traditional ways differed markedly from what was expected in the wider Canadian society, the resulting conflict has often been at the root of many social problems. At times the children of immigrants have found that their aspirations for upward mobility and individual expression conflicted with the family's insistence on solidarity and the fulfilment of traditional roles. The second generation Italian Canadian family, however, has changed considerably. While usually maintaining an emphasis on family cohesion, respect and loyalty, it has increasingly moved toward a greater equalization of roles between husband and wife.

Prewar Italian Canadians, by 1941, had a higher rate of intermarriage (45%) than most other major ethnic groups. In the postwar group, by 1961, almost 24% of males and 18% of females were married outside the group. In Québec, Italian Canadians integrate more easily into the francophone society than do many other ethnic groups. Over 80% of Italian Canadians are able to speak French, giving them one of the highest levels of French-language facility of any ethnic group in the province. FRANC STURINO

Reading: R.F. Harney, *Italians in Canada* (1978); H. and J. V. Scarpaci, eds, *Little Italies in North America* (1981); A.V. Spada, *The Italians in Canada* (1969).

Ittinuar, Peter Freuchen (b at Chesterfield Inlet, NWT 19 Jan 1950). The first Inuk MP, Ittinuar is the grandson of Danish explorer Peter Freuchen. He has had a varied and colourful career as teacher of Inuktitut linguistics and Inuit culture at U of Q, executive director of the Inuit Tapirisat of Canada, CBC announcer, northern medical counsellor, pilot and hunter. After his election to the Commons in 1979 as the member for Nunatsiaq and his re-election the following year, he became the northern development critic for the New Democratic Party. In 1982 he crossed the floor to join the Liberal Party, where he directed his attention to the establishment of Nunavut, one of the 2 territories to be created by the proposed division of the Northwest Territories. Ittinuar was defeated in the Sept 1984 federal election. JOHN BENNETT

Jack, William Brydone, mathematician, astronomer, educator (b at Trailflatt, Scot 23 Nov 1817; d at Fredericton 23 Nov 1886). An outstanding natural scientist and educator, Jack built the first astronomical observatory in Canada on the campus at UNB, Fredericton, in 1851, now named the Brydone Jack Observatory. In 1854 at UNB (professor 1840-85, president 1861-85), Jack introduced an engineering course to train students in practical surveying. Two decades later he established the first "standards laboratory" in Canada for surveying instruments. He gave numerous public lectures on ASTRONOMY and related topics. Under his distinguished presidency, UNB became a centre of excellence and produced many outstanding Canadian scholars.

J.E. KENNEDY

Jackman, Henry Newton Rowell, financier (b at Toronto 10 June 1932). Educated at Upper Canada College, U of T and the London School of Economics, Jackman in 1984 was head of the family group of companies, assembled by his father, that includes E-L Financial Corp, Empire Life Insurance Co, National Victoria and Grey Trust, Dominion and Anglo Investment Corp, the Casualty Co of Canada and Dominion of Canada General Insurance. From 1978 to 1983 he was a VP, director and member of the executive committee of ARGUS CORP, the Toronto conglomerate which he and Conrad and Montagu BLACK took over. He is a director of Hiram Walker Resources, chairman of Algoma Central Ry and member of the board of several other corporations.

JORGE NIOSI

Jackman, William, sealing captain, sailing master (b at Renews, Nfld 20 May 1837; d at St John's 25 Feb 1877). William, like his famous brother, Capt Arthur Jackman, was at an early age involved in the Labrador cod fishery and at the seal hunt. From 1867 to 1876 he was in charge of 2 Bowring Brothers sealing steamers. He is remembered for the dramatic sea rescue at Spotted Is, Labrador, on 9 Oct 1867, which is one of the greatest stories of heroism ever recorded. In harbour to ride out a storm, Jackman went ashore, where he saw a wooden fishing vessel, the *Sea Clipper*, being dashed to pieces on a reef some distance from shore. Jackman threw himself into the icy water and, though battered by the surf, was able to rescue 11 of the 27 aboard unassisted. Then, with a rope and the help of others, he swam out 16 more times to bring the remaining men and women ashore.

JOHN PARSONS

Jackson, Alexander Young, painter, writer (b at Montréal 3 Oct 1882; d at Kleinburg, Ont 5 Apr 1974). As a leading member of the GROUP OF SEVEN, Jackson helped to remake the visual image of Canada; as a sparkling storyteller, he ensured the Group's notoriety. His early art training was partly on the job (he worked at various lithography firms in Montréal 1895-1906 and Chicago 1906-07) and partly at night schools, including the Council of Arts and Manufacturers in Montréal 1896-99 under Edmond DYONNET. Anxious to become a painter rather than a commercial artist, Jackson saved assiduously and in Sept 1907 enrolled in the Académie Julian, in Paris, under Jean-Paul Laurens. He stayed in Europe until Dec 1909, studying, travelling and sketching.

Soon after his return to Montréal, Jackson painted *Edge of the Maple Wood*, a canvas that brought him in contact with his future friends in the Toronto-based Group of Seven. Fed up with advertising work and Montréal's indifference to his painting, Jackson moved to Toronto in the fall of 1913. Soon he was sharing his studio with a shy, uncertain painter, Tom THOMSON. The 2 quickly became firm friends, to their mutual advantage: Jackson taught Thomson aspects of technique, especially colour, while Thomson taught Jackson about the Canadian wilderness. Anxious to experience Thomson's north country, Jackson went up to Canoe Lk in Algonquin Park in Feb 1914. Here he found not only excellent painting country, but also an image of Canada. After a trip to the Rockies, he was back in the park that fall with Thomson, Arthur LISMER and Fred VARLEY, and painted *The Red Maple*, a sketch in which art-nouveau composition is balanced by bold coloration.

In 1915 Jackson enlisted in the army and was sent to Europe. Two years later he was appointed an artist with the Canadian War Records and was immediately required to paint a portrait, despite his lack of experience with such themes. His subsequent works were more in keeping with his preference for landscape. Back in Canada in 1918, Jackson continued his perambulations, a tradition he maintained all his life. He spent the summer of 1919 painting in Georgian Bay, and in Sept joined Lawren HARRIS, J.E.H. MACDONALD and Franz JOHNSTON in a boxcar trip into Algoma. These and subsequent expeditions provided the material for the first Group of Seven exhibition held in Toronto in May 1920. Jackson's active participation in 7 other Group exhibitions and in many contemporary shows, including the controversial British Empire Exhibition in Wembley, Eng, 1924, ensured that his images of a rolling, unpopulated land became indelibly imprinted on the Canadian consciousness.

All his life Jackson remained a leading proponent of the Group's land-based nationalism. Once his painting style was established it shifted only to accommodate newly explored territory. Never abandoning his interest in landscape, he painted Canada's most distinct and identifiable climates, especially favouring winter, and sought remote regions, including the Arctic, which he visited in 1927 and 1930. But he frequently returned to the gentler regions of his youth, including Québec and Georgian Bay. In Québec in 1926, he painted *Barns*, a canvas that exemplifies his use of simple, curvacious forms and temperate colour to present a powerful, enduring image. Jackson was also one of the Group's most effective propagandists. In numerous articles and in his engaging autobiography, *A Painter's Country* (new ed 1976), all written in appealingly colloquial language, Jackson gently presses home his nationalistic vision.

ANN DAVIS

Jackson, Clarence Shirley, trade union leader (b at Ft William [Thunder Bay], Ont 1906). Jackson worked first in the northern Ontario bush and later in Montréal and Toronto. His interest in left-wing politics brought him into organizing work for the fledgling Congress of Industrial Organizations. In 1937 he became a full-time organizer and later Canadian VP of the United Electrical Workers (UE), one of the most internally democratic of the new industrial unions in Canada. Despite his internment for his radical politics in 1941, he led left-wing opposition to the Canadian Congress of Labour (CCL) leadership in the 1940s, running several times for president. The CCL expelled his union in 1949, but Jackson and his fellow unionists held their membership together and by 1972 had reentered the mainstream by affiliating with the Canadian Labour Congress. For the 4 decades before his retirement in 1980, Jackson had been one of the most articulate, well-informed, though controversial, labour leaders in Canada.

CRAIG HERON



A.Y. Jackson, *Barns* (1926), oil on canvas (*courtesy Art Gallery of Ontario/gift from The Reuben and Kate Leonard Canadian Fund, 1926*).



Some consider Donald Jackson to have been Canada's finest figure skater. He was known for his spectacular free-style skating and is shown here performing a triple salchow (*courtesy Canada's Sports Hall of Fame*).

Jackson, Donald, figure skater (b at Oshawa, Ont 2 Apr 1940). Winner of the Canadian senior men's FIGURE SKATING title 1959-62, Jackson won the bronze medal in the Olympic Games and placed 2nd in the world championships in 1960. His greatest achievement was in the 1962 world championships, when he moved from a distant 2nd place after compulsory figures to win the title with a spectacular performance in free skating. His winning routine included the 1st triple-lutz jump in competition. Jackson joined a professional ice show in 1962, and in 1970 won the world professional figure-skating championship. He became a coach in 1969. Some authorities consider him the finest skater Canada has ever produced. BARBARA SCHRODT

Jackson, Henry, "Busher," hockey player (b at Toronto 19 Jan 1911; d there 6 June 1966). He joined TORONTO MAPLE LEAFS in 1929 and played left wing on the famous "Kid Line," with Joe Primeau and Charlie CONACHER. He led the NHL in scoring 1932-33 and compiled a record of 241 goals and 475 points, adding 18 goals in playoffs. He was long denied recognition of his fine career, even nomination to the HOCKEY HALL OF FAME, because of his alleged drinking problem. He gained entry in 1971, 5 years after his death. JAMES MARSH

Jackson, Russell Stanley, Russ, football player (b at Hamilton, Ont 28 July 1936). Jackson was prominent in baseball, hockey, basketball and FOOTBALL as a youth. After graduation from McMaster he turned down a possible Rhodes scholarship to play football with OTTAWA ROUGH RIDERS as a defensive back and quarterback (1958), and became starting quarterback after the 1962 season. A poised passer, strong runner and capable leader, Jackson finished his 12-year career with 1341 completed passes (53%) for 23 341 yds and 184 touchdowns; he also rushed for 5045 yds while scoring 55 touchdowns and 330 points. In his last season, 1969, he led Ottawa to a Grey Cup championship. He won numerous awards, including the Schenley as outstanding player (3 times), and was twice chosen Canada's male athlete of the year. A 1979 US survey of all professional football rated Jackson as the finest of all time. He always combined teaching with football, except for his term as head coach of the Toronto Argonauts (1975-76), and he went on to become a high-school principal. FRANK COSENTINO

Russ Jackson, quarterback for 12 years with the Ottawa Rough Riders, is rated by many the finest quarterback ever to have played in Canada (*courtesy Canada's Sports Hall of Fame*).



Jackson, William Henry, also known as Honoré Joseph Jaxon, Louis RIEL's secretary immediately before the NORTH-WEST REBELLION, labour leader (b in Toronto 13 May 1861; d in New York C, NY 10 Jan 1952). After his family moved from Ontario to Prince Albert, Sask, Will Jackson joined them, abandoning his classics course at U of T. Having completed 3 years there, he was one of the best educated men in the area. He became secretary of the local farmers' union, and in this capacity he met Riel in the summer of 1884. Sympathetic to the Métis cause, he went to live at Batoche, Sask, to serve as Riel's secretary, converted to Roman Catholicism and later accepted Riel's new religion. After the failure of the Rebellion, Jackson was tried and committed to the lunatic asylum at Ft Garry, Man. Escaping 2 months later, he walked to the American border and eventually settled in Chicago, Ill. As Honoré Joseph Jaxon he worked as a union organizer for over 2 decades. "Riel's Secretary" moved to New York after WWI, where he died. DONALD B. SMITH

Jacobs, Jack, "Indian Jack," football player (b at Holdenville, Okla 1920; d at N Greensboro, NC 12 Jan 1974). A Creek Indian, Jacobs joined the National Football League from the U of Oklahoma; playing mostly on defence, he was a sure-handed and solid tackler. He joined the CFL's WINNIPEG BLUE BOMBERS in 1950. Jacobs's fierce desire, competitiveness and brilliant quarterbacking helped popularize professional football in Winnipeg and Canada. Over his CFL career he passed for 11 094 yds and 104 touchdowns and punted for a 41-yd average. He coached London Lords (ORFU), and was an assistant coach with Hamilton, Montreal and Edmonton (CFL). FRANK COSENTINO

Jacobs, Peter, or Pahtahsega, meaning "one who makes the world brighter," Methodist missionary (b near present-day Belleville, Ont *c*1807; d at Rama Reserve, Lk Simcoe, Ont 4 Sept 1890). An early Mississauga (Ojibwa) convert to Methodism, Jacobs served first as a prayer leader and interpreter, and later as an ordained minister in the Hudson Bay Territory at Lk of the Woods, and at Ft Alexander and Norway House. Twice he visited England on missionary tours (1842-43, 1850). His published journal of his return trip in 1852 from central Canada to York Factory on Hudson Bay provides a graphic account of the perils of such an overland journey. Expelled by the Methodists (1858) for soliciting funds in the US without the church's approval, he settled at Rama, where he worked as a schoolteacher, merchant and guide. DONALD B. SMITH

Jaeger, any of 3 species of rapacious, gull-like SEABIRDS of genus *Stercorarius*. With their close relatives the skuas (*Catharacta*), they are placed by some taxonomists in the GULL family (Laridae), or in a family of their own, Stercorariidae. Jaegers are hook-billed, long-winged, swift and predatory. They mercilessly harass other birds, forcing them to disgorge food which the jaeger then snaps up with a graceful swoop. They are



Will Jackson served as Riel's secretary in Batoche, and after the rebellion was tried and committed to a lunatic asylum (*courtesy Cicely Plaxton*).

polymorphic (ie, have light and dark colour phases) and adults have elongated central tail feathers. Breeding range is northern circumpolar. All 3 species, pomarine (*S. pomarinus*), parasitic (*S. parasiticus*) and long-tailed (*S. longicaudus*), nest widely on the arctic tundra where they feed on small mammals, birds, fishes and invertebrates. Because they winter on the open oceans, they are scarce in the southern interior of their breeding grounds at any time. W. EARL GODFREY

Jalna, novel by Mazo DE LA ROCHE (Toronto, Boston and London, 1927). The first of 16 books about the Whiteoak family, *Jalna* is the book which determined the course of de la Roche's career. *Jalna* shows de la Roche's genius for keeping her readers engaged in the improbably fascinating developments in her characters' lives. The novel has been described (and dismissed) as escape literature, as romance, as soap

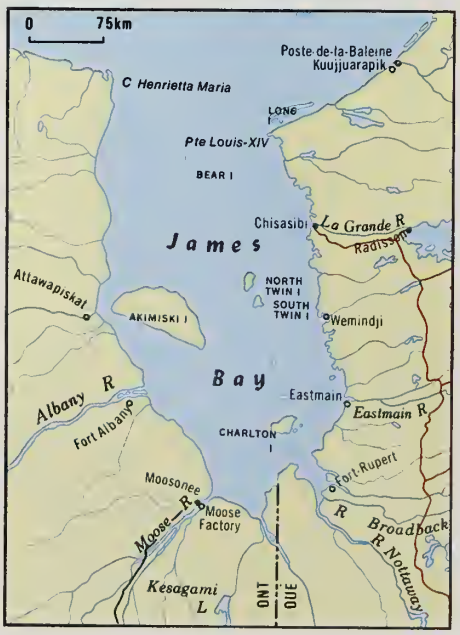
Illustration from Peter Jacobs's journal showing mid-19th-century Indian fancy winter dress. An Ojibwa, Jacobs was an early convert to Methodism (from Peter Jacob's *Journal*, 2nd ed 1858).



opera and as an "Upper Canadian dream," and there is some truth in all these epithets. The Whiteoaks are, indeed, an impossibly romantic and imperialist concoction; Jalna is too preposterously the British dream of a country estate, set down intact in Ontario; the intertwining affairs (and names) of Renny and Alayne, Eden and Pheasant do anticipate the TV melodrama of *As the World Turns;* and yet *Jalna* has proven magically readable for generations, not only in English, but in French, German, Swedish, Danish, Norwegian, Czech, Polish, Finnish and Portuguese. NEIL BESNER

James, Thomas, explorer (b 1593; d 1635). He sailed from Bristol to Hudson Bay in 1631, 2 days before Luke FOX left on a rival voyage from London. The 2 met by chance at Cape Henrietta Maria (the name of James's ship). The only independent exploration made by James was of the W coast of the bay to which he gave his name. He beached his ship off Charlton I and spent a miserable winter — the first European to winter deliberately in the North. James's voyage was less productive than that of Fox, who was the superior navigator, but the harrowing tale so richly described in his masterly narrative discouraged further attempts to seek the passage for nearly 100 years. The circumstances of his death are unknown. JAMES MARSH

James Bay, southern appendix of HUDSON BAY. It is about 160 km wide between Pointe Louis-XIV on the E coast and Cape Henrietta Marie on the W. The Québec-Ontario border is at the bottom of the bay, and its numerous islands are administered by the NWT. Akimiski is the largest island with an area of 3002 km². The bay was discovered in 1610 by Henry HUDSON and named for Thomas JAMES who entered the bay in 1631 and spent a difficult winter on Charlton I. The bay was long a centre for trade as CREE brought furs down the many rivers draining the surrounding area. The major rivers, from E to W, are LA GRAND RIVIÈRE (formerly Ft-George R), EASTMAIN, RUPERT, Nottaway, Harricana, MOOSE, ALBANY and ATTAWAPISKAT. Ft Rupert, Moose Factory and Ft Albany — at the mouths of the rivers of the same names — were active HBC posts. MOOSONEE, Ont, the largest settlement in the area, is the northern terminus of the Ontario Northland Rwy. There are native settlements at Chisasibi (formerly Ft-George), Eastmain and Attawapiskat. Polar Bear Provincial Park borders on the NW coast. *See* JAMES BAY PROJECT.
JAMES MARSH





The massive underground powerhouse of LG2, blasted from solid bedrock, is the largest underground powerhouse in the world (*courtesy National Film Board/Photothèque*).

James Bay Agreement of 1975 is the first major agreement between the Crown and the native people in Canada since the numbered treaties of the 19th and early 20th centuries. This agreement was negotiated after 4 years of politics, court cases and bargaining following the 1971 announcement of plans to build a system of hydroelectric dams in northern Québec (*see* JAMES BAY PROJECT). The natives of the James Bay area insisted on and received a permanent right to control the hunting, fishing and trapping of all economically important species of game in northern Québec; a strong degree of self-government in their own communities; the relocation of the site of the first dam; the clearance of timber from reservoir basins before flooding, with the Cree given first refusal rights on clearing contracts; and $225 million to be paid over a 25-year period.

The lands were divided into 3 categories: 14 007 km² in and around native communities to be controlled solely by residents; Cree to have 65 087 km² and the Inuit 90 650 km² of exclusive hunting, fishing and trapping territories; and in the remaining lands natives to have exclusive rights to 22 important species of game and freedom to cut timber for their own needs. In addition, provision was made for a minimum family-income plan for those in wildlife harvesting; native languages to be included as official languages of administration; and a James Bay Native Development Corporation to handle investments. Some problems related to the agreement affect the Inuit and Métis in Québec. Because they speak Inuktitut and English, the Inuit still protest the imposition of the French language in schools and administration. The Métis, and Indians who historically moved out of the agreement area into southern Québec or to Moose Factory, Ont, are now campaigning for some compensation for their exclusion from the agreement.

By 1983 the new or unplanned medical, housing, educational and other costs had brought the total cost of the agreement to more than $500 million, or $50 000 per native person living in the area. JOHN A. PRICE

Reading: D. Francis and T. Morantz, *Partners in Furs: A History of the Fur Trade in Eastern James Bay 1600-1870* (1982); H. McCullum and K. McCullum, *This Land Is not for Sale* (1975); John A. Price, *Native Studies: American and Canadian Indians* (1978); B. Richardson, *James Bay: The Plot To Drown the North Woods* (1972).

James Bay Project, a monumental hydroelectric-power development on the E coast of JAMES BAY. The $15-billion project entailed massive diversions of water from the EASTMAIN, Opinaca and Caniapiscau (KOKSOAK) rivers to dammed reservoirs on LA GRANDE RIVIÈRE; the average flow of La Grande Rivière will be increased from 1700 to 3300 m³/s. A tiered spillway, 3 times the height of Niagara Falls, has been blasted from the bedrock, and LG2 — with the world's largest underground powerhouse — generates 5328 MW of electric power. Caniapiscau Reservoir, with waters diverted from the river of the same name, will become the largest lake in Québec. A second station is due to open in 1985, and Phase II of the project calls for 5 more powerhouses, with a total generating capacity of over 10 000 MW — about 20% of Canada's present hydroelectric generation. Five reservoirs will total 11 900 km² — half the size of Lk Ontario — and 8 dams and 198 dikes have been built.

The project has raised controversy for its effect on the native people and environment. Announced by Québec Premier Robert BOURASSA in 1971, it was contested by the Cree, who had not even been notified. In 1975 the Cree surrendered their LAND CLAIMS for $225 million (*see* JAMES BAY AGREEMENT), retaining special hunting and fishing rights. The village of Ft-George (pop 2200) at the mouth of La Grande R was uprooted and relocated upstream. It is now called Chisasibi. The village of Eastmain (pop 350) now lies in a saltwater estuary, as the Eastmain R has been reduced to a trickle. Vast areas of wilderness have been inundated and whole forests incinerated in an attempt to clear debris. JAMES MARSH

James Norris Memorial Trophy is awarded annually to the player selected by hockey writers as the best defenceman in the NATIONAL HOCKEY LEAGUE. It was first presented in 1953 by the children of James Norris, former owner of Detroit Red Wings. Bobby ORR won the trophy 8 times and Doug HARVEY 7 times. JAMES MARSH

Jameson, Anna Brownell, née Murphy, writer, feminist, art historian (b at Dublin, Ire 17 May 1794; d at London, Eng 17 Mar 1860). Anna spent her early adulthood as a governess

in England, in 1825 publishing *A Lady's Diary* (later *Diary of an Ennuyée*), a fictionalized account of a European tour. She married lawyer Robert Sympson Jameson in 1825, but the couple were separated in 1829 when Jameson became a judge in Dominica, and later in Upper Canada. By 1836, when she joined her husband temporarily in Toronto, Anna Jameson was a well-known author. She chronicled her 8-month stay in Canada in the frank, informative *Winter Studies and Summer Rambles in Canada* (1838), its "Winter Studies" a lively but uncomplimentary portrait of Toronto, and its "Summer Rambles" an enthusiastic recounting of her journey through southwestern Ontario, up the lakes to Sault Ste Marie and back. On her return to England, legally separated from Jameson, she began a 6-volume compendium of Christian art, popularly known as *Sacred and Legendary Art*. In her later years she was the mentor of the young feminists who founded the *Englishwoman's Journal* and Girton College. CLARA THOMAS

Reading: Clara Thomas, *Love and Work Enough: The Life of Anna Jameson* (1967).

Jamieson, Donald Campbell, broadcaster, politician, diplomat (b at St John's 30 Apr 1921). He first achieved prominence as a broadcaster in the 1940s, in time becoming Newfoundland's most recognized radio and TV personality and cofounder of a communications empire. In the Confederation debate of the late 1940s, he advocated a Newfoundland-US economic union over union with Canada. Elected to the House of Commons as a Liberal in 1966, he served in the federal Cabinet 1968-79, most notably as minister of external affairs 1976-79. He became leader of the Newfoundland Liberal Party in May 1979, a month before the Liberals were defeated in a general election and resigned in 1980. Jamieson was appointed Canadian high commissioner to Great Britain in 1983. GEOFF BUDDEN

Jamieson, Elmer, educator (b on the Six Nations Indian Reserve, Ont 30 Aug 1891; d at Toronto 18 Apr 1972). He received his BA from McMaster in 1913. He enlisted in the army, and censorship of his letters led him to write home in Mohawk. When censors could not "crack his code," he was called in to reveal its secrets. With his fellow Mohawks he set up the first Amerindian communications network, an idea adopted by the American army in WWII. After the war he took an MA at McMaster in 1922, and then a doctorate in pedagogy at U of T in 1928. He was head of the chemistry and biology dept at North Toronto Collegiate 1922-57. ROY WRIGHT

Jansenism, a theological doctrine which urged greater personal holiness, espoused predestination and was linked to some extent with GALLICANISM. Supported by the writings of St Augustine, it was synthesized by Cornelius Jansen (1585-1638), Roman Catholic bishop of Ypres, in his posthumous *Augustinus* (1642). At odds with Rome and particularly critical of the Jesuits, Jansenism was, after 1650, the object of a series of condemnations which shook the church of France. It soon took on a moralistic tone and rigorously opposed all laxity; it also became the vehicle for opinion hostile to Roman centralism.

NEW FRANCE, firmly under Jesuit control, was little touched by doctrinal Jansenism, although there were a few enthusiasts. Nevertheless the moral rigour of Mgr de SAINT-VALLIER and his successors drew on Jansenist morality, for it was inspired by the same Augustinian source, though it had different theological bases; yet it was sometimes nourished by the reading of certain Jansenist texts. The ULTRAMONTANIST religious movement of the mid-19th century swept away the last traces of this indirect influence in Canada, without in the process eliminating the rigour itself. NIVE VOISINE

Janvier, Alex Simeon, painter (b at Le Goff, Alta 28 Feb 1935). A Chipewyan, he graduated from the Southern Alberta College of Art in 1964 and had his start painting a mural for the Indians of Canada Pavilion at EXPO 67. He returned to Alberta in 1968 to teach adult classes at the Saddle Lk Indian School, St Paul, and Alberta Newstart Inc, Fort Chipewyan. Late in 1971 he decided to paint full-time. In 1973 he was a founding member of the Professional Native Artists Inc (Winnipeg), a group of 7 Indian artists seeking to market their own work. Janvier's abstract work is characterized by pools of colour on negative space. In 1975 he painted a mural for the Muttart Conservatory (Edmonton) and for the County of Strathcona Building (Sherwood Park, Alta). Janvier was invited to Sweden 1977 to paint and exhibit. He did *The Seasons* for the National Museum of Man 1978-81 and a mural for the 1983 World University Games (Edmonton). GERALD R. MCMASTER

Japanese The first known Japanese immigrant, Manzo Nagano, settled in Victoria, BC, in 1877. By 1914, there were 10 000 Japanese settled permanently in Canada. By 1981 there were some 40 995 Japanese Canadians in Canada. The 100 years separating these events were filled with racial discrimination, turmoil and success.

Origins and Migration Almost all Japanese migration to Canada occurred during the first decade of the century. At the beginning of the decade, almost all the migrants were young men. In 1907, at Canada's insistence, Japan agreed to limit the number of male migrants to Canada to 400 per year. Between the signing of this agreement, and another in 1928 which reduced the flow to 150 persons a year, most of the Japanese migrants were young women coming to join their husbands. These first Japanese Canadians, called *Issei* (Ee-say), formed the nucleus of the Japanese Canadian community. They were young, literate and the products of the overcrowded farming and fishing villages of Japan's southern islands of Kyushu and Honshu.

Most of the Issei, on their arrival in Canada, settled in Vancouver and Victoria and in the surrounding towns. Others settled on farms in the Fraser Valley and in the fishing villages and pulp towns scattered along the Pacific coast. Small groups also settled on farms near Lethbridge and at Redwater near Edmonton, Alta.

A strident anti-Asian element in BC society did its best to force the Issei to leave Canada. In 1895 Japanese were denied the vote. A white mob rampaged through the Chinese and Japanese sections of Vancouver, in 1907. Japanese were excluded by law from most professions, the civil service and teaching. Social convention prevented Caucasian employers from hiring Japanese workers or encouraged them to pay Japanese workers far less than their white counterparts, a practice sanctioned by BC's discriminatory minimum-wage laws.

During these early years, and for the next 4 decades, BC's municipal, provincial and federal politicians pandered to the white supremacists in the province. The only exceptions to this were CO-OPERATIVE COMMONWEALTH FEDERATION politicians who openly argued that Asians should be given the vote.

This exclusion from the broader social and economic life of BC and the natural tendency for immigrants to seek each other's company, led to the development of Japanese ghettos. The Powell Street area of Vancouver and the fishing village of Stevenston were 2 of the main centres of Japanese life in Canada. In these ghettos, the Issei raised their children, the *Nisei* (Nee-say), or second generation. The Nisei, while raised in the Japanese ghetto, were also attuned to life in the wider Canadian community.

Throughout the 1920s and 1930s, the Japanese Canadian community slowly established itself. During this time, however, the contact between Japanese Canadians and other Canadians remained very restricted. The Issei's contact with white society was primarily economic. In the ghetto a wide array of Japanese organizations and institutions developed to serve the Japanese Canadian community.

Japanese Canadian veterans who fought in the Canadian Army in WWI were still refused the franchise, and in the 1920s the federal gov-



Community kitchen at a hastily built internment camp at Slocan City, BC, 1943, which received thousands of displaced Japanese Canadians during WWII (*courtesy Public Archives of Canada/C-24452*).

ernment limited the number of fishing licences issued to Japanese Canadians, thus denying many Japanese Canadians their traditional livelihood. During the GREAT DEPRESSION, Japanese Canadians received only a fraction of the social assistance that white applicants received and medical facilities were segregated.

The Nisei, however, had learned how to function in the broader Canadian society. Encouraged by their parents, the Nisei were successful students. They were fluent in English, well educated and ready to leave the Japanese Canadian ghettos. Nevertheless, they found their way barred by the same prejudices that had blocked their parents. Young Nisei with degrees from UBC found themselves working as labourers in lumber mills or as clerks in ghetto stores. In 1935, their demand that Canadian-born Japanese be given the vote was denied because of opposition from BC politicians.

The reaction of the Canadian government to the attack by Japan on Pearl Harbor in Dec 1941 destroyed the modest economic and social gains made by the Issei and Nisei during the preceeding 40 years. In Feb 1942, the Canadian Government ordered the removal of all Japanese Canadians from an area within 160 km of the Pacific coast, justifying its action on the grounds that the Japanese Canadians threatened Canada's security. The senior members of Canada's military and the RCMP opposed the action, however, arguing that the Japanese Canadians posed no threat to security. In fact, no Japanese Canadian was ever charged with being disloyal to Canada. Later, the government claimed that it removed the Japanese Canadians to protect them from mobs in BC, despite the fact that they had received only 150 letters and anti-Japanese resolutions.

The ordér to leave the coast was made under the authority of the WAR MEASURES ACT and affected over 20 000 Japanese Canadians. They were held first in the livestock barns of the Pacific National Exhibition grounds in Vancouver and then moved to hastily built camps in the BC interior. Towns like Slocan City, Kaslo and New Denver received thousands of the displaced men, women and children. The government then sold the farms, homes, businesses and personal property of the Japanese internees.

As WWII drew to a close, Japanese Canadians were made to choose between deportation to Japan, or being moved east to other parts of Canada. Many moved to the Prairie provinces, Ontario and Québec. The government's attempt to deport 10 000 Japanese Canadians was frustrated by massive public protest. In 1949, after the dispersal east was complete and the last of the wartime restrictions was removed, Japanese Canadians were granted the right to vote.

Japanese Canadians spent the 1950s rebuilding their lives. These years saw the birth of the *Sansei* (San-say), the third generation of Japanese Canadians. Unlike the Issei and most Nisei, the Sansei were raised fully within the wider Canadian community. They speak English and French but little or no Japanese. Most know little of their cultural heritage and their contact with other Japanese Canadians outside their immediate family is limited. As a group, Sansei are more highly educated than most other Canadians of the same age and disproportionately large numbers of Sansei work in academia, the professions and the arts. Also, in sharp contrast to the 2 previous generations, the rate of intermarriage among Sansei is extremely high. Studies conducted in the late 1970s indicate that over 75% of the Sansei marry outside the Japanese Canadian community. Well-known Japanese Canadians include Joy KOGAWA, David SUZUKI, Tom Shoyama, Raymond MORIYAMA, Yuki Yoshida, Mitch Kawasaki, Takeo Nakano and Zenkichi Shimbashi.

Changes in Canada's immigration laws in 1967 permitted a small number of new immigrants to come from Japan. These migrants, called the *Shin Issei*, were the first new migrants in almost 50 years and they differed markedly from the immigrants who preceeded them many years before. The Shin Issei came from Japan's urban middle class. Thus they carried with them a version of Japanese culture very different from the peasant culture brought by the Issei. Many of the traditional skills brought by the Shin Issei, eg, the tea ceremony, paper folding and flower arranging, added a new dimension to the Japanese Canadian community.

Today, Japanese Canadian society continues to evolve. The new immigrants have made it possible for young Japanese Canadians to learn the arts, crafts and language of their ancestral homeland. At the same time Japanese Canadians of all generations contribute to Canadian society at large in responsible occupations and as good citizens.

ANN SUNAHARA

Reading: K. Adachi, *The Enemy That Never Was: A History of the Japanese Canadians* (1978); B. Broadfoot, *Years of Sorrow, Years of Shame: The Story of Japanese Canadians in World War II* (1977); J. Kogawa, *Obasan* (1981); Ann Sunahara, *The Politics of Racism: The Uprooting of Japanese Canadians During the Second World War* (1981); P. Ward, *White Canada Forever* (1980).



Royal Canadian Navy officers question Japanese Canadian fisherman while confiscating his boat, Esquimalt, BC, Dec 1941. The government sold the farms, homes, businesses and property of the Japanese internees (*courtesy Public Archives of Canada/PA-37468/RCN*).

Jasper, Alta, UP, pop 3269 (1981c), is located at the junction of the Miette and Athabasca rivers, 362 km W of Edmonton. First called Fitzhugh, it was named after Jasper House, a nearby NWC post, and acted as a supply depot for the mountain trade across ATHABASCA PASS. Possibly established as early as 1801, it remained open with occasional interruption until 1884. Its modern development can be said to have started in Sept 1907, when the Jasper Park Reserve was established. The first major hotels, the Athabasca and Jasper Park Lodge, were started in 1915. The coming of the GRAND TRUNK PACIFIC and GREAT NORTHERN railways (1911-12) and construction of the all-weather road to Edmonton in 1927 spurred Jasper's growth, not only as a tourist town, but also (from 1912 to 1916 and again after consolidation of the 2 rail companies in the 1920s) as a railway divisional point.

FRITS PANNEKOEK

Jasper National Park (est 1907, 10 880 km^2) rests amid the unforgettable splendour of the ROCKY MOUNTAINS. It is the most northerly of the 4 adjoining mountain parks (*see* BANFF, KOOTENAY, YOHO). The combined forces of wind, water and glacial ice have carved Jasper's U-shaped valleys, which sweep upwards to mountain peaks as high as 3747 m. The resulting landscape supports a rich blend of alpine meadows, subalpine forests and montane vegetation. Wildlife is a main attraction in the PARK. Many species can be seen along park roads, including moose, elk, mule deer, black bear, coyote and bighorn sheep. Grizzly bears roam the back country. The highest ledges are inhabited by mountain goats, golden eagles, ptarmigan and ravens. The park's history is rich with the adventure of the FUR TRADE and of exploration for a route to the West Coast, including David THOMPSON's 1811 discovery of the ATHABASCA PASS and Jasper Hawes's establishment of a trading post near the present town of JASPER. The COLUMBIA ICEFIELDS Parkway provides direct access to outstanding scenery. Snow-capped peaks, mineral SPRINGS and glacier-fed lakes and rivers attract over 2 million visitors each year.

LILLIAN STEWART

Jay, medium-sized bird of the CROW family (Corvidae). Most jays have crests and are brightly coloured. Thirty-seven species are recognized, with 3 occurring in Canada: blue jay (*Cyanocitta cristata*), gray jay (*Perisoreus canadensis*) and Steller's jay (*C. stelleri*). All are mainly permanent residents. Gray jays breed from the northern YT to Nfld, but are generally absent from SE Alta, southern Sask and SW Man. Blue jays breed in central Alta, Sask and Man and southward across Ont to Nfld. Steller's jay is restricted to western and southeastern BC and SW Alberta. Essentially, jays are woodland birds of coniferous and mixed forests. Blue jays are also very common in shade trees in urban areas. Jays tend to nest in conifers and lay clutches of 2-6 eggs. They are omnivorous, feeding on various fruits, insects and grains, and are noted for storing food in crevices in trees. Scientists speculate that this behaviour may be a means of ensuring a food reserve.

LORRAINE G. D'AGINCOURT



Blue jay (*artwork by John Crosby*).

Jay's Treaty, signed 19 Nov 1794 in London by the US and Britain and named for John Jay, US chief justice and a signatory. This primarily commercial agreement was intended to settle disputes which threatened war, such as British retention of frontier posts in American territory after the 1783 TREATY OF PARIS, American-Indian disputes over the Ohio Valley, and American anger over British seizure of shipping. The treaty stipulated that Britain would evacuate western posts by 1 June 1796, and that merchants of both countries would have free access to lands on either side of the border; that the Mississippi R would be open to both countries; that a commission to settle debts to Britain since the start of the AMERICAN REVOLUTION would be established; and that American shipping would not be hindered in trade with British possessions. The treaty marks the beginning of arbitration in international relations, since commissioners were appointed to settle outstanding boundary problems caused by the peace of 1783. *See* JOINT COMMISSION.

STUART R.J. SUTHERLAND

Jazz, improvised music of Afro-American origin, is a synthesis of elements from African folk music and European art music. The term jazz, covering a succession of styles historically, has been given various derivations but, like the music itself, its exact genesis is vague. Jazz emerged in New Orleans at the turn of the 20th century and was disseminated throughout the US by its proponents' northern migration to Chicago, New York and other cities and, after 1917, by recordings. Its evolution has been the result of both personal initiatives (Louis Armstrong, Charlie Parker, John Coltrane, etc) and popular movements, the latter eventually bringing jazz to Canada. Through the efforts of men like the cornetist Trump Davidson (b Sudbury 1908) and clarinetist Bert NIOSI, jazz was woven loosely into the Canadian musical fabric by the late 1940s. Its styles, from traditional and the related dixieland, through swing and bebop to free and fusion, have each had adherents in Canada, bebop especially among musicians emerging in the 1950s and still dominant in the 1980s, and traddixie among European musicians immigrating during the 1960s. Most of Canada's jazz musicians have been white. Notable exceptions include pianists Oscar PETERSON, the most significant Canadian in jazz, Wray Downes and Oliver Jones; and guitarists Sonny GREENWICH and Nelson Symonds.

Characteristically an urban music, jazz has had centres of support in most major Canadian cities, where it has been played in nightclubs (eg, The Cellar, Vancouver; the Yardbird Suite, Edmonton; the Colonial and Town taverns, George's Spaghetti House and Bourbon Street in Toronto; the Café St-Michel, La Jazztek, Le Jazz Hot and Rockhead's Paradise in Montréal) and in concerts and festivals. Many musicians have gravitated to Toronto and Montréal and others to the US, eg, trumpeter and big-band leader Maynard FERGUSON and pianist Paul BLEY, or to Europe, eg, trumpeter and composer Kenny WHEELER.

Many of the country's best-known jazzmen are equally well known for their work in the Canadian pop music — studio world: flutist and saxophonist Moe KOFFMAN, big-band leader (Boss Brass) and trombonist Rob MCCONNELL (b London, Ont, 1935), flugelhornist Guido Basso, pianists Chris Gage, Vic Vogel and Tommy Banks, and saxophonists Fraser MacPherson and P.J. Perry. Some have established their reputations on their work in jazz alone: guitarists Ed BICKERT and Sonny Greenwich, bassist and pianist Don Thompson, composer and big-band leader Phil NIMMONS and saxophonist Jim Galloway. Jazz has had limited TV exposure, but many long-running radio programs indicate its popularity with Canadian audiences.

MARK MILLER

Reading: J. Litchfield, *The Canadian Jazz Discography 1916-1980* (1982); Mark Miller, *Jazz in Canada: Fourteen Lives* (1982).

Jefferys, Charles William, painter, illustrator, muralist, writer, teacher (b at Rochester, Eng 25 Aug 1869; d at Toronto 8 Oct 1951). Determined to explore both "the true nature of our landscape" and the historical (and prehistorical) background that shaped Canadian society, Jefferys was a strong advocate of artistic nationalism. Beginning work as a newspaper artist in 1889, Jefferys served as an illustrator on the *New York Herald* 1893-1901, and as art editor of the satirical periodical *The Moon* (1902-03). He was appointed chief illustrator of the Toronto *Star* (1905) and art director of Toronto *Star Weekly* (1910), before launching a freelance career. He also taught at the school of architecture, U of T, 1911-39. Jefferys is one of the most frequently reproduced of Canadian illustrators and is best known for his "visual reconstructions" of Canadian history. ROBERT STACEY

Reading: W. Colgate, *C.W. Jefferys* (1945); C.W. Jefferys, *Dramatic Episodes in Canada's Story* (1930), *Canada's Past in Pictures* (1934) and *Picture Gallery of Canadian History,* 3 vols (1942-50) Robert Stacey, *Charles William Jefferys: 1869-1951* (1976).

Jehin-Prume, Frantz, violinist, composer, teacher (b Jehin at Spa, Belgium 18 Apr 1839; d at Montréal 29 May 1899). As the first foreign musician of international fame to settle in Canada, with his wife Rosita del Vecchio, he played an important role in the development of musical life in Montréal. He enjoyed a brilliant career in Europe, Russia and Mexico. He came on a fishing and hunting trip to Canada in 1865 at the invitation of violinist Jules Hone and in 1867 settled in Montréal. For performances of Gounod's *Jeanne d'Arc* (1877), he was choirmaster and solo violinist under the direction of Calixa LAVALLÉE, his friend and collaborator. He was president of the Académie de musique de Québec (1877-78) and founder of the Association artistique de Montréal (1891). After a final tour of France and Belgium (1885), he returned to Montréal where he devoted himself to teaching. Jehin-Prume composed numerous works, most of which have not survived.

HÉLÈNE PLOUFFE

Jehovah's Witnesses, religious denomination known internationally for tireless door-to-door EVANGELISM, large conventions, and members' refusal to bear arms, salute flags or accept blood transfusions. Witnesses are thoroughgoing MILLENARIANS who believe that Christ came invisibly in 1914, and that through witnessing they are carrying out a "harvest work" by which mankind is separated into the saved and the damned. Accordingly the world will be destroyed at Armageddon, which will occur before the generation old enough to witness events in 1914 has all died. Witnesses deny the Trinity and hold to an Arian theology, which asserts that the Son of God is not coeternal with the Father and partakes of deity to a lesser degree. They teach that 144 000 will eventually dwell in heaven, but the rest of the saved will live eternally on a restored paradisal earth. In 1981 only 9601 proclaimed a heavenly hope out of 2.4 million active members worldwide. The Witnesses are mortalists and believe that most humans will be resurrected physically during the millennium. They hold that other religions and the secular state are demonic.

Jehovah's Witnesses grew out of the Bible Student movement developed by Charles T. Russell in the 1870s at Pittsburgh, Pa. In 1876 he adopted the "biblical" chronology of Nelson H. Barbour, which has been basic to the date-setting apocalypticism of the Bible Students and Witnesses ever since. Russell founded the Watch Tower Society in 1881 to spread his views. In 1931, Russell's successor, Joseph F. Rutherford, gave the name Jehovah's Witnesses to those Bible Students loyal to the Watch Tower Society. He abandoned many of Russell's teachings, rearranged Barbour's chronology and established autocratic control over his followers. Nathan H. Knorr (1905-77) was largely responsible for their growth into a worldwide movement.

Bible Students appeared in Ontario about 1882 and soon spread throughout Canada. During both world wars they suffered much persecution. In 1918 their literature was banned, and they were outlawed 1941-43 under the WAR MEASURES ACT. Their most serious problems occurred in Québec after WWII (*see* RONCARELLI V DUPLESSIS; SAUMUR V CITY OF QUÉBEC). Consequently, to obtain religious freedom they popularized the idea of a Canadian Bill of Rights and established numerous libertarian precedents before Canada's highest courts (*see* HUMAN RIGHTS). Paradoxically, they have recently come under severe public criticism for their illiberal treatment of dissenters within their ranks. Some 143 000 Canadians claimed to be Jehovah's Witnesses in the federal census of 1981. Of these, there were 67 328 active Canadian Witness "publishers," or evangelists. *See* EVANGELISM. M. JAMES PENTON

Reading: M. James Penton, *Jehovah's Witnesses in Canada* (1976).

Jellyfish, common name for free-swimming medusae of INVERTEBRATES of phylum CNIDARIA. Jellyfish are characterized by an umbrella-shaped body containing a jellylike substance (mesoglea), between upper and lower surfaces, which acts as a buoyancy aid. Three types are recognized: true jellyfish (Scyphozoa), hydromedusae (Hydrozoa) and colonial Siphonophora and Chondrophora. About 110 species are found in Canadian waters. They can occur in incredible densities; eg, moon jellies (*Aurelia aurita*) may clog boat cooling systems. Their effectiveness in capturing other planktonic animals makes jellyfish an integral part of oceanic food chains. Stinging cells (cnidoblasts) used to capture food have made some species notorious: sea wasp (*Chironex fleckeri*), off Australia's Queensland coast, can kill unwary bathers; the sting of the Portuguese man-of-war (*Physalia physalis*), however, is probably never fatal. Most Canadian species are harmless. Jellyfish buoy themselves by mesoglea or by gas-filled bladders. Siphonophores and chondrophores are supported by bladders and may be buoyant enough to float at the surface (eg, *Physalia* and *Velella*). Sail-by-the-wind-sailor (*Velella*) has a sail which usually keeps it away from shore by enabling it to tack across the wind. After periods of prevailing onshore winds, these jellyfish may become stranded on the outer BC coast in such numbers that beaches turn violet. Jellyfish move by jet propulsion, using powerful muscles to squeeze water out of the cavity formed by the umbrella.

A.N. SPENCER

Jenkins, Ferguson Arthur, baseball player (b at Chatham, Ont 13 Dec 1943). The finest Canadian-born baseball player, Jenkins began his major-league career in Philadelphia before joining the Chicago Cubs in 1966. In 1967 he began a 6-year string of 20 or more pitching victories per season. A control pitcher, he rebounded from a disappointing 1973 season to win 25 games for the Texas Rangers in 1974. Released by the Chicago Cubs prior to the 1984 season, his pitching record includes 284 wins, 3192 strikeouts, a remarkable strikeout-to-walk ratio of 3.20 and the modern major league lifetime record of 363 putouts by a pitcher. He won the Cy Young Award for pitching excellence (1971), the LOU MARSH TROPHY as Canada's outstanding athlete (1974) and was Canadian male athlete of the year 4 times. WILLIAM HUMBER

Jenness, Diamond, anthropologist, arctic scholar (b at Wellington, New Zealand 10 Feb 1886; d near Ottawa 29 Nov 1969). Canada's most distinguished pioneer anthropologist, he was educated at U of NZ and Oxford. After fieldwork in New Guinea in 1911-12, he joined the Canadian Arctic Expedition under V. STEFANSSON 1913-16 at the request of the National Museum of Canada. His participation in the traditional life of the COPPER INUIT around Coronation Gulf, NWT, laid the base for his later work. After service in WWI, he joined the museum staff and began his remarkable series of publications in Canadian ethnology, linguistics, physical and applied anthropology and archaeology. *The People of the Twilight* (1928) is probably the best single book on the Canadian Inuit. His classic *The Indians of Canada* (1932), based on field projects among native peoples across the country, has been republished repeatedly. In 1925 he authored a brilliant paper on the prehistoric culture of Arctic Canada. His excavations at Cape Prince of Wales, Alaska, in 1926 resulted in his



Diamond Jenness (left) and W.L. McKinley aboard the *Karluck*, 1913 (*courtesy Public Archives of Canada/C-86412*).

definition of the Old Bering Sea culture, still a fundamental discovery in Alaskan prehistory.

Jenness became chief anthropologist of the National Museum in 1926. He subsequently represented Canada at many international conferences and served as president of the Soc for American Archaeology in 1937 and the American Anthropological Assn in 1939. Before 1939 he developed the antiquities legislation vital to the protection of archaeological resources in the NWT. Deputy director of intelligence for the RCAF in 1940 and then chief of the Inter-Service Topographical Section, he later organized the Geographical Bureau and was its director until 1947. In 1962 he published an economic history of Cyprus. Between that date and 1968 the Arctic Institute of N America issued his 5 volumes on Eskimo administration in Alaska, Canada and Greenland, adding to his bibliography of some 100 titles.

A kind, quiet, modest man, Jenness was the recipient of honorary degrees from 5 universities and was associated with many learned institutions in Canada and abroad, among them the Royal Canadian Geographical Soc, whose Massey Medal he was awarded in 1962. Diamond Jenness Peninsula on Victoria I was named for him, and in 1970 he was appointed a companion of the Order of Canada, his country's highest honour. WILLIAM E. TAYLOR, JR

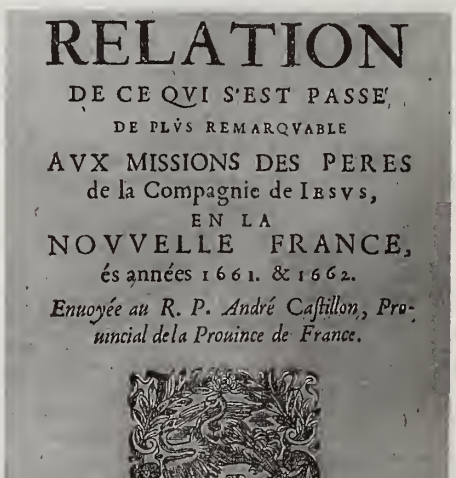
Jerome, Harry Winston, track and field athlete, consultant, teacher (b at Prince Albert, Sask 30 Sept 1940; d at Vancouver 7 Dec 1982). He was the first man to share world 100-yd and 100 m records. While attending U of Oregon on an athletic scholarship in 1960, Jerome ran the 100 m in 10.0 sec, tying German Armin Hary's world record; in 1962 he ran the 100 yds in 9.2 sec, equalling the mark of Frank Budd and Bob Hayes. An Olympic representative for Canada in 1960, 1964 and 1968, he won the 100 m bronze in the 1964 Tokyo Olympics; he took the 100 m gold in the 1967 Pan-American Games. After retirement, Jerome taught, consulted for Sport Canada and travelled Canada inspiring youngsters to try TRACK AND FIELD sports. TED BARRIS

Jesuit Relations (*Relations des jésuites*), the voluminous annual documents sent from the Canadian mission of the Society of Jesus to its Paris office, 1632-72, compiled by missionaries in the field, edited by their Québec superior, and printed in France by Sébastien Cramoisy. As a result of Cardinal Richelieu's decision to enlist the Jesuits in colonizing French N America, the early history of settlement was systematically and colourfully documented by priests attempting to convert the Indians and also to attract support at home for their project. The journals and letters of Paul LE JEUNE, Jérôme LALEMANT, Jean de BRÉBEUF and Paul Ragueneau, among others, dramatize tribal warfare in HURONIA and the day-to-day life of colonists in ACADIA; these are supplemented by "relations" of Jesuit participation in colonial matters throughout the New World. Invaluable as ethnographic and documentary sources, the *Jesuit Relations* were avidly read in the 18th century, along with the works of Cartier and Champlain, as exciting travel literature. Reuben Gold Thwaites edited 73 volumes as *The Jesuit Relations and Allied Documents, Travels and Explorations of the Jesuit Missionaries in New France 1610-1791* (1896-1901), presenting annotated parallel versions of his translations and the French, Latin and Italian original texts. MICHÈLE LACOMBE

Jesuits, *see* CHRISTIAN RELIGIOUS COMMUNITIES.

Jesuits' Estates Act During the French regime Jesuits were granted considerable property and seigneuries, which they used for educational purposes and for their Indian missions. After the CONQUEST, ownership of these estates passed to Britain, which held them 1763-1800, when the last Canadian Jesuit died. In 1831 London awarded the estates to the Province of Canada. In 1838 Catholic bishops began to petition unsuccessfully for the appropriation of the Jesuits' estates in accordance with the wishes of the donors.

The Jesuits, re-established in Canada in 1842, were authorized by Rome in 1871 to begin negotiating a settlement of their estates with the Québec government, the estates' owner since CONFEDERATION. Archbishop Elzéar-Alexandre TASCHEREAU of Québec then intervened, arguing that revenue from these estates should be divided among Catholic schools rather than being given to the Jesuits, who wished to establish


RELATION
DE CE QVI S'EST PASSE'
DE PLVS REMARQVABLE
AVX MISSIONS DES PERES
de la Compagnie de IESVS,
EN LA
NOVVELLE FRANCE,
és années 1661. & 1662.
Enuoyée au R. P. André Caſtillon, Pro-uincial de la Prouince de France.
A PARIS,
Chez SEBASTIEN CRAMOISY, Et SEBAST. MABRE-CRAMOISY, Imprimeurs ordinaires du Roy & de la Reine, ruë S. Iacques aux Cicognes.
M. DC. LXIII.

The *Jesuit Relations* were annual documents compiled by Jesuit missionaries in New France and were avidly read in Europe for their colourful depiction of the early days of colonization (*courtesy National Library of Canada*).

a university in Montréal to rival Québec's UNIVERSITÉ LAVAL. As Québec's Roman Catholic hierarchy quarrelled, Québec Prem Honoré MERCIER called upon Pope Leo XIII to arbitrate the dispute. In July 1888 the Legislative Assembly unanimously passed the Jesuits' Estates Act, which provided a monetary settlement: the Jesuits would receive $160 000 and surrender all claims; $140 000 would go to U Laval and $100 000 to selected dioceses. A further $60 000 was allocated to Protestant institutes of higher education. Since Pope Leo XIII had been arbiter the ORANGE ORDER in Ontario vehemently opposed the settlement as a papist intrusion into Canadian affairs. A heated debate occupied the House of Commons in Mar 1889; the motion to disallow the Québec law was defeated by 188 votes to 13. The Jesuits' Estates Act put additional strain on English Protestant-French Catholic relations. PHILIPPE SYLVAIN

Jeune-Canada, a FRENCH CANADIAN NATIONALIST movement, fd 1932 in Montréal during the GREAT DEPRESSION. Its membership of some 20 university students included André LAURENDEAU, Pierre DANSEREAU and Gérard FILION. They supported a conservative form of nationalism based on the protection of francophone rights in Canada and the defence of Québec as a Catholic, French, rural and agricultural society whose destiny was one of economic and political independence. For 5 years its members led an awakening of the collective consciousness, speaking at meetings, publishing pamphlets and attacking economic monopolies and governments. By 1938, as the Depression neared its end, the movement faded. RÉAL BÉLANGER

Jeunesses musicales du Canada/Youth and Music Canada Founded in 1949 in St-Hyacinthe, Qué, by Gilles Lefebvre, J.H. Lemieux, Anaïs Allard-Rousseau and Alice Desruisseaux-Boisvert, this nonprofit organization encourages the pursuit of music among young Canadians and helps talented composers and performers in developing their careers in Canada and abroad. In 1950 JMC joined the International Federation of the JM; next year it established a summer music camp which, in 1967, became the JMC Orford Arts Centre, run since 1972 by an independent JMC corporation. Following the initiative of Lefebvre and the JMC the World Orchestra of JM was created in 1969. By 1984 some 80 JMC centres and sections across Canada presented more than 400 concerts each year. Other JMC activities include artists' competitions and tours, instructional workshops, Sunday concerts and recordings. Jean-Claude Picard became director general of this Montréal-based organization in 1976, succeeding Lefebvre (1953-72) and Gaston Germain (1972-76). In 1983 the name Youth and Music Canada, in place of Jeunesses musicales of Canada, was adopted for anglophone members. H. PLOUFFE

Jewellery and Silverware Industry includes establishments that manufacture jewellery (including costume jewellery, emblems, watch bracelets and precious metal cigar and cigarette cases) and silverware (including sterling or plated flatware and hollowware, and trophies), and those which rerefine or roll precious metals and produce precious metal alloys. This entry will concentrate on the jewellery and silverware MANUFACTURING sector.

The jewellery industry in Canada dates back to the 17th century and includes clockmakers and watchmakers as well as silversmiths who emigrated from the British Isles. Canada has a tradition of SILVER crafting, as seen in the Henry BIRKS Collection of antique Canadian silver at the ROYAL ONTARIO MUSEUM. François Ranvoyzé (1739-1819), acclaimed as Canada's outstanding silversmith, developed a beaten technique that made his work both beautiful and distinctive. During most of the 19th century, the silversmith's craft in Canada revolved around 2 Montréal workers, Robert Hendery and John Leslie. First as master and apprentice, later as partners, they fashioned silver for dealers in nearly all large population centres. They so dominated the trade that perhaps more than half the silver made in Canada in the last half of the century bears their mark.

Toward the end of the 19th century, a craftsman commonly described himself as a "watch-

maker, jeweller and silversmith" and, as his position in the community consolidated, became a merchant who employed watchmakers and silversmiths. Hence, by the beginning of the century the jeweller was firmly established as a link between the public and the craftsman. In this period, there were about 2000 jewellery firms in Canada. Many jewellers acted as opticians or worked closely with them in the early years when spectacle frames were made of silver.

Formal government intervention in the industry began in 1906, when the Precious Metals Marking Act was introduced to control the quality of precious metals used in jewellery. In 1918 the government placed a discriminatory 5% excise tax on jewellery; by 1982 the tax was 10%, in addition to the 9% federal sales tax. In Jan 1982 the industry became one of the first in Canada to implement METRIC CONVERSION.

The Dept of Industry, Trade and Commerce (Regional Economic Expansion) encourages export of Canadian jewellery by sponsoring foreign trade missions for jewellery manufacturers. Markets are sought in the US, Japan and Britain. In 1981 Canada exported about $10 million in jewellery, including fashion (costume) jewellery. In recent years, Canadian jewellery has received worldwide attention through international competitions in which Canadian designers have received awards. This recognition has led foreign buyers to take a greater interest in Canadian jewellery products. The Canadian gold maple leaf, a consumer jewellery item produced by the federal government, is also popular in international markets.

Various native craftsmen are also producing a range of jewellery (necklaces, brooches, bracelets) in a variety of materials (eg, gold, silver, copper, bone). Foremost among these is Northwest Coast artist Bill REID, who in 1951 began to produce jewellery in Vancouver. His work, like that of other native craftsmen, is characterized by the adaptation of traditional native style and iconography to new materials and forms.

In 1981 the industry included over 4000 retail outlets with total annual sales of nearly $1 billion. In addition, there are about 375 manufacturing firms, employing over 6000 persons; about one-third are small companies, each employing up to 4 people. Often, several generations of a family have carried on in a business. Most jewellery and silverware manufacturers are located in Ontario and Québec, with some in BC, Alberta and Manitoba. A single organization, the Canadian Jewellers Assn (CJA), represents manufacturers, wholesalers and retailers. It was formed in 1918 to promote sales and to represent the industry to government. The CJA publishes the *Jewellery Journal* which, along with regional associations, keeps members informed of national activities such as developments in insurance, excise tax, appraisals, ethics, precious-metals marking regulations and metrication. The educational branch of the CJA, the Canadian Jewellers Institute (incorporated 1945), offers courses at various levels of expertise, beginning with the 2-term Retail Jewellers Training Course. Completion of this course leads to a diploma and the designation "Graduate Jeweller" (GJ). Other educational and training courses are offered by the Québec Jewellers Corporation, the Canadian Gemmological Association and community colleges. These courses and practical training have increased the professionalism of Canadian jewellers. Three trade publications serve the jewellery industry in Canada: *Bijou*, *Canadian Jeweller* and *Jewellery World*.

DOROTHY A. LENARCIC

Jewett, Pauline, educator, politician (b at St Catharines, Ont 11 Dec 1922). Educated at Queen's, Radcliffe, Harvard, Oxford and London School of Economics, she was a professor of political science (1955-71) and head of the Institute of Canadian Studies (1971-74) at Carleton before being appointed president of SFU (1974-78), the first woman to head a major coeducational university in Canada. Jewett was a Liberal MP for Northumberland from 1963 to 1965 and in 1966 she was vice-president of the national Liberal Party. In 1979, 1980 and 1984 she was elected MP for New Westminster-Coquitlam for the New Democratic Party. In Parliament she has acted as NDP critic on education and external affairs. HARRIET GORHAM

Jewish Writing in Canada is characterized by linguistic and thematic influences derived from successive waves of immigration, and it appears mainly in Yiddish, Hebrew, English and French. Some Jewish writers work in other languages, such as German and Hungarian, reflecting countries of their origin. Jewish concerns are also treated by non-Jewish authors; eg, Gwethalyn Graham's *Earth and High Heaven* (1944) deals with intermarriage and anti-Semitism, and Yves THÉRIAULT's *Aaron* (1954) concentrates on the rejection of orthodoxy and the question of assimilation.

Yiddish and Hebrew writing began to appear in Canada before WWI when large numbers of Jews arrived after fleeing pogroms in tsarist Russia. In 1851 there were barely 450 JEWS in Canada; in 1901 there were almost 17 000, and suddenly there was a Yiddish reading public. By 1931 there were about 156 000 — mainly in Montréal, Toronto and Winnipeg — of whom 95% claimed Yiddish as their mother tongue. Yiddish was at its crest 1930-45, being used by Jewish communal institutions, 3 daily newspapers and numerous journals. For another decade Yiddish was bolstered by the influx of Holocaust survivors, including famous writers such as Melech Ravitch (1893-1976) and Rochl Korn (1898-1982), who continued the "internationalism" of Yiddish literature in Canada begun 1912 by the great Yiddish-Hebrew author Reuben Brainin (1862-1939) when he was editor of the Montréal Yiddish daily *Kanader Adler*.

Unlike most immigrant groups, Jews brought writers who tended to write with a "foreign" perspective for a worldwide public. Early in the 1920s J.I. Segal (1896-1954) led a group of poets who were raised or began writing in Canada. Most notable were A.S. Shkolnikov (1896-1962), A. Almi (1892-1963), Ida Maze (pseudonym for Ida Massey, 1893-1963) and Sholem Shtern (1907-). Together they established Montréal as a centre of Yiddish creativity. The most distinctly Canadian is Shtern, whose 2-volume epic *In Kanada* (1960; 1963) narratively describes the Jewish immigrant experience in Canada. With Shabtai Perl (1906-76) and 3 noteworthy Toronto "native" poets — Abraham Nisnevitch (1886-1955), Shimon Nepom (1882-1939) and Judica (Yehudit Zik, 1898-) — Shtern belongs to a group loosely called "proletarian" because their verse was heavily Marxist.

The writers who arrived after WWII intensified the "international" tendency, and their influence, and that of the Holocaust, became dominant. Korn's dark but strangely undespairing poetry has been translated by Seymour Mayne and others in *Generation* (1982), and the "Auschwitz" poems of Joseph Rogel (1911-) have appeared in English and French as well as Yiddish. Novelists Yehuda Elberg (1912-) and Chava Rosenfarb (1923-) are known worldwide for their description of Jewish life in Poland before and during WWII. In Toronto fabulist Peretz Miransky (1908-), lyricist Simcha Simchovitch (1921-), and poet and critic Itzchak Goldkorn (1911-) are also recognized for Holocaust writing. Two younger survivors, Jack Kuper (1932-) in *Child of the Holocaust* (1973) and Abraham Boyarsky (1942-) in *Shreiber* (1982), have written in English about wartime experience. Most mainstream Jewish writers publishing in English, such as Eli MANDEL, Irving LAYTON and Phyllis GOTLIEB, have also attempted to deal artistically with the tragedy.

The use of Yiddish declined in Canada as succeeding generations turned to English; recent arrivals from Arab countries, Israel and Russia know no Yiddish. Iraqi-born Naim KATTAN writes in French about acculturation in his novels *Farewell Babylon* (1972) and *Paris Interlude* (1977), and in the collection *The Neighbour and Other Stories* (1982); he is perhaps the most important Jewish writer in French Canada. Michel Solomon, born 1919 in Romania, is also widely known in Québec for his memoirs *Magadan* (1971) and *Mon Calvaire roumain* (1976), and his novel *Eden retrouvée* (1980).

Most of those writing in Hebrew were usually also Yiddish writers, the exception being authors of religious works. Until WWII Yiddish was widely regarded as too vulgar for serious literature. Later it had to compete with the Zionist revival of Hebrew. Thus most of the rabbinic sages who settled here — such as world-renowned Rabbi Judah Rosenberg, grandfather of Mordecai RICHLER — wrote mainly in Hebrew, although Rabbi Rosenberg also published several books on legends in Yiddish. The only poet composing exclusively in Hebrew is Miriam Schneid (1924-), but poet and educator Isaiah Rabinovitch (1904-) and novelist Joshua Altman (1898-) also wrote in Hebrew.

Jewish writers publishing in English in Canada share certain concerns with their immigrant predecessors: immigrant acculturation, the Holocaust, Zionism and the birth of the state of Israel, and fear of assimilation. Thus, nostalgia for the vanished traditions of European Jewish life, dominant in the work of Segal and the early Yiddish writers, reappears in A.M. KLEIN's attempt to synthesize Jewish culture and English language. His shock at the collapse of European Jewry during the Nazi ascendancy produced the first Canadian Holocaust poetry in *Hath Not A Jew*(1940) and in the bitter hyperbole of his satire *The Hitleriad* (1944), and scenes of Jewish wartime suffering in *The Second Scroll* (1951), his powerful, symbolic Zionist novel.

Klein is thus a pivotal figure; others followed his example. Although Mandel, Layton, Miriam WADDINGTON, Joseph ROSENBLATT and Leonard COHEN represent some of the most important influences of mainstream Canadian poetry, they also reflect in various ways their Jewish heritage, eg, in Cohen's darkly satiric *Flowers for Hitler* (1964-) and his *Death of a Lady's Man* (1978), in which he attempts to blend romantic and Holocaust visions. Layton's poetry, especially after the Arab-Israeli War of 1967, has become increasingly concerned with Jewish, rather than artistic, alienation and with anxiety over Israel's survival. Among novelists these concerns surface in *The Sacrifice* (1956) by Adele WISEMAN, in *The Rich Man* (1948) and *The Betrayal* (1965) by Henry KREISEL, and in Mordecai Richler's fiction, particularly *The* APPRENTICESHIP OF DUDDY KRAVITZ (1959) and *St Urbain's Horseman* (1971). The shorter fiction of Jack Ludwig and Norman Levine also reflects facets of the Jewish experience in Canada, as do the plays of Leonard Angel, Sharon Pollock, Ted Allan and Beverley SIMONS.

Canada's Jewish population is predominantly urban, but its concentration in a few major cities has not led to a marked regionalism in Jewish writing. The eastern Ontario novels of Matt COHEN are an exception, and Richler's St Urbain Street can be seen as an urban "region" akin to Hugh GARNER's Cabbagetown or Ethel Wilson's Vancouver. Even the radicalism of playwrights Rick Salutin and Janis Rapoport, while it has its own form of regionalism, is actually in the tradition of Yiddish socialist writing. In their concern over identity, Canadian Jewish writers are related to their American

counterparts and reflect the international orientation of their immigrant predecessors. Through the unique linguistic and cultural experience of its authors, Jewish writing continues to enrich the Canadian identity. *See also* LITERATURE IN ENGLISH and related articles. ADAM G. FUERSTENBERG

Jewison, Norman Frederick, film director and producer (b at Toronto 21 July 1926). Jewison has an international reputation as a filmmaker of talent and integrity. Though the bulk of his career has been spent outside Canada, Jewison believes his Canadian perspective has brought an important objectively to his work. He was a graduate of U of T and worked as an actor and writer for both the British and Canadian broadcasting corporations before moving on to direct live TV in Canada and the US. In 1963 he directed his first film, *Forty Pounds of Trouble,* for Universal Pictures. Since that time, Jewison has maintained complete artistic control of all the films he has directed, and has, in most instances, functioned as both producer and director. These films include *The Cincinnati Kid* (1965), *In The Heat Of The Night* (1967; Academy Award for best picture), *Fiddler on the Roof* (1971), Jesus Christ Superstar (1973), *And Justice For All* (1979) and *A Soldier's Story* (1984). Jewison has also produced a number of films which he did not direct, such as *The Landlord* (1969), *Dogs of War* (1980) and *The Iceman* (1983). In all his work, Jewison has attempted, with frequent success, to balance popular appeal and serious social comment. Jewison moved back to Canada in the late 1970s, with the desire to make a significant contribution to Canadian film.

KAREN LAURENCE

Jewitt, John Rodgers, armourer (b at Boston, Eng 21 May 1783; d at Hartford, Conn 7 Jan 1821). Jewitt was an armourer aboard the American fur-trading ship Boston. He and one companion were spared by NOOTKA chief Maquinna, whose followers destroyed the ship in Nootka Sound 22 March 1803. Jewitt agreed to remain as Maquinna's gunsmith and blacksmith. Immersed in Nootka culture, Jewitt was initiated into the Winter Ceremonial and took a Nootka wife. His journal was published in 1807, 2 years after his rescue, inspiring Richard Alsop to interview Jewitt at length. The result was *A Narrative of the Adventures and Sufferings of John R. Jewitt* (1815) — a classic of captivity literature — and a broadside ballad "The Poor Armourer Boy," which Jewitt hawked around New England. Jewitt was a shrewd observer, and his accounts are valuable records of Northwest Indian culture. DEREK G. SMITH

Jews The first Jews to make their permanent home in Canada arrived with General Jeffery AMHERST, who entered Montréal in 1760, eg, Aaron Philip Hart, who settled in Trois-Rivières. Most of the original Jewish settlers emigrated from the US and the majority settled in Montréal. The 1831 census recorded 107 Jewish residents in Upper and Lower Canada; by 1851 this number had increased to 451. These pioneering Jewish settlers were not, in one sense, a typical immigrant group. Most belonged to the middle class, were well educated and engaged in trade, commerce and industry. Many played an important role in the economic growth of the country.

Between 1850 and 1900 the nature of Jewish immigration changed. The 1850s marked the beginning of a period of intensive emigration from Europe (which was torn by wars, revolutions, national rivalries and religious conflicts) to the New World, which needed labour power for development. It has been estimated that between 1850 and 1900, some 15 000 Jewish immigrants arrived in Canada. The 120 000 Jews who immigrated between 1900 and 1920 were primarily from eastern Europe, but those who arrived between 1920 and 1940 (60 000) and from WWII to the present (135 000) included Jews from the US, North Africa and the Middle East. The Jews migrated for the same reasons that other peoples did, except that economic and social discrimination, social and political inequality, and racial and religious persecution in their native lands made the position of Jews more precarious, and thus made the drive for migration very strong. Emigration was often synonymous with survival.

Between 1850 and 1914, immigrants wishing to emigrate to Canada encountered relatively unrestricted admission provisions, but restrictions tightened after WWI, at the same time that upheavals in Europe forced many Jews, particularly those of Russia, Poland, Austria-Hungary, Romania and the Baltic states, to emigrate. As a result of virulent anti-Semitism, thousands of European Jews were massacred or were driven from their homes, or fell victim to disease and starvation. The rise of Nazism in the mid-1930s threatened Jews throughout Europe, yet it became difficult for Jews to find refuge because the traditional countries of immigration, including Canada, had imposed restrictions on immigration. As a result, millions of Jews and non-Jews perished. Canada's record was particularly dismal.

In the middle of the 19th century, Jews were largely a European people, but today only 25% of all Jews live in Europe, most of them in the Soviet Union. The largest number (6 million) live in N America, some 300 000 of whom are in Canada.

During the first century of settlement Jews lived primarily in Upper and Lower Canada, but by the 1850s they had settled in all the provinces. Although they generally settled in "urban centres" (a census term, in 1851, for all nonrural areas), there were also Jewish farm colonies in various parts of Canada. In 1981 Jews were distributed as follows: Ontario (131 320), Québec (90 355), Manitoba (14 950), BC (13 170), Alberta (9460), Nova Scotia (2090), Saskatchewan (1515), New Brunswick (720), Newfoundland (285), PEI (80) and Yukon and NWT combined (80).

Economic Life Economic and occupational distribution among Jews has been diversified (ie, they have entered a variety of occupations), although there has been a relative concentration in specific fields. Jews in Canada have been victims of overt discrimination (eg, restricted admission to universities and professional schools) and subtle discrimination, which has tended to diminish during the last 30 years (*see* PREJUDICE AND DISCRIMINATION).

Religion, Social and Cultural Life The synagogue has served as a house of worship and of study and as a place of bringing together the members of the community for social and philanthropic work. Several forms of religious expression exist within the Canadian Jewry, such as orthodox, conservative, liberal and reconstructionist (*see* JUDAISM). Certain other groups practise specific religious philosophies.

Orthodox Jews follow the 16th-century laws of the authoritative code of religious observance known as the "Shulchan Aruch," which is based on the Halakha, or legal part of Talmudic law. Conservative Judaism, an essentially American movement whose influence is spreading, maintains that Judaism can retain its distinctiveness and still be responsive to the changing social, economic, religious and moral needs of Jews. Reform Judaism, which originated in the past century, has advocated the abolition or modification of some traditional religious practices and beliefs that are considered anachronistic. According to reconstructionism, which originated in the US in 1935, Judaism is not only a religion but a dynamic religious civilization. It supports the reestablishment of the Land of Israel as the historic home of Jewish civilization, organic Jewish communities outside of Israel, free inquiry and acceptance of diversity in Jewish thought, and respect for traditional cultural values. Adherents of various Hasidic religious movements are strictly orthodox.

As the Jewish community grew, organizations were established to serve specific functions, eg, to support local and national philanthropy; to provide health and social services; and to aid immigrants and refugees. There are also fraternal organizations, mutual and self-aid societies, Jewish groups of various ideological leanings, Jewish labour groups, organizations related to Zionism and Israel, and organizations to promote Jewish culture. National organizations include the National Budgeting Conference of Canadian Jewry, the Canadian Jewish Congress (which is sometimes known as "the parliament of Canadian Jewry" and is the most representative of national organizations as far as general community participation is concerned), the Jewish Immigrant Aid Services of Canada, the Canada Israel Committee, the B'nai B'rith, the Canadian Zionist Federation, and the National Council of Jewish Women. As an integral part of the world Jewish community, the organizational structure of Canadian Jewry aims to maintain local communal agencies while providing a bond between scattered communities in Canada and in other countries.

The Jewish community is served by one Yiddish and 4 Anglo-Jewish weeklies, one monthly magazine, a number of house organs of general interest and periodic publications.

The Canadian Jewish community has contributed significantly to various forms of cultural expression. Jewish poets and writers, artists, musicians and performers include Lloyd Bochner, Pauline DONALDA, Lorne GREENE, John HIRSCH, Johnny WAYNE and Frank SHUSTER, Mordecai RICHLER, A.M. KLEIN, Irving LAYTON, Leonard COHEN, Peter NEWMAN, Alexander BROTT and Louis APPLEBAUM.

Education Most Jewish children in Canada attend public schools, but almost every Jewish community provides facilities for religious and Jewish education through supplementary schools. In the larger communities, there is also a network of Jewish day schools that combine a program of secular and Jewish education at the elementary and high-school levels. Some Canadian universities have developed programs of Judaic studies. There are several orthodox rabbinical schools. Jewish education is considered vital for group identity, and every community attempts to provide schools, synagogues, publications, etc, usually with the assistance of national organizations devoted to this purpose.

Politics Ezekiel Hart, son of Aaron Hart, was elected to the legislature of Lower Canada in 1807, but was unable to take his seat because the law prescribed that an oath be taken "on the true faith of a Christian." This condition was removed by legislation 5 June 1832 and Jews were granted the same civil and political rights as other Canadians — some 25 years before similar legislation in England. Canadian Jews are represented in all Canadian political parties and voting patterns on a national level appear to follow general trends. Jews are represented in the provincial legislatures, the House of Commons, the Senate, the Judiciary (eg, the late Supreme Court Chief Justice Bora LASKIN) and have served or are serving as members of the provincial and federal Cabinets.

David LEWIS, former leader of the national New Democratic Party, was of Jewish origin. Jews have also figured prominently in the Canadian labour movement; the Jewish Labour Committee, formed shortly after WWII, promoted human rights legislation in Canada. About 17 000 Canadian Jews served in the Canadian armed forces during WWII.

Group Maintenance Ever since the biblical origin of the Jews and throughout their history — including their history of migration and resettlement in various countries — religion has been the major force of group cohesion, not only as a faith but as the fountainhead of education and social and communal organizations.

Three major historical events have affected the Jews during the 20th century: intensive migration, which resulted in the formation of new or enlarged communities in N and S America, Australia, Africa, the UK, France and Israel; the decimation of the Jews during the Nazi persecutions and WWII; and the establishment of the state of Israel in 1948, which posed a number of political, social and economic challenges to Jewish communities throughout the world. Finally, Jews have had to face the difficulty of maintaining Jewish identity in a relatively open society during the transitional stage between generations. More and more Canadian-born Jews are identifying themselves by religion rather than ethnic origin, and English and French are replacing Yiddish as the mother tongue. Although the decline in formal religious identification with the synagogue has been replaced by other manifestations of Jewish identity, eg, identification with Israel, the task of Canadian Jewry is to evolve specific programs designed to aid the retention of Jewish values and cultural life. JOSEPH KAGE

Reading: A. Horowitz, *Striking Roots: Reflections on Five Decades of Jewish Life* (1979); E. Kallen, *Spanning the Generations: A Study in Jewish Identity* (1977); H. Troper and I. Abella, *None is Too Many* (1982).

Jiu-jitsu is a martial art developed by the warrior class of Japan. The modern martial ways of JUDO, Aikido, Hapkido, Nippon Shorinji Kempo and some systems of Karate-doh all have their roots in Jiu-jitsu. Jiu-jitsu is a generic or collective term which when translated means "the art of flexibility or adaptability." In Canada, in addition to a combat self-defence art, Jiu-jitsu is practised as a healthy and exciting sport at the provincial, national and international level. The Canadian Jiu-jitsu Association, founded in 1963 by Ronald W. Forrester, sent its black-belt team to Honolulu, Hawaii, in 1977 to win top honours in the first recorded international Jiu-jitsu team tournament. At the 1978 Canadian National Exhibition, the Canadian Jiu-jitsu black-belt team defeated teams from the US and West Indies; in addition, Canadian Jiu-jitsu athletes won the first 5 places in individual competition, male and female divisions. In 1981 the Canadian Jiu-jitsu team defeated the Florida State black-belt team by winning 7 matches out of 8. Jiu-jitsu now ranks as one of the most popular of the martial arts. RONALD W. FORRESTER

Jobin, Louis, sculptor (b at St-Raymond, Qué 26 Oct 1845; d at Ste-Anne-de-Beaupré, Qué 11 Mar 1928). In 1870, after 4 years of apprenticeship in Québec City and New York, Jobin opened his own studio in Montréal. He filled many naval and commercial orders: ships' figureheads, signs and furniture. Moving to Québec in 1875, he increasingly specialized in large religious statues in metal-covered wood for the exterior of buildings. He did many Calvary scenes, monuments to the Sacred Heart, and numerous angels and saints. The huge Notre-Dame-du-Saguenay statue (7.5 m) is his most famous creation of this period (1881). After an 1896 fire in his workshop, Jobin moved to Ste-Anne-de-Beaupré where, until his retirement in 1925, he continued to serve his religious clientele. Here he made his celebrated monument of St George on horseback for St-Georges-de-Beauce (1912). After his prolific 60-year career, Jobin was "rediscovered" by the anglophone and francophone intelligentsia, and his works are now much sought after by Canadian museums.
MARIO BÉLAND

Jobin, Raoul, teacher, administrator, civil servant (b Joseph Roméo Jobin at Quebec C 8 Apr 1906; d there 13 Jan 1974). He was the greatest francophone tenor of his age. His studies, begun at U Laval, were continued in Paris. Throughout a long and fruitful career, he was frequently asked to interpret strong characters such as Samson, Don José and Lohengrin. He was first tenor at the Opéra-Comique de Paris during the 1930s before joining the Metropolitan Opera in New York (1940-50). He taught at the music conservatories in Montréal and Québec (where he was also director 1961-70). Cultural consultant with Québec's general delegation in Paris 1970-73, he was a knight of the Légion d'honneur in France (1951) and a companion of the Order of Canada (1967). HÉLÈNE PLOUFFE

Jodoin, Claude, labour leader (b at Westmount, Qué 25 May 1913; d at Ottawa 1 Mar 1975). During the Depression he worked in the garment industry, becoming in 1937 an organizer for the International Ladies' Garment Workers' Union. Selected president of the Montréal Trades and Labour Council in 1947, he was elected VP of the TRADES AND LABOR CONGRESS in 1949. During 1953-54 he played an important role in arranging a "no raiding pact" between the TLC and the CANADIAN CONGRESS OF LABOUR, setting the stage for the complete amalgamation of the 2 by 1956. President of the TLC 1954-55 and 1955-56, he was selected first president of the new CANADIAN LABOUR CONGRESS (CLC) in 1956, retaining the position for 10 years. Labour unity, in his view, was essential if organized labour was to influence the social, economic and political life of Canada and raise the standard of living of working people. Despite his early opposition to organized labour's involvement in politics, he supported the CLC's decision to back the NEW DEMOCRATIC PARTY in 1961. M.D. BEHIELS



Claude Jodoin, first president of the Canadian Labour Congress, 1956-66. He was a strong proponent of Canadian labour unity (*courtesy Public Archives of Canada/PA-116448*).



Trumpeting Angel, woodcarving by Louis Jobin, whose works have been recently "rediscovered" and are in great demand (*courtesy Royal Ontario Museum*).

Jogues, Isaac, Jesuit missionary, martyr (b at Orléans, France 10 Jan 1607; d at Auriesville, NY 18 Oct 1646). Jogues entered the Society of Jesus in 1624. Sent to the Canadian missions in 1636, he was captured and tortured by the Iroquois in 1642. A year later, Dutch traders arranged his escape to France. Nevertheless, Jogues returned to Canada in 1644 and in 1646 volunteered for a peace embassy to the Iroquois. He was murdered that year on his second trip into Iroquois country. In 1930 Jogues and 6 other martyrs of the Huron missions were canonized. JOHN S. MOIR

Johannsen, Herman Smith, "Chief Jackrabbit" (from his Cree name), ski pioneer (b at Horten, Norway 15 June 1875). One of the best all-round skiers in Norway during the early 1890s, he became a salesman of engineering equipment and made Montréal his headquarters in 1919. A pioneer in all forms of skiing, he cut alpine and cross-country trails all over the Laurentians and acted as an organizer, instructor, coach and official of international stature well into his nineties. A living legend in 1984, he remains a quick-witted and popular speaker on skiing and natural living. He is the patron of the nationwide "Jackrabbit" league, which introduces children to cross-country skiing. MURRAY SHAW

John Labatt Corporation, with head offices in London, Ont, is a management holding company which was begun as a small family brewery in 1832 by John Kinder LABATT. The company was incorporated in 1930 and became public in 1945. Today it has interests in 3 areas: brewing, packaged food and agricultural products. The principal company in the brewing group is Labatt Brewing Company of Canada; Laura Secord and Catelli are parts of the packaged foods group. John Labatt Corporation has also been involved, with Redpath Industries, in the Zymaize experiment, producing high-fructose syrup from corn. As of Apr 1983, it had $1.9 billion in annual sales or operating revenue (ranking 43rd in Canada), assets of $953 million (ranking 88th) and 11 000 employees. BRASCAN LTD holds 40% of the shares. DEBORAH C. SAWYER

Johns, Harold Elford, physicist, educator (b at Chengtu, W China 4 July 1915). Educated at McMaster and U of T, Harold Johns devoted his career to the application of physics to medicine and biology and to training students with similar interests. He is best known for his development of COBALT therapy units which revolutionized the radiation treatment of CANCER worldwide, and for his pioneering efforts in a variety of areas of medical physics and photochemistry. His work was at all times characterized by the application of imagination and experimental skill backed by theoretical rigor to the solution of major problems, largely related to cancer diagnosis and treatment. An inspiring and enthusiastic teacher and lecturer, he was the initiator of Canada's first department of medical biophysics at U of T and gained international recognition for his research and educational efforts. He is author of numerous scientific papers and *The Physics of Radiology* (1961, rev 1970). GORDON WHITMORE

Johnson, Byron Ingemar, "Boss", businessman, politician, premier of BC (b at Victoria 10 Dec 1890; d there 12 Jan 1964). After service in WWI, Johnson and his brothers formed a building supply company in Victoria. Elected as a Liberal in Victoria in 1933, he was defeated in 1937. During WWII he was in charge of building RCAF airports in BC. In 1945 he was elected Coalition (Liberal) MLA for New Westminster and in 1947 succeeded John HART as premier. The coalition disintegrated in 1952 and Johnson was personally defeated in the election. His government introduced compulsory hospital insurance and the retail sales tax, negotiated the Alcan agreement, promoted highway expansion and began extension of the Pacific Great Eastern Ry. PATRICIA E. ROY

Johnson, Daniel, lawyer, premier of Québec (b at Ste-Anne-de-Danville, Qué 9 Apr 1915; d at the Manic Dam near Baie Comeau, Qué 26 Sept 1968). Elected Union nationale MNA for Bagot in the 1946 by-elections, he did not enter the Cabinet until 1956, when Maurice DUPLESSIS made him minister for hydraulic resources. Chosen party leader in 1961, he worked to reorganize the UNION NATIONALE by giving it a solid program and democratic structures. In 1965 Johnson published *Égalité ou indépendance* and had his party adopt the principle — political equality between the 2 founding peoples of Canada — that was his government's touchstone on the subject of constitutional reform. Having won power in 1966, the new premier continued and even accelerated the major reforms of the QUIET REVOLUTION; for example, he created the U du Québec and Radio-Québec and laid the foundations for the future health-insurance system. PM Pierre TRUDEAU strongly disagreed with Johnson's defence of Québec's interests in FEDERAL-PROVINCIAL RELATIONS and his search for a new constitutional arrangement. Johnson is the father of Pierre-Marc Johnson, a minister in the Parti Québécois government, and of Daniel Johnson, a Liberal MNA. DANIEL LATOUCHE

Johnson, Edward, tenor, opera administrator (b at Guelph, Ont 22 Aug 1878; d there 20 Apr 1959). After amateur experience in Guelph and success in a Broadway operetta, Johnson studied singing in Italy, made his opera debut in Padua in 1912 and for 8 years, calling himself Edoardo Di Giovanni, won a devoted Italian following. In 1919 he joined the Chicago Opera Co and in 1922 went to New York's Metropolitan Opera where for 13 seasons he remained one of its most highly acclaimed singers. During this period he made a few recordings. As the Metropolitan Opera's general manager 1935-50, Johnson expanded the company's repertoire and introduced to the public many of opera's most spectacular personalities. Retiring to Canada in 1950, he helped establish the Edward Johnson Foundation to support public music education. BARCLAY MCMILLAN

Reading: R. Mercer, *The Tenor of His Time* (1976).



Emily Pauline Johnson, the daughter of a Mohawk chief and an Englishwoman, best known for her poetry celebrating her Indian heritage. She is shown characteristically dressed as an Indian princess (*courtesy Public Archives of Canada/PA-111473/Cochrane*).

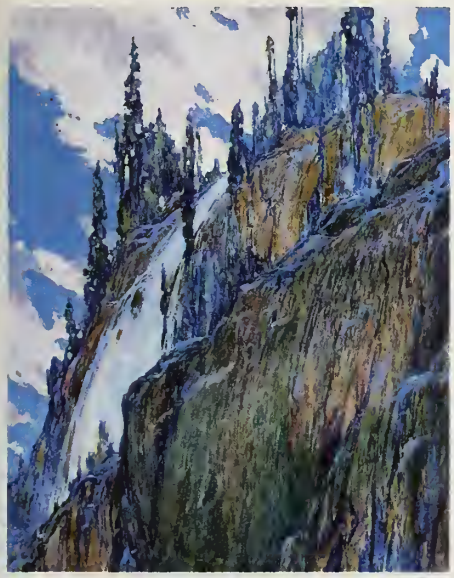
Johnson, Emily Pauline (she adopted the native name Tekahionwake, meaning "double wampum"), Métis poet, entertainer (b at Six Nations IR, UC 10 Mar 1861; d at Vancouver 7 Mar 1913). The daughter of a Mohawk chief and an Englishwoman, Pauline Johnson is best known for her poetry celebrating her Indian heritage, such as "The Song My Paddle Sings." Her work was well received by critics and popular with the public during her lifetime, but faded into obscurity after her death. Much of her writing might be seen as an early expression of NATIONALISM since it deals with Canadian themes. Between 1892 and 1910 she undertook a series of speaking tours in Canada, the US and England. She crisscrossed Canada, giving poetry readings in many remote settlements that saw few other forms of entertainment. Characteristically dressed as an Indian princess, she acted as a Canadian cultural ambassador throughout her travels. Her first collection of poems, *White Wampum,* was published in 1895, followed by *Canadian Born* (1903); *Flint and Feather* (1912); a volume of tales, *Legends of Vancouver* (1911); and a novel, *The Shagganappi* (1913). HARRIET GORHAM

Johnson, Sir John, soldier, Loyalist, public servant (b at Mohawk Valley, NY 5 Nov 1742; d at Mount Johnson, near Montréal 4 Jan 1830). He was the son of Sir William JOHNSON and heir to the Johnson family's massive Mohawk Valley estates. With the outbreak of the AMERICAN REVOLUTION, he moved to Montréal and organized and commanded the 2 battalions of King's Royal Regiment of NY, a Loyalist Provincial corps. In Mar 1782 Johnson was appointed to command the British Indian Dept, a position he held until 1828. He assisted in resettling the LOYALISTS, especially along the upper St Lawrence. Appointments to the legislative councils of Québec in 1787 and Lower Canada in 1796 followed. During the WAR OF 1812, he commanded the Six Township Battalions of Québec Militia. ROBERT S. ALLEN

Johnson, Thorvaldur, plant pathologist (b at Arnes, Man 23 Oct 1897; d at Winnipeg 15 Sept 1979). Johnson became Margaret NEWTON's assistant at the Winnipeg Rust Research Laboratory in 1925 and was its head from 1953 until his retirement in 1962. His chief work was the plant-disease survey, especially for wheat. Following the discoveries of J.H. CRAIGIE, a constant watch was kept for new varieties of crop-plant diseases, and genetic material was collected for C.H. GOULDEN to breed into new disease-resistant wheats. Johnson later wrote the standard history, *Rust Research in Canada* (1961), and an informal memoir of the rust laboratory and its staff 1925-67. DONALD J.C. PHILLIPSON

Johnson, Sir William, superintendent of northern Indians (b at Smithstown, County Meath, Ire *c*1715; d at Johnson Hall, near Johnstown, NY 11 July 1774). As a landowner and militia officer Johnson amassed a fortune in the Mohawk Valley, NY, and cultivated close relations with the Six Nations Indians. Superintendent of Indian Affairs, he solved a number of problems of Indian-white relations and led Indians and irregulars in several actions in the SEVEN YEARS' WAR, including at Lk George (1755), Ft Niagara (1759) and Montréal (1760). Johnson's second wife was Mary BRANT, sister of Joseph BRANT. CARL A. CHRISTIE

Johnston, Francis Hans (later Franz), painter (b at Toronto 19 June 1888; d there 9 July 1949). Among those who founded the GROUP OF SEVEN in 1920, Johnston was unusually well trained in academic practice, first at Toronto's Central Technical School with Gustav Hahn and at the then Central Ontario School of Art with William Cruikshank and G.A. Reid. After a stint at Grip Ltd in 1908, he studied at Philadelphia and



Batchawana Falls (1918), tempera on illustration board, by Frank H. Johnston, who participated in the Group of Seven's first show in 1920 (*Collection of The Winnipeg Art Gallery, Ernest P. Mayer/Franz Johnston/Paul Rodrik Foundation*).

did commercial work in New York before returning to Toronto in 1915. In 1917-18 he was commissioned by the Canadian War Memorials to record the activities of Canadian flying personnel training for overseas duty. Johnston's landscapes reflect his knowledge of turn-of-the-century ideals, being more atmospheric than those of the Group. The difference in ideology and technique may partially explain why he participated only in the Group's first show (1920). Johnston may have felt also that the adverse publicity generated by the show might affect his sales. He was principal of the Winnipeg School of Art (1922-24) and taught at the Ontario College of Art (1927-29). JOAN MURRAY

Johnston, George Benson, poet, translator (b at Hamilton, Ont 7 Oct 1913). Johnston is best known for lyric poetry that delineates with good-humoured wisdom the pleasures and pains of suburban family life. After serving as an RCAF pilot in WWII and studying at U of T, Johnston joined the Dept of English at Carleton, where he taught until retirement in 1979. He is the author of *The Cruising Auk* (1959), *Home Free* (1966), *Happy Enough: Poems 1935-72* (1972), *Taking a Grip: Poems, 1971-78* (1978) and *Auk Redivivus: Selected Poems* (1981). His translations of poetry from Old Norse include *The Saga of Gisli the Outlaw* (1963), *The Faroe Islanders' Saga* (1975), *The Greenlanders' Saga* (1976) and *Wind over Romsdale: Poems by Knut Odegard* (1982). JAMES STEELE

Joint Commission, a mechanism used extensively by Britain and the US to settle bilateral disputes mainly of a technical nature. Bodies composed of one or more representatives from each country, occasionally with a neutral chairman, are appointed to collect the facts of a dispute and offer recommendations for its solution. The ancient principle of arbitration was revived in N America by JAY'S TREATY, 1794, which set up 3 commissions to resolve intractable British and American differences. One, identifying the "true" ST CROIX R mentioned in the TREATY OF PARIS, 1783, was outstandingly successful and began the use of mixed commissions to clarify the route of the Canadian-American border. The method was also applied to the determination of merchant-shipping losses in naval warfare and to disputes over the N Atlantic fisheries. When joint commissions failed, matters were referred to diplomatic negotiation (eg, ASHBURTON-WEBSTER TREATY, 1842) or to arbitration by a friendly power (eg, San Juan Is decision by the German emperor, 1872).

Following the US Civil War the practice began of referring a range of questions to a joint or mixed commission for simultaneous decision. The most famous of these bodies was the 10-member commission (among whose members was PM Sir John A. MACDONALD) that resulted in the 1871 TREATY OF WASHINGTON. Another commission, meeting in Québec City and Washington 1898-99 and including PM Sir Wilfrid LAURIER and 2 Cabinet ministers among its members, failed to settle the ALASKA BOUNDARY DISPUTE. The most successful mixed commission has undoubtedly been the permanent INTERNATIONAL JOINT COMMISSION (1909). Joint commissions between Canada and the US have dealt with diverse topics: fisheries, defence, marking of the boundary and reconciliation of trade statistics. Parity of membership has enhanced Canada's standing in an asymmetrical relationship, and both countries have benefited from the disposition to solve problems constructively.

D.M.L. FARR

Joliette, Qué, City, population 16 987 (1981c), inc 1863 and as a city in 1918, is located 60 km NE of Montréal on the banks of the Rivière L'Assomption, close to the Laurentians and surrounded by a prosperous agricultural region. It was founded around 1824 by Barthélemy Joliette, seigneur de Lavaltrie, who wanted to become involved in the forestry industry. The lumber mill was one of the first buildings constructed. The town's economy diversified rapidly with the establishment of stone quarries and a foundry. Joliette himself sought to establish new businesses, including a distillery (1839) and a railway (1848-50). After his death in 1850, diversification continued and the town has always had a varied manufacturing base, ranging from food products to ceramics, textiles, tires, building materials and specialized metal products. As of 1847, a classical college drew students to Joliette from surrounding areas. In 1858 the town became a seat of the district court, and toward the end of the century built a hospital. Establishment of the Joliette diocese in 1904 confirmed the town as a regional service centre. Today Joliette still plays a dual role as a small industrial and service centre, with 2 hospitals, several educational institutions, a CEGEP, a museum of art and government offices.

JEAN-CLAUDE ROBERT

Jolliet, Louis, explorer, cartographer, king's hydrographer, fur trader, seigneur, organist (bap at Québec 21 Sept 1645; d near Ile d'ANTICOSTI late summer 1700), best known as the co-discoverer of the Mississippi. In 1656 Jolliet entered the Jesuit college at Québec where he studied for the priesthood and became an accomplished organist. He took his minor orders in 1662 but left in 1667 to become a fur trader. In 1672 he was chosen by Intendant Jean TALON to lead an expedition to determine whether the Mississippi, known from native accounts, flowed into the Gulf of Mexico or the Pacific Ocean. By 17 June 1673, Jolliet, with Father MARQUETTE and 5 others, was on the Mississippi and in mid-July he reached 33°40′ N lat near the mouth of the Arkansas R, sufficiently far S to prove that the river flowed into the Gulf of Mexico. Upon his return to Québec, Jolliet was denied a fur concession he sought for the Illinois area and joined his father-in-law in a company trading at Sept-Îles. In Mar 1679 Jolliet was granted a trade concession at Mingan in the Gulf of St Lawrence to which Ile d'Anticosti was added in 1680. After an overland voyage to Hudson Bay in 1679 Jolliet concentrated on trade and fisheries at his concession until 2 raids by the English in 1690 and 1692 dealt him a financial blow from which he never recovered. Jolliet was commissioned in 1694 to chart the Labrador coast, a task he accomplished to 56°8′ N lat near the present Zoar. In 1697 he succeeded Franquelin as king's hydrographer and teacher of navigation. C.E. HEIDENREICH

Joly de Lotbinière, Sir Henri-Gustave, lawyer, politician, premier of Québec 8 Mar 1878 to 31 Oct 1879 (b at Épernay, France 5 Dec 1829; d at Québec C 15 Nov 1908). He represented Lotbinière in the Assembly of the PROVINCE OF CANADA 1861-67, in the Québec Assembly 1867-85 and in the House of Commons 1867-74. Leader of the Liberal Party of Québec from 1867, he was asked to replace BOUCHER de Boucherville as premier. Joly was unable to govern effectively, lacking majority Liberal support, and his government was defeated in the Assembly in the fall of 1879. He returned to federal politics in 1896 and joined PM LAURIER's Cabinet as controller (later minister) of inland revenue 1896-1900. He was lieutenant-governor of BC 1900-06.

Jones, Alice, writer (b at Halifax 26 Aug 1853; d at Menton, France 27 Feb 1933). Developing international themes and the "New Woman" figure in her novels, Jones counterpointed the superficiality of European life against the vitality of Canadian society and character. Besides short stories and travel pieces for periodicals, she wrote *The Night-Hawk* (1901, pseud Alix John), *Bubbles We Buy* (1903, repr in England as *Isobel Broderick*, 1904), *Gabriel Praed's Castle* (1904), *Marcus Holbeach's Daughter* (1912), and *Flame of Frost* (1914). In 1903 a reviewer in *The Canadian Magazine* called her "the leading woman novelist in Canada," a consideration encouraged by her practice of including Canadian characters and settings in her fiction even after she had moved to France in 1905. GWENDOLYN DAVIES

Jones, Douglas Gordon, poet, literary critic, editor (b at Bancroft, Ont 1 Jan 1929). Jones ranks among the major lyric poets in English in Canada. He has written 4 books of poetry: *The Sun Is Axeman* (1961); *Phrases From Orpheus* (1967); *Under the Thunder the Flowers Light Up the Earth* (1977), which won the Gov Gen's Award; and *A Throw of Particles: New and Selected Poetry* (1983). Furthermore, his work as an editor of *ellipse* has been vital in making poets of English and French Canada mutually intelligible. Although chiefly inspired by rural Ontario and Québec, his work is not "nature" poetry, but rather a Taoist meditation on language, love and art whose roots are in Archibald LAMPMAN as well as Ezra Pound and William Carlos Williams. One of the crucial aspects of this poetry is its development from a central Canadian "garrison mentality" to neo-romanticism, expressed in the leitmotif of his book on Canadian literature *Butterfly on Rock* (1970) — "let the wilderness in." E.D. BLODGETT

Jones, George Clarence, naval officer (b at Halifax 24 Oct 1895; d at Ottawa 8 Feb 1946). Jones joined the RCN in 1911 and spent WWI at sea in British warships. From 1940 to 1942 he was commanding officer Atlantic coast, at that time the senior Canadian naval appointment on either coast. He became chief of the naval staff 15 Jan 1944, overseeing Canada's acquisition of major warships, including 2 cruisers and a light fleet aircraft carrier, and supervising the demobilization of the navy for peacetime. He died in office. ROGER SARTY

Jones, Hugh Griffith, architect, artist (b at Randolph, Wis 3 Dec 1872; d at Montréal 16 Feb 1947). Trained in Minneapolis, he practised in Chicago and New York, and came to Montréal in 1908 to work as a designer and assistant chief architect for the CPR. One of the designers of Toronto's UNION STATION (1913-14), his outstanding achievement was a redevelopment plan for the downtown core of Montréal on property owned by the CNR; the plan occupied his in-

terest 1923-32 but was thwarted by the world financial slump. Besides enjoying a successful private practice, Jones received wide recognition for his watercolours and oils, examples of which are in the Montréal Museum of Fine Arts. ROBERT LEMIRE

Jones, John Walter, farmer, politician, premier of PEI (b at Pownal, PEI 14 Apr 1878; d at Ottawa 31 Mar 1954). An unsuccessful Progressive candidate in the federal election of 1921, Jones was first elected to the provincial legislature as a Liberal in 1935. In 1943, following Premier Thane CAMPBELL's appointment as chief justice, he became premier. A student of agricultural science and a successful farmer, "Farmer Jones" championed rural interests. As premier he took on the powerful PEI Temperance Federation when in 1945 he favoured strict government regulation of intoxicants rather than PROHIBITION. When the lt-gov, a prohibitionist, refused assent to the necessary legislation, Jones, characteristically, proceeded by ORDER-IN-COUNCIL. During a 1947 Canada Packers strike, his government, claiming to "protect the farm interest," seized the plant, employed scab labour and outlawed unions affiliated with national or international labour organizations. Colourful, outspoken and popular, Jones was appointed to the Senate in 1953. DAVID A. MILNE

Jones, Peter, or Kahkewaquonaby (Sacred Feathers), Methodist minister, chief, translator (b at Burlington Heights [Hamilton], UC 1 Jan 1802; d at Brantford, Canada W 29 June 1856). Son of a white surveyor and a Mississauga (Ojibwa) woman, he became the first native Methodist missionary to the OJIBWA after his conversion to Christianity in 1823. With his brother John, he prepared the earliest translations of the Bible from English into Ojibwa. Elected chief of 2 Ojibwa bands, he argued articulately for Indian land rights. His *Life and Journals* (1860) and *History of the Ojebway Indians* (1861) were published posthumously.

DONALD B. SMITH



Peter Jones was converted to Christianity in 1823 and became a missionary to his Ojibwa people. He prepared the first translation of the Bible into Ojibwa (*courtesy Victoria University Library, Toronto*).

Jones, Richard Norman, scientist (b at Manchester, Eng 20 Mar 1913). A British-educated specialist in infrared SPECTROSCOPY, which is used to elucidate molecular structure, he retired from 3 decades of service with the NATIONAL RESEARCH COUNCIL in Ottawa 1978. Among his contributions was the harnessing of computers to refine instrumented spectrometric information. He was one of Canada's most "international" scientists, giving lectures and working on committees across the academic world. He developed strong links with Japanese colleagues and was a guest professor at the Tokyo Institute of Technology 1979-82. Having a historical bent, he has written illuminatingly on the origins and evolution of vibrational spectroscopy. His publications run to over 200 titles. N.T. GRIDGEMAN

Jones Case (1975) In *Jones* v *A.G. of Canada and NB* the Supreme Court had to judge, among other things, the validity of the federal OFFICIAL LANGUAGES ACT (challenged by Mayor Leonard Jones of Moncton), which makes English and French the official languages for everything that derives from the Parliament and government of Canada, by granting their use equal status, rights and privileges in all institutions of Parliament and of the government in Canada. The judges unanimously found that by virtue of its residual power Parliament could enact such a measure. GÉRALD-A. BEAUDOIN

Jones Konihowski, Diane, pentathlete, track and field coach (b at Vancouver 7 Mar 1951). Educated at Saskatoon, Jones first competed internationally for Canada in 1967, and has been a member of 3 Olympic teams since 1972, finishing out of the medals each time; she won gold medals in the 1975 and 1979 Pan-American Games pentathlon, and in the XI Commonwealth Games at Edmonton (1978) with a Canadian record 4768 points. Throughout her amateur career, she has spoken for Canada, athletes in general and women in sport. TED BARRIS

Jonquière, Qué, City, pop 60 354 (1981c), inc 1975, is located at the confluence of the SAGUENAY R and Rivière aux Sables, 5 km W of CHICOUTIMI and 200 km N of Québec City. Regional metropolis of the Saguenay-Lac St-Jean area, the present city includes the amalgamated municipalities of Jonquière, Arvida, Kénogami and the parish of Jonquière. It was named after J.P. de Tafanel, marquis de la Jonquière, governor of New France 1749-52.

As the industrial axis of the region, its history is closely tied to the history of big business, specifically to that of the Price and Alcan companies. An agricultural parish founded in 1847, Jonquière began developing in 1900 when a group of citizens built a pulp mill on the Rivière aux Sables. The mill was soon bought by William PRICE, who turned it into a paper mill. In 1911 the company built a larger paper mill near the town, which, like the town built to house its employees, was called Kénogami. By 1912 Jonquière was the major producer of newsprint in Canada. In 1925 the Aluminum Co of America (Alcoa, later ALCAN) built the aluminum plant that gave rise to Arvida on the plain between Jonquière and Chicoutimi. Arvida (from the name of *Ar*thur *Vi*ning *Da*vis, then president of Alco) was a fine example of a right-wing company town. Its 1926 charter contained many deviations from the Québec law for cities and towns. The company ran every aspect of the townspeople's lives, from the urban plant to education (the school board), sports and health. Besides factories, Alcan built a hydro station on the Saguenay near Jonquière, which was finished in 1931. During WWII Alcan boosted its production capacity at Arvida and built the Shipshaw hydro station, at the time the largest aluminum production centre in the Western world, a title it still holds. Basically an industrial centre, Jonquière began to change in the 1960s as services began to develop. Along with its commerce and professional services the city has since 1975 become home to the regional offices of a number of Québec government ministries. As well, the Collège de Jonquière (1967), part of the CEGEP network, has an admirable reputation at the provincial level.

MARC ST-HILAIRE

Joual is a type of Canadian French language. The term, often used pejoratively, derives from a colloquial pronunciation of the word *cheval* ("horse"), which came to symbolize this form of speech. Just as Canadian English is different from English spoken elsewhere, French in Canada is different from that of France. But the standard has traditionally been set in France alone. The more an individual's speech diverges from standard French (this usually depends on education), the more it is considered joual, but there is no clear dividing line between joual and simply Canadian French. Features such as *moê* (*moi*), *m'as partir* (*je vais partir*), *achaler* (*ennuyer*), and the extensive use of words borrowed from English are often construed to be joual; but such features are found in informal Canadian French in general.

The significance of joual is as much political and cultural as linguistic. The word was first given prominence in the early 1960s, at the beginning of the QUIET REVOLUTION, by André LAURENDEAU, editor of *Le Devoir*, and Jean-Paul Desbiens, author of Les INSOLENCES DU FRÈRE UNTEL, who attacked the "incorrectness" of Québec French as one of the evils of their society. At the same time, many Québec writers, especially those of the review PARTI PRIS, began using joual in their novels, plays, poetry, radio and TV scripts, and popular songs. For the first time, a substantial proportion of such material was being written in the real language of the people, rather than in an asepticized, artificial French. Most of these works were set among the working class, and while joual enhanced the social realism, it also symbolized the degradation suffered by the people as a result of English Canadian economic and political domination. The joual movement was controversial: many believed that such language should not be made public. For that reason Michel TREMBLAY's play *Les Belles Soeurs* was refused a government subsidy for a European tour. Today "joual" is no longer a watchword. The role of a spoken variety of Canadian French in popular culture is firmly established. SINCLAIR ROBINSON

Reading: M.M. Orkin, *Speaking Canadian French* (1971); Sinclair Robinson and Donald Smith, *Practical Handbook of Quebec and Acadian French* (1984).

Journalism is the occupation of a diverse group of people who earn their living by writing or editing material of current interest for dissemination via print or electronic media. The libertarian norms of "freedom of the press," the unofficial status of a "fourth estate," and the notion that modern society is greatly influenced by the content of the mass media all suggest an impressive and privileged role for the journalist in Canadian society. In an age of mass media administered by corporate executives, and rapid advances in electronic communications, the character of journalism is by no means simple to define.

Journalism has always been conditioned by a series of institutional constraints: the state, the party system, the business imperatives of MEDIA OWNERSHIP, and the impact of technological innovation. These factors have interacted throughout the development of Canadian journalism to condition the standards, style, social status and freedom of journalists. The professionalization of journalism is best understood as a historical process in which journalists responded to these various constraints with a variety of strategies to defend their group integrity. This process, however, has not amounted to a simple progression towards "freedom of the press." Instead, escape from one institutional constraint has led to a new one, usually more

subtle and posing even greater problems to the ideal of professionalization.

As a colony of the centralized Bourbon monarchy of France, NEW FRANCE was not allowed a printing press before 1760. Journalism came to NS in 1751 in the wake of the British expedition to found Halifax, and to Québec in 1764 after the British CONQUEST. The character of publishing and the nature of society, however, provided little scope for journalists. Most of the population was still illiterate and circulations were small. The typical journalist was usually a publisher, editor and printer all in one. The weekly newspaper "gazettes" that developed were dependent on government printing for revenue. Journalists were subject to arbitrary arrest and they often had to post bond to ensure good behaviour. A publisher could be convicted of criminal or seditious libel merely for criticizing public officials.

In an age of revolution abroad and political reaction at home, the outspoken journalist was associated with rebellion, sedition and treason, an impression reinforced by the defection of Joseph Willcocks to the Americans in 1812. Colonial elites looked upon the press as a convenience of the state, otherwise intolerable. The suppression of *Le Canadien* and the imprisonment of Pierre Bédard and François BLANCHET in 1810 is just one example of this intolerance. Most journalists, however, accepted state patronage, toed the official line, and served a faction of the ruling oligarchy.

The libel case of Joseph HOWE in 1835 established the press as a vehicle of legitimate dissent in Canada. Impatient with the slow pace of reform, Howe used his paper *The Novascotian* (acquired 1827) to criticize public policy and the magistrates who administered it. He was sent to jail and indicted for criminal libel. At his trial, he gave an impassioned defence of a free press and submitted evidence substantiating his allegations. Although he was clearly guilty, for the only issue of law before the court was whether or not he had published the defamatory remarks, the jury nonetheless acquitted Howe. The real and psychological threat of criminal libel that colonial regimes had held over the heads of publishers was now practically removed.

Further augmenting journalistic independence was the growth of commerce, literacy and the mechanization of printing. Colonial society began to experience serious tensions that gave rise to competitive political parties, first in LOWER CANADA, after 1800, then in UPPER CANADA in the 1820s, and later in the Maritime colonies. Political conflict gave scope for the newspaper as a vehicle for dissent, a ready readership for such "opinionated" journalism, and the backers necessary to supply operating capital when necessary. In this changed environment, journalism began to take on a different character. The chief offering of the mid-Victorian press was opinion, usually partisan. Partisan or not, the Victorian journalist entered his "profession" because he had something to say. It might be William Lyon MACKENZIE attacking the FAMILY COMPACT, or Egerton RYERSON defending the dissenting majority of Upper Canada in his *Christian Guardian*. "Personal" journalism flourished.

Individuality in journalism was often achieved at the expense of profit for the paper. Even large dailies were short-lived before Confederation. In the face of commercial uncertainties and the heat of political battle over RESPONSIBLE GOVERNMENT, journalists readily allied themselves with political parties. George BROWN, eg, was encouraged by the Reform Party in 1844 to start the Toronto *Globe*. He employed the *Globe* as a party organ to expand readership, and thereby to attract advertising revenue. The influence Brown gained as publisher helped consolidate his position as leader of the reconstituted Grit Reform Party after 1854, which in turn gave him tremendous editorial freedom as a journalist. Other successful newspaper entrepreneurs such as Edward Whelan of the Charlottetown *Examiner* or Etienne PARENT of *Le Canadien* exercised influence and enjoyed editorial latitude through their combined role of publisher-politician.

The payoffs of the party connection were real enough: partisan publishers gained access to patronage, power, even office. The progressive revision of libel laws to limit the liability of journalists, the formative conventions of the PARLIAMENTARY PRESS GALLERY, and favourable postal rates for periodicals were all effected at the high tide of party journalism. Partisan journalism, however, meant biased reporting. The maverick publisher faced financial reprisals, boycotts, loss of patronage and the threat of a new party-sponsored rival.

Party papers only gradually asserted their editorial independence after Confederation, 1867, leaving the norms of partisan conformity at least outwardly intact until 1914. Yet, even in the pioneer communities of the West, dependent party publishers like Nicholas Flood DAVIN of the Regina *Leader* or Frank OLIVER of the Edmonton *Bulletin* could offer quality in their news and editorial columns. Ultimately, party journalism did not prevent the achievement of better standards.

By the 1880s a revolution in the pattern of daily competition had begun. A new type of paper, the "people's journal," was developing in industrial cities to win a mass readership. Their style varied greatly, but they abandoned close affiliation with political parties and emphasized not opinion but news, especially sensational news. They were challenged by revamped quality papers, such as the Montréal *Gazette* or the Toronto *Mail*, which strove to win an elite readership by offering extensive coverage of political and business affairs. The dailies separated the functions of reporters, desk men, city and news editors, and columnists.

The personnel of journalism was changing in other ways as well. By the turn of the century, the increased complexity of the newspaper enterprise had encouraged the appearance of professional editors, such as John W. DAFOE of the *Manitoba Free Press*. The poorly paid reporter became the workhorse of the 20th-century newspaper office, and job pressures weeded out all but careerists. At the TORONTO STAR, Joseph E. Atkinson experimented in recruiting a few university men. Women were also able to gain entry into journalism, as Kit Coleman at the *Mail and Empire* and Edouardina Lesage ("Collette") at *La Presse*, eg, started their careers in the new "women's sections" (*see* CANADIAN WOMEN'S PRESS CLUB). E. Cora HIND, agricultural specialist of the *Manitoba Free Press*, and Simma Holt, crime reporter for the Vancouver *Sun*, found other ways to establish reputations.

The initiative in creating the original people's dailies was taken by individual entrepreneurs. Publishers were still people with something to say — and many failed precisely because they considered what they had to say more important than profits. Those who found a balance became the characters of their age: Hugh GRAHAM of the Montréal *Star*, E.E. Sheppard of the Toronto *News*, Wilson and Harry SOUTHAM of the Ottawa *Citizen*, and Joe Atkinson of the *Toronto Star*. Among the weeklies of the western frontier, Robert (Bob) EDWARDS of the Calgary *Eye Opener* (1902-22) and Margaret (Ma) Murray of the Bridge River-Lillooet, BC, *News* gained national notoriety.

The growing business imperatives of newspapers altered the conventions of the old party journalism. In Montréal, the sensationalist *La Presse* (1884) of Trefflé Berthiaume almost wiped out the old-style dailies. Party organs imitated



"Ma" Murray (*courtesy Provincial Archives of British Columbia/60425*).

the people's journals to survive. Beneath the gloss and diversity of the new popular style, however, a second more subtle revolution was occurring which proved more fundamental in shaping journalism as a profession: the industrialization of newspapers into big business. In the face of rising costs and factionalized advertising revenues, the chief imperative of all newspapers was to find the formula to maximize readership and attract the most ADVERTISING. Papers that fell behind were doomed to extinction. Between 1914 and 1931, the trend was established for the single newspaper city and the newspaper chain. Successful publishers became associates of the corporate elite. The model of journalism based on the "independent" editor-publisher was clearly obsolete.

Ironically, journalism as a profession had only escaped its partisan master to face a new order of big business. By the 1920s big-city dailies settled down in their rationalized markets to a superficial formula of day-to-day headline journalism. The rough edges of personal idiosyncracy were smoothed away and newspapers came to be more and more alike. The scoop, the stunt or the human-interest story substituted for editorial character. In this atmosphere a new ideal of objectivity or balanced coverage defined the professional ethos of career journalists, though the ideal was honoured no more consistently than the "principled" standards of the personal journalism it had superseded.

The triumph of a business ethos at big-city dailies prompted a variety of strategies to achieve a new degree of professionalism. The Canadian Press Assn and its successor, the Canadian Daily Newspapers Assn, were effective publisher lobbies which helped to rationalize the business side of newspapers; they also contributed to the defence of publishers' prerogatives in such classic challenges to freedom of the press as the arbitrary Alberta Press Act of 1937. (*see* ALBERTA PRESS ACT REFERENCE) John M. Imrie of the EDMONTON JOURNAL received a Pulitzer Prize for leadership in the fight.

News services developed at the initiative of publishers, CANADIAN PRESS, eg, emerging out of a rebellion of western newspapers against the Canadian Pacific Telegraph Co. By 1923 CP had become a nationwide co-operative of member papers, controlling the rights to the Associated Press world report. CP and its rivals were influential in developing the contemporary ideal of objective reporting, as they sought to serve an



CBC radio reporter (later premier of Québec) René Lévesque, interviewing a soldier during the Korean War, 14 Apr 1951. Many of Canada's leading political figures, from W.L. Mackenzie and Henri Bourassa to the present day, began their careers in journalism (*courtesy Public Archives of Canada/C-79009/DND Post-WWI Collection/MacLean*).

editorially diverse constituency. Also conducive to professional standards after 1900 was the Press Gallery which, by the 1920s, had become a voluntary, self-governing body. Admission gave entry to a competitive "jungle" in which political reporters sharpened their investigative skill.

By the mid-20th century the tempo of change accelerated. Journalism was transformed by the internal need of working journalists to develop new strategies to define role and status, and the external pressure from the communications businesses to find a successful formula in the competition for advertising. With the advent of television in the 1950s, old newspaper formats no longer assured a market share. In the resulting uncertainty, journalists found greater latitude for initiative. The PIPELINE DEBATE of 1957 seems to have been a turning-point, at which the Press Gallery began to act like a public watchdog, criticizing the government. Canadian political journalism (Jack Scott, Bruce Phillips, Douglas Fisher, Charles Lynch) suddenly became "opinionated" again — but this time in an adversary role with the politicians. Public-affairs programs on television, whether a newsmagazine such as "This Hour Has Seven Days" or a special documentary like "Air of Death" (1967), were particularly prone to editorializing about perceived public wrongs (*see* TELEVISION PROGRAMMING).

Technology gave greater latitude to the photo, film and broadcast journalists. René LÉVESQUE, eg, capitalized on the novelty of television to launch himself as a media star and leading personality in Québec politics. Gordon Sinclair settled for media stardom and personal wealth by simultaneously pursuing careers in 3 media.

The expanded opportunities for journalists did not translate into an improvement of working conditions, and journalists turned to union organizations to deal with problems of poor pay and job security, irregular hours and arbitrary management. The most successful union was the American Newspaper Guild (ANG), which signed its first collective agreement with the *Toronto Star* in 1949. By 1960 union rates, if not unionization, set the standards for the industry.

French Canadian journalists, following the bitter strike of French-speaking CBC personnel in 1958-59, became the militant vanguard. The radical idea of using collective bargaining to achieve editorial independence for staff members, however, was defeated in the bitter strike at *La* PRESSE in 1964. Though the 1969 contracts at *La Presse* and *Le* SOLEIL contained "professional clauses," the legal language deprived them of much substance. Declarations of editorial policy at management initiative, eg, at the *Toronto Star*, provided the most ambitious professions of standards in the industry, but could not resolve the tension between working journalists and the management of mass media organizations. A survey of Canadian journalists at major dailies in 1973 showed that 50% of those surveyed had their copy altered significantly without prior consultation. Unionized journalists took compensation in better working conditions, hours and pay, and thereby attracted a new generation of university graduates, including women, into its ranks.

After WWII some universities in Canada introduced courses in journalism. Carleton U and Ryerson Polytechnical Institute established the first full undergraduate programs, while U of Western Ontario became an innovator in specialty seminars and graduate programs oriented to working journalists. In 1968 Laval U introduced journalism in Québec universities. By the 1970s dozens of universities, community colleges and CEGEPs offered an array of diplomas, certificates and degrees in communications studies or journalism. By 1983, 10 universities offered graduate programs. The changes in educational standards were evident by 1973: over 40% of working journalists at city dailies had a university degree of some kind.

By the 1960s journalists had become more self-critical about their craft. Organizations of working journalists, eg, la Fédération professionnelle des journalistes du Québec or the Institute for Investigative Journalism, provided a forum for journalists to develop a common sense of professionalism, as did radical "alternative" magazines such as *Content*. A few newspapers and the CBC (after 1967) provided training programs, though these initiatives were weakened rather than strengthened by community college programs. Some newspapers initiated summer training schools for select university undergraduates. Since 1962 the Southam chain has offered fellowships for a year of study at U of T, and by the 1980s journalists were often granted a leave of absence to further their formal university studies.

The trends in unionization, university education and professional development contributed to a rising debate about the role of the press and its freedom. Critics came up with a variety of catch phrases to rationalize a new degree of professional independence and indict the status quo. Under the influence of communications theory, newly affluent journalists became self-conscious about bias created by "snalwords," social class, or "pack journalism"; their ideological role as gatekeepers; and the behavioural effects of the mass media. Proposed reforms included advocacy journalism, investigative reporting and the more radical notions of an alternative press, "staff democracy," or reporter control. The New Journalism, however, was far less radical than the rhetoric would imply. Compromise on standards was made possible by the technological nature of the new media environment. Efficient use of news-gathering technologies required some delegation of authority and editorial independence, at least to the more experienced reporters. Moreover, changes in technology made it imperative to find journalistic formats that attracted the attention of a more affluent and sophisticated audience. *See also* MAGAZINES; NEWSPAPERS. BRIAN BEAVEN

Reading: W.H. Kesterton, *A History of Journalism in Canada* (1967); P. Rutherford, *Making of the Canadian Media* (1978).

Juan de Fuca Strait is an inlet of the Pacific Ocean between VANCOUVER I and Washington state, connecting the Str of GEORGIA and Puget Sound to the outer ocean. The international boundary with the US follows its 160 km length. Tides are complicated and dangerous for ships using it to approach mainland harbours. It was named for mariner Juan de FUCA, whose voyages to the area were likely apocryphal. In 1787 the trading captain Charles Barkley entered the strait and named it. For many years it was considered a possible entrance to a NE passage to the Atlantic. DANIEL FRANCIS

Judaism is the religion of Jews. Canadian JEWS, with few exceptions, find their religious heritage in Rabbinic Judaism, which emerged after the destruction of the Temple in Jerusalem in AD 70, an event precipitated by a Jewish revolt against the Roman Empire. By the 7th century Rabbinism was the religion of virtually all Jews in the Middle East, N Africa, Asia Minor and Europe. It remained the dominant form of Judaism there through the late 19th and early 20th centuries, the period of massive immigration of Jews to N America.

The Rabbinic Judaism of the immigrants had provided them in their homelands with a comprehensive cultural system. According to the ancient rabbis (teachers; religious leaders), the God of Israel, YHWH, having made a covenant with the ancestors of the people of Israel, vouchsafed to Moses on Sinai a dual revelation (Torah). One, in written form, they hold, is the Pentateuch (the first 5 books of the Hebrew Bible); the other Moses communicated orally to the first of successive generations of Israel's (religious) leaders. The rabbis claim religious "mastery" because of their knowledge of the whole Torah. Although their writings — the Mishnah (oral law recorded about 200 AD), the Palestinian and Babylonian Talmuds and subsequent codes and commentaries — are expressions of Torah, ultimately Torah resides in the persons and pronouncements of rabbis and their disciples. The content of this whole Torah of Moses, "our Rabbi," is open-ended; under the authority of the rabbi's Torah come not only such matters as prayer, synagogue ("house of assembly") and

religious fasts and festivals, but also family, business, civil and criminal law, and the court system by which these are legislated and enforced. Thus the Rabbinism of the immigrants provided them with all requisites of religion, society, and culture.

The N American context provided Jews and Judaism with a cogent challenge. Free and open participation by a Jewish minority in N America's secular society (overwhelmingly indebted to Protestantism for its culture) meant relegating their life as Jews to something other than an all-encompassing cultural system. This was now defined by the Canadian and N American milieus, in which a reasonable level of participation was not only desirable but a requisite of economic survival. Canada was and remains a society in which cultural differences are permitted, even encouraged. But societies depend for their cohesiveness upon shared values and lifestyles. The costs of not conforming are social prejudice and limited economic opportunity. Insofar as Jews overwhelmingly opted to remain, in some significant sense, Jews, and to contribute fully to, and benefit from, Canadian life, they have adopted distinctive definitions of "Judaism" and "Jewishness" — all by means of an unofficial consensus, without regard to the authority of tradition, which is vested in the rabbi.

Canadian Jews generally practise Rabbinic Judaism highly selectively. Rabbinic legal injunctions (the *halakhah*, the "way") concerning such matters as refraining from all labour on the Sabbath and on festivals (New Year, Day of Atonement, Booths, Passover, and Pentecost) seem little honoured. So too are dietary laws, injunctions regarding daily prayer, distinctive dress, menstrual taboos, regular study of Torah and the like. Most laws governing business and the courts have been laid aside in deference to Canadian law and jurisprudence. Synagogues as the locus for communal prayer suffer infrequent and sporadic attendance, although formal affiliation through membership dues remains relatively high.

That Jews have abandoned much of their traditional religion is not surprising; most Canadians have done so. Nevertheless, Canada's Jews appear remarkably persistent in those parts of their traditional religion they do practise. For example, prayer services on the New Year (Rosh Hashanah) and Day of Atonement (Yom Kippur) see heavy attendance, along with fasting on the latter. Whereas laws pertaining to the Passover (Pesach) may not be observed, the family service and feast (*seder*) marking the first 2 eves of the Passover find widespread participation. Many families still gather at a Friday evening meal ushering in the Shabbat (Sabbath), although Sabbath observances are honoured by relatively few Jews. The festival of Hanukkah, commemorating the successful Jewish revolt against the Seleucid Empire in the 2nd century BC, also retains a considerable following. Further, there is general consensus among Canadian Jews that they should marry within the faith, even though intermarriage is increasingly common.

The consistency in what has been selected for continued observance is explained in part by Canadian Jewry's commitment to participation in N American life. Traditional practices which impinge upon an "appropriate" level of participation in Canadian life have been abandoned. But Canada's Jews remain Jews and wish to invest that identity with some transcendent, or religious, legitimacy and meaning. Hence, most contemporary Jewish practice stresses the importance of family and people. In all the retained ritual activity, Jewish peoplehood and its constituent unit, the Jewish family, are endowed with ultimacy. God and Torah seem either conspicuously absent or carefully hidden.

This selective practice has its counterpart in other activities recently incorporated into the "religion of Jewish peoplehood." The destruction of European Jewry in WWII's Holocaust and the establishment of the state of Israel have come to constitute powerful symbols to Canadian Jewry of the "eternity" of the people, guaranteed by a deity of whom few Jews will speak. Thus a mythic Israel (not entirely identified with the political state) appears a phoenix rising out of the ashes of Auschwitz (one of the most notorious death camps, where millions of Jews were killed), the ultimate symbol of those forces bent upon destroying the people. These events function as sacred stories, endowing Jewish peoplehood with transcendent meaning, but the actual events that brought about both the mass murder of Europe's Jews and the politics of Israel have relatively little significance. Thus, Holocaust Memorial Day (and the functions related to the Holocaust) and Israel's Independence Day have come to constitute major "religious" commemorative festivals for Canadian Jews.

In sum, the dynamics of the religion of Canada's Jews lie in 2 principal commitments: first, to full participation in Canadian life and society; second, to retention, in some significant way, of the Jewish identity.

Institutions Canadian Jewish institutions are both instruments for the realization of ideas selected from European and N African rabbinical traditions, and a social reality in themselves. Belonging to virtually any Jewish group, which may range from a weekly bridge club to a Zionist association or a Jewish hospital, has become a definition and measure of being Jewish. Statistics are not available, but participation is high.

Jewish religious organization in Canada is not limited to the spiritual, to Torah learning, or to the ritual. It reflects communal, social and educational, as much as theological, concerns. This is true of synagogue membership and even of its leadership. From 1770 to 1860 each local community established one synagogue. Montréal alone had 3 by 1882. In the 1880s, with the strong informal organizational traditions of the great migration, orthodox congregations in Montréal, Toronto and Victoria multiplied beyond record. By the mid-1920s there were many more congregations than now remain.

After WWII congregations reorganized and consolidated, thus reducing the total number, despite increased Jewish population and a larger proportion of it willing to identify with a synagogue. In 1963 Max Bookman counted 210 Canadian congregations, but in 1982 there were 113 synagogues, 57 of them in Montréal, Toronto and Winnipeg, the rest in 40 other centres. Fifty-two are Orthodox, 45 Conservative, 15 Reform, and one (in Montréal) Reconstructionist. The distinctions are not rigid; there is a wide gradation, but no clear demarcation. There are no true denominations in the Christian sense, and all divisions are in communion. Each synagogue creates its own place in the order, as, in fact, does each Jew.

The synagogue is probably a greater focus for family life than it was in the past, and it is a major vehicle for Jewish culture and tradition. The cantor (one who sings liturgical music and leads a congregation in song and prayer) has won a key role which he has not had for 1000 years. Musicologists may find in the Canadian synagogue a very high quality of performance. In larger cities, synagogues (and to some extent their clergy) compete for congregations in a common pool of potential members — in a manner somewhat akin to the merchandising philosophy of consumerism; frequently the product is bland and noncontroversial. The ancient decisive role of custom and consensus has dominated, but probably for the first time it has been a popular, not a learned, consensus. The rabbi has taken to pastoral and organizational work and to sermonizing frequently. He speaks in the language of contemporary sociology, not that of Talmud studies. In the Canadian synagogue there is not a deterioration but a new Jewish religious civilization slowly taking shape.

The centrality of Jewish organization dates mainly from the 17th-century Hassidic revolution and the emergence of secularism. In the new world of industrialization, cosmopolitanism and other concomitants of the American and French revolutions, the survival of Judaism could not depend solely on the expectation of divine intervention or on patient suffering of cataclysmic violence. From western Europe Judaism imported the fundamental philosophical value of organizing information, and of organizing a disunited society as an instrument of action. To counteract geographic dispersion, poverty, anti-Semitism and even the lack of a common language, the communal ideal of vol-



Schoolchildren viewing Old Testament scrolls at the Machzikel Hades Synagogue in Ottawa. The synagogue is a focus of Jewish tradition (*courtesy Canapress*).

untary organization arose. This inspiration led to the Zionist organization to restore statehood, the syndicalist Bund to bring nearer the other messianic objective of justice and equality, and other organizations. Since Jewish communities in the New World either were formed by migration of secularists or were quickly secularized, it was here that this philosophy flowered.

In Canada, local structures for voluntary self-taxation, such as the United and Combined Jewish appeals and welfare funds, enroll citizens for voluntary effort and financial contribution. This structure reaches nearly every Jewish citizen above the level of social aid recipients. The oldest such agency, the Hebrew Benevolent Society of Montréal (later Allied Jewish Community Services), was founded in the 1860s when a wave of eastern European migrants arrived. This group's prevailing civic religion altered, as it became ever more integrated into Canadian middle-class society, and its ethic moved from the religious to the philanthropic. Simultaneously, power and honour within the community moved from learning and piety to participation in organized services.

The Toronto, Winnipeg, Victoria and Saint John experiences were similar. At present their UJAs comprise nearly all the agencies dealing with the Jewish community's needs, from welfare to libraries and legal aid. That community's representatives apportion large budgets, study performance and, in effect, constitute the agencies' executive. In Canada, where the state is deeply involved in social work, contact with the political machinery is inevitable. The people selected for these processes must be devoted, skilled and trusted. They clearly constitute an elite, constantly required to justify their appeals to the total voluntary community.

The need for efficiency in communal concerns justifies the enrolment of available talent, regardless of individuals' commitment to the society's fundamental principles. But mobilization of "useful" manpower helps to cement more and more persons into organizational structures, thus strengthening the Jewish community and the (secular) Jewish identity of individual participants. This condition has opened participation and leadership in the community to women, who form a large talent pool. The National Council of Jewish Women, an old parallel to the Canadian Council of Women, has been influential from coast to coast. The Jewish Council of Women has for decades searched out the vanguard of social thought and has worked to introduce hitherto neglected areas of welfare.

Canadian Jews also consider themselves well served nationally by the Canadian Jewish Congress (fd 1919). This body deals with nationwide responsibilities, eg, co-ordinating immigrant reception, advancing civil rights, sponsoring historical interests and acting for Canadian Jewry on perennial international questions, especially those related to Israel. The congress works closely with the World Jewish Congress and other such institutions. The democratically structured CJC comprises representatives of Jewish groups across Canada. At its triennial plenary sessions virtually every Jewish man and woman has full opportunity of expression and is represented on its committees.

Another national organization is the B'nai B'rith, with both men's and women's chapters. It advances general Jewish causes and cooperates in adult education, welfare, camp programs and combating anti-Semitism. Because of its large membership it exerts some influence in the community, but it shuns controversy and does not pretend to innovation. Jewish Immigrant Aid Services is atypical in being an independent service organization, formulating and executing its own programs nationwide, though it co-operates closely with related agencies. Another structure independent of the central network is that of the Young Men's and Young Women's Hebrew associations (parallel to the YMCA and YWCA), with large memberships, broad programs and long traditions.

The Zionist movement is central in importance. It began with the thesis that scattered persons, by uniting, propagandizing and structuring their adherents, can accomplish politically what 2000 years could not achieve through communion, prayer and traditional communication. Zionism has had a simple purpose: to establish a publicly assured Jewish state in Palestine. Its history in Canada has involved gathering disparate Canadian Jews and forming local groups; raising funds; pleading with the outside world; and winning more and more of the Jewish community until the state took shape. Organization in Canada came early — even before Theodore Herzl crystallized the world movement in 1896. Remarkably, Canadian Zionists had broad support. The movement's structure was largely "political," divided along lines parallel to the division in world Zionism: labour Zionists (Po'alei Zion), religious Zionists (Mizrachi) and free enterprise (General) Zionists, each group engaged in such ideological programs but all supporting the advancement of the Jewish state.

The sectarian programs are still vigorous, notably the women's institutions such as Hadassah-WIZO and Pioneer Women (labour-oriented). But since WWII Zionism has become central, and Israel is conceived generally as essential to Jewish survival. Dissidents are hard to find. Although there are extensive organizations devoted entirely to Zionism, the major Canadian contribution to the Jewish state is provided not by strictly Zionist institutions, but by the total organizational structure of the community.

It is in education that the voluntary and democratic options of organization have their widest range. Every parent must decide whether his or her child is to receive training for living as a Jew, the nature of this education, and the relation between it and the Canadian provincial curricula. These questions, complicated by unavoidable ideological problems, have faced Canadian Jews (as they have, in some ways, faced Canadian Roman Catholics) for 2 centuries, and have evoked imaginative resolutions. Historically, solutions have included private tutors (*melammedim*), exclusive private schools and sections in established schools, universities and other institutions. Until recently, special schools (Talmud Torahs) have operated after public school hours. The children learn Hebrew, the Bible, religious practices and traditions, Jewish history and current affairs. Although many such schools are now in systems, a number continue to operate independently, and here Yiddish has remained a factor; Canada has been among the world pioneers in Yiddish education and literature.

Over 50 years ago Jewish day ("parochial") schools ventured to provide an integrated double curriculum, combining Jewish and public system curricula within the traditional public school timetable. This daring program succeeded and was widely adopted. The Jewish system of day and afternoon schools is essentially private, but the community has virtually assumed the additional cost of public education, even as Jewish parents continued to pay school taxes. Some provincial governments have begun contributing to the public education programs of Jewish day schools. *See also* JEWISH WRITING.

JACK N. LIGHTSTONE AND DAVID ROME

Reading: B.G. Sack, *History of the Jews in Canada* (1965).

Judicial Committee of the Privy Council, a British institution, until 1949 the court of final appeal for Canada. Drawn mainly from persons who had held high judicial office in Britain, with a sprinkling of Commonwealth judges, its authority rested on British statute and on the royal prerogative. An unsuccessful attempt was made by Canadian Justice Minister Edward BLAKE to abolish appeals to the Judicial Committee when the SUPREME COURT OF CANADA was established in 1875. Nevertheless, appeals in criminal cases were abolished in 1888, a limitation that existed until 1926, when it was held invalid. The STATUTE OF WESTMINSTER (1931) gave Canada the authority to re-enact the regulation. WWII delayed the movement for completely ending appeals, but in 1949 an amendment to the Supreme Court Act transferred ultimate appellant jurisdiction to Canada.

Arguments against the appeal to the Judicial Committee rested on the claims that it was demeaning for Canada to have to go outside the country for final judicial decision, that the Privy Council was poorly equipped to consider problems of Canadian federalism, and that the committee had misinterpreted the BNA Act in many of its more than 170 constitutional judgements. *See also* CONSTITUTIONAL HISTORY. D.M.L. FARR

Judiciary, judges of the courts, collectively; also, the branch of government in which judicial power is vested. Judges are public officers appointed to preside and administer the law in a court of justice. The CONSTITUTION ACT, 1867, provides for the establishment and operation of Canada's professional judiciary. It gave exclusive lawmaking power over CRIMINAL LAW and CRIMINAL PROCEDURE, but not over criminal courts, to the federal government, and exclusive lawmaking power over the administration of justice in each province to the provinces. The federal government appoints the judges of the SUPREME COURT and the FEDERAL COURT, and under section 96 of the Constitution Act it also appoints judges to some provincial courts. Sometimes referred to as "section 96 judges," they sit in the provincial Supreme Court or Court of Appeal or in equivalent courts such as the Court of Queen's Bench, the Divisional Court or the Superior Court. Provincial or municipal governments appoint judges of provincial lower courts, magistrates, justices of the peace, coroners, sheriffs and other officers of provincial courts. Provincially appointed judges deal with both provincial and federal legislation.

Whether it presides over criminal prosecutions or civil lawsuits (*see* CIVIL PROCEDURE), the role of the judiciary is to serve as an impartial arbiter. The court's impartiality flows from the essential feature of our judicial system — independence of the judiciary. Although the judiciary is sometimes regarded as equal to the executive and legislative branches of government, and although appointment, removal and remuneration of judges are dependent upon the other branches, the quality of justice to which Canadians are accustomed can only be maintained if an independent judiciary is jealously guarded. The notion of judicial independence has been shaken by some provincial court judges who have refused to rule on various cases, claiming they are not independent of the provincial government, which sets their salaries and working conditions.

The Constitution Act and the federal Judges Act provide the basis for the appointment, removal, retirement and remuneration (including matters such as pension) of federally appointed judges. Similar provisions contained in various provincial enactments which vary to some extent, from province to province, exist for provincially appointed judges. Most federal appointments are made by the minister of justice after Cabinet consultation and approval, but some, eg, to the Supreme Court and to the various chief and associate chief justiceships and judgeships, are made by the prime minister, again after Cabinet consultation and approval.

Prospective federal appointments are usually considered through the office of a special assistant to the minister of justice and are reviewed and rated by the Judicial Appointments Committee of the Canadian Bar Association. Provincial appointments are made by the attorney general of the province, after provincial Cabinet consultation and approval. Although there is no formal review by a Canadian Bar Association committee, in some provinces the attorney general appoints a judge only after consideration of the application by a special committee constituted for that purpose.

Federally appointed judges must be lawyers who have been members of a provincial bar for at least 10 years. Although "horizontal" appointments from bar to bench have been traditional, judges are now frequently elevated from a lower to a higher court. The composition of the judiciary is changing with the recent appointment of women, younger persons, academics and others. Provincially there is no minimum requirement of 10 years at the bar, and other eligibility rules vary among provinces. In some provinces prospective judges must have been members of the bar for 5 years, while in others they need not even be lawyers. Many police magistrates are retired members of national or local police forces. However, even in provinces where judges need not be lawyers, only lawyers are now appointed.

Federally appointed judges hold office during "good behaviour" and can be removed only by Joint Address of the House of Commons and the Senate. Under the federal Judges Act, however, matters not constituting good behaviour are given broad definition to include conditions such as senility. The Judges Act also created the Canadian Judicial Council, comprising the various federally appointed chief and associate chief justices whose president is the chief justice of Canada. The Judicial Council provides continuing education for federally appointed judges, makes recommendations to the minister of justice following investigation and review of complaints against them, and recommends, when appropriate, their removal. While no federally appointed judge has been removed this way, some have resigned in the course of or under the threat of the invocation of this impeachment process. Similar, but varying guidelines for judicial behaviour exist for provincially appointed judges. Some provincially appointed judges have been removed by an impeachment process which in certain provinces follows investigation and review by a provincial judicial council similar to its federal counterpart. Judges have been disciplined or removed for the commission of crime, moral turpitude or gross addiction.

Federally appointed judges hold office until their mandatory retirement at age 75 if they are serving on a superior court, or at age 70 if they are serving on a county or district court. After they have served 15 years on the bench and have reached the age of 65 or more, or, in the case of superior-court judges, after they have served 10 years on the bench and have reached the age of 70, they can partially retire or go "supernumerary," sitting on cases from time to time. The retirement age of provincially appointed judges (usually age 70) is set out in statutes creating the provincial courts.

The process of judicial appointment has always been surrounded with secrecy which has perpetuated the belief that political considerations influence the appointment of judges. It is widely held that to become a judge it is beneficial to be politically affiliated with the party in power — a fact generally regarded by the public in a somewhat negative way. However, a person should not be disentitled from a judicial appointment because of past political affiliation. This matter became the subject of public debate during the 1984 federal election following a spate of PATRONAGE appointments by the outgoing Trudeau Liberals. Since the early 1970s, all federal judicial appointments are externally reviewed by the Judicial Appointments Committee of the Canadian Bar Association. This review served as a buffer against the usage of judicial appointments as political patronage. This procedure was not followed in a 1984 appointment and the CBA publicly expressed its concern and created a national committee to study judicial appointments.

Most newly appointed judges are persons trained and experienced in the law. A great deal is expected of them by society, yet they possess no superhuman qualities. In return for special legal and ethical constraints imposed upon them, society provides them with status, prestige and trust. Because they are also entrusted with the ultimate responsibility of adjudicating personal, sensitive, delicate and emotional disputes as well as resolving the major social, economic and occasionally political issues that arise in some legal contexts, the judiciary helps mold the social fabric governing our lives.

GERALD GALL

Judique, NS, UP, pop 925 (1981c), is located 189 km SW of Sydney, Cape Breton I. The name is likely of French origin, perhaps a corruption of the name for Judith. Judique is an administrative district extending along Cape Breton's western shore from Port Hood to Port Hastings and including several small settlements. Known for its green meadows and many fine inlets and coves, Judique was settled by Highland Scots who emigrated to Pictou, NS, in the late 18th century in search of unoccupied farmland and finally settled on Cape Breton I. Judique became a prominent Catholic centre in western Cape Breton during the 19th century owing to the uninterrupted residency of Catholic priests. The area depended on mixed farming and fishing for its livelihood, but poor docking facilities discouraged development of the latter; outmigration of Judique's youth led to agricultural failure. Today, there is a little fishing and forestry, but no major industries. DEBRA MCNABB

Judo literally means "the gentle way." It is a sport developed from JIU-JITSU, a group of self-defence methods, but with certain harmful techniques eliminated or modified for safety's sake. Judo incorporates ethics, art and science into a sport which uses the opponents' strength against themselves. Judo was begun in June 1882 in Tokyo, Japan, by Dr Jigoro Kano in a small hall which became the Kodokan, the mecca of judo. Kano defined the purpose of judo as the training of one's mind and body to use energy efficiently, in competition and everyday life, toward the goals of physical development, contest proficiency and mental and moral development.

Around 1924 judo was introduced on the Canadian West Coast by pioneers such as S. Sasaki, first director of the Vancouver Judo Club. WWII moved many Judokas east of the Rockies, establishing new centres to practise the sport. Judo Canada, the governing body for the sport, was established in 1956. Each province has affiliated associations to help govern and promote judo. Participants are graded from 6th *Kyu* (white belt) to *Ikkyu* (brown belt) provincially, and from 1st *dan* (degree), or black belt, to 9th *dan*. The highest rank in Canada at present is the 8th *dan*.

Judo received Olympic recognition at the 1964 Tokyo Olympics, at which Doug Rogers won a silver medal for Canada in the heavyweight class. Since then, Canada has been represented at all Olympics, world championships and Pan-American Games. Other highlights for Canada were the 1981 world championships in Maastricht, Holland, where Phil Takahashi and Kevin Doherty both won bronze medals in the 60 kg and 78 kg classes respectively. Later Takahashi, Brad Farrow (65 kg) and Louis Jani (86 kg) won bronze medals at the 7th world university championships in Jyvaskyla, Finland, August 1982. YOSH SENDA

Jukes, Joseph Beete, geologist (b near Birmingham, Eng 10 Oct 1811; d at Dublin, Ire 29 July 1869). Jukes had attended geology lectures at St John's College, Cambridge, graduating with a BA in 1836. In 1839 he became Newfoundland's geological surveyor and began a scientific search for mineral resources, prospecting many coastal areas. After a fruitless search he returned to England in Oct 1840. *Excursions in and about Newfoundland* (1842), a rich record of colonial Newfoundland society 1839-40, emphasized negative results and discouraged "rash speculation" in mining. In 1842 Jukes was appointed naturalist on a surveying expedition into Australasian waters. His career culminated in 1850 with the directorship of the Geological Survey of Great Britain's Irish Branch.

RICHARD DAVID HUGHES

Julien, Octave-Henri, painter, illustrator (b at Québec C 14 May 1852; d at Montréal 17 Sept 1908). He began his career as engraver and lithographer with Desbarats's printing firm (about 1868), where he also learned drawing and painting. He accompanied the expeditionary force of NWMP sent to suppress the liquor traffic on the Prairies (1874) and prepared illustrations of western life for the *Canadian Illustrated News*. He became art director of the Montréal *Star* in 1888, where he developed his skill for capturing portraits with a few strokes of a pencil. He soon became Canada's foremost newspaper illustrator, executing brilliant cartoons of Sir Wilfrid LAURIER and his Cabinet. His keen interest and sharp sense of humour produced some of the best political comment of the time. He also worked in watercolours and oils, exhibiting regularly with the Royal Canadian Academy. JAMES MARSH

Julien, Pauline, singer, actress, songwriter (b at Trois-Rivières, Qué 23 May 1928). She studied drama in Paris and made her debut there as a singer about 1957. She first appeared in Montréal at a cabaret called Au Saint-Germain-des-Prés, and she introduced the songs of Kurt Weill and Bertolt Brecht to Québec, soon adding songs by Raymond Lévesque and Gilles VIGNEAULT to her repertoire. Julien made her first album in 1962 and 2 years later took second prize at the International Festival of Song in Sopot (Poland), singing "Jack Monoloy" by Vigneault. In 1968 she began to write some of the words for her songs. Feminism is only one of the topics she treats with fiery passion. As an actress she has appeared in several films, including *La Mort d'un Bûcheron*. Her album *Suite québécoise* won a Grand Prix du disque from the Académie Charles-Cros in Paris (1970) and she received the 1974 Prix de musique Calixa-Lavallée. HÉLÈNE PLOUFFE

Juliette, stage name of Juliette Augustina Sysak, singer, entertainer (b at St Vital, Man 26 Aug 1927). She started her singing career as a child, making her CBC radio debut at 15. After regular CBC appearances, "Our Pet, Juliette" ran her own program 1956-66. Her folksy pop style created one of CBC's most popular shows. This success was followed by several TV specials and regular CBC-TV performances: "After Noon" (1969-71) and "Juliette and Friends" (1973-75).

ANN SCHAU

Juniper, evergreen CONIFER, genus *Juniperus* of cypress family (Cupressaceae). About 60 species occur worldwide, primarily in the Northern Hemisphere; 4 are native to Canada. Of these, eastern red cedar (*J. virginiana*) of the Great Lakes



Common juniper (*Juniperus communis*), with flowers (left) and fruit (*artwork by Claire Tremblay*).

region, and Rocky Mountain juniper (*J. scopulorum*) of arid regions of BC, reach TREE size. Common juniper (*J. communis*) and creeping juniper (*J. horizontalis*), both shrub species, occur in the boreal forest and on the prairies. Scalelike or awl-shaped leaves usually have a distinct resin gland on the surface. The round, berrylike seed cones are composed of fleshy, fused bracts (modified leaves) and scales. Male pollen cones and female seed cones usually grow on separate trees. POLLINATION occurs in spring; cones mature in the second or third year, turning blue. They have been used as flavouring (eg, gin). The seeds are small, with 2 lateral wings, and the wood is hard, heavy, aromatic, purplish red and decay resistant. Juniper trees are usually too small to be commercially valuable in Canada, but are widely used as ORNAMENTALS. JOHN N. OWENS

Jurisprudence, literally "knowledge of law," is used in several different senses. Occasionally it simply means law in general or of a particular kind, eg, "medical jurisprudence"; rarely, it denotes the study of law, eg, an Oxford degree in jurisprudence. Today when using it civil lawyers (*see* CIVIL LAW) usually mean a body of case law or court decisions, and common lawyers (*see* COMMON LAW) usually mean a philosophical inquiry into problems about rather than of law, such as What is law? or What is the relationship between law and justice? In this sense jurisprudence in English-speaking countries has traditionally been divided into legal theory, analysis of specific legal concepts, and sources of law. Legal theory, generally considered the most important, focuses on the definition of law and analysis of the notion of a legal system. It has generated most of the jurisprudential literature and spawned many theories, including the theory of natural law, expounded originally by Aquinas, which views law as comprising rules that accord with right reason, and therefore claims an intrinsic connection exists between law and morality; legal positivism, according to which law is distinct and separate from morality, the validity of a law deriving from its pedigree rather than its content; legal realism, according to which, as expressed by some American scholars, law is only the practice of the courts and various officials, and as expressed by certain Scandinavian philosophers the concept is a fiction; pure theory, according to which law is a system of norms deriving from a basic norm; and Hart's theory of law, according to which laws are special kinds of social rules, legal systems depending on an interplay between them. Recently legal theory has gained attention not only from academic lawyers but from philosophers who have created an American Society of Philosophers of Law. A Canadian section was set up in 1982 under the director of the Westminster Institute for Ethics and Human Values in London, Ont.

Today, with accelerating change and law reform, it is becoming evident that fundamental questions of law are really questions of politics, and these in turn are ultimately questions of morality. Students of ethics, philosophers and students of jurisprudence are needed to assist in their exploration. This is clear in the work being done at the Westminster Institute, at the Centre for Bioethics in Montréal and at the Law Reform Commission of Canada, as well as in the more general investigations in Canada into the nature and justification of criminal law itself. It will become even clearer in future analysis of human-rights problems arising from the new CANADIAN CHARTER OF RIGHTS AND FREEDOMS.

PATRICK FITZGERALD

Jury A group of citizens summoned by law to render verdict on a question submitted in a court of justice. Originally, jurors testified too and decided issues on the basis of their own community knowledge, but since the admission of sworn testimony, jury verdicts have been based on evidence submitted at the trial.

Statute governs the right to jury trial. In criminal cases, summary and minor indictable offences (eg, theft not exceeding $200 in value) are tried without jury (*see* MAGISTRATE). Serious offences, eg, murder, treason, sedition and hijacking, require trial by jury (except in Alberta). With many less serious indictable offences the accused may elect jury trial. In civil proceedings (proceedings governed by provincial statutes) parties may elect to dispense with the jury except in cases involving libel, slander, seduction, malicious arrest or prosecution and false imprisonment. Even in those cases the jury may be dispensed with if both sides agree (in fact juries in civil trials are becoming the exception), and in highly complicated and technical cases, and in some instances where the assessment of damages is involved, the courts frequently refuse a jury trial.

Because provinces are responsible for the constitution and selection of juries, qualifications vary from province to province. Normally, all Canadian citizens between ages 18 and 65 or 69 who do not suffer mental or physical handicaps that might impede the performance of their duty and who have not been convicted of an indictable offence are qualified to serve as jurors. Certain classes of persons (and occasionally their spouses) are exempt, including members of the Privy Council, provincial Cabinets, the Senate, the House of Commons and provincial legislatures, lawyers, law students, judges, police, law-enforcement officers, clergy, doctors, dentists, veterinarians in active practice and employees of some essential services.

Jury lists (arrays) are prepared annually from a random selection of names from the county assessment roles or voters' lists. In Manitoba, Québec and New Brunswick the use of either official language in the courts is an entrenched right, and in many other areas the accused has the right to trial by a jury speaking his or her official language.

The county SHERIFF is responsible for the summoning and attendance of the jury. Persons normally qualified to serve may be excused on the grounds of illness or if undue hardship would result.

The "petit" (as opposed to a "grand") jury in criminal cases comprises 12 jurors, except in the Yukon and the NWT, where there are 6. The jury's verdict must be unanimous and based on evidence presented in court. If, after a reasonable time, there appears to be no hope of a jury reaching agreement (a "hung" jury), the judge may call for a new jury or set the case for retrial. Fewer jurors (usually 6) are required in civil cases, and unanimity is not necessary; it is sufficient that 5 agree.

The grand jury was the forerunner of the petit jury. The grand jury decided whether reasonable grounds existed for sending a case to trial. If so, it brought in a "true bill." Qualifications for grand jurors are the same as those for petit jurors. The grand jury has been abolished in Canada, except in Nova Scotia.

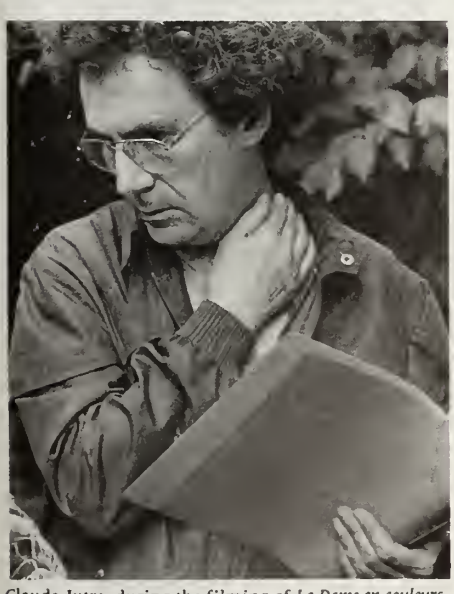
The jury in criminal cases has historically been regarded as the "foundation of our free institutions," although others have said it "puts a ban upon intelligence and honesty, and a premium upon ignorance and stupidity and perjury." Most surveys on the value of the criminal jury have supported its retention with minor changes, but juries in civil trials are becoming the exception, mostly as a consequence of the extra costs and time involved and the more complex and technical nature of the cases.

K.G. MCSHANE

Reading: Canada, *The Jury* (1982); P. Devlin, *Trial by Jury* (1956).

Justice, Department of, est 1868 by Act of Parliament. The responsibilities of the department include being the legal adviser of the governor general, superintending all matters concerned with the administration of justice in Canada (excluding the jurisdiction of provincial governments) and seeing that the administration of public affairs is in accordance with law. The minister is also attorney general of Canada responsible for the conduct of all litigation for or against the Crown or any public department. The department carries out, on behalf of the federal government, the legal functions and services customarily performed by a law firm for its clients. The Tax Review Board, LAW REFORM COMMISSION OF CANADA, CANADIAN HUMAN RIGHTS COMMISSION and SUPREME COURT OF CANADA report to the minister. The department's 1984-85 budget was $145 million.

Jutra, Claude, filmmaker (b at Montréal 11 Mar 1930). Jutra is best known as the director of *Mon oncle Antoine* (1971), one of the best-loved and most popular films made in Canada. He joined the NFB in 1956 and made a number of shorts before leaving for Africa, where he co-directed *Le Niger, jeune république* (1961) with Jean Rouch. Back in Québec he joined NFB's famed French unit, and directed several short films before attempting his first feature *A tout prendre* (1963), the film that launched the new Québec cinema. With *Mon oncle Antoine,* Jutra established his reputation as an accomplished film director. Set in a small Québec town on Christmas Eve, the film sensitively shows a young boy approaching manhood, and won many awards. *Kamouraska* (1973), an adaptation of Anne HÉBERT's novel, did not match expectations. After *Pour le meilleur et pour le pire* (1976), Jutra began to work in English for the CBC. "Ada" (1977), "Dreamspeaker" (1977) and "The Wordsmith" (1979) are among the most distinguished TV films produced in Canada. Jutra returned to the theatrical feature with *Surfacing* (1981), based on the Margaret ATWOOD novel, and *By Design* (1982). His warmth and ironic humour are evident in all his work. PIERS HANDLING



Claude Jutra, during the filming of *La Dame en couleurs,* 1984 *(courtesy Cinémathèque Québécoise/Alain Gauthier).*

Juvenile Delinquency, in social science, refers primarily to social acts of juveniles that are defined and evaluated as deviant or antisocial by legal or social norms and that are usually, though not always, socially learned. When children are designated "juvenile delinquents," it is a precise definition of their legal status and makes them wards of the court subject to its discretion (*see* JUVENILE JUSTICE SYSTEMS). In Canada provisions for special institutions and treatment for young people were available in 1857, but the first federal legislation dealing with juvenile delinquents was the Juvenile Delinquents Act passed in 1908 and revised in 1929. Under the Act, the definition of delinquency encompasses more than the adult crimes in the Criminal Code and includes "sexual immorality or any similar form of vice" as well as cases of neglected, abused or uncontrollable children. The Act established the state as a sympathetic guardian which treats the juvenile as a misguided child requiring care and supervision. Courtroom procedures are informal, allowing the judge wide discretion in deciding juvenile proceedings. Dispositions vary from a reprimand, fine or probation to committal to an institution.

In recent years the Act has been attacked for its paternalism, informality and failure to protect the basic rights of the child, and the new Young Offenders Act (passed July 1982, effective Apr 1984) should provide the same safeguards for juveniles as those accorded adults. The Act will likely cover only those young people charged with specific offences against the Criminal Code and other federal statutes and regulations; the age of criminal responsibility will probably be raised from 7 to 12 years and juveniles will have the right to legal representation throughout the court proceedings.

The official statistics on delinquency gathered from the records of public agencies, eg, the police, juvenile courts and correctional institutions, and published by the Centre for Justice Statistics, Statistics Canada, are valuable but reflect the actions of officials rather than children and limit understanding of the nature of delinquency and the process by which an individual becomes delinquent. The behaviour of children varies widely, and since all youngsters likely act in ways that can result in legal action, it is not correct to presume that children are either delinquents or nondelinquents. Moreover, clinically normal children are responsible for most of the delinquency in society, and although some maladjusted children do violate the law, there is no necessary correlation between delinquency and defective personalities. Also, police statistics do not reveal all the delinquency that occurs in society. Self-reported questionnaires on delinquent acts, administered to high-school students, reveal that juveniles from all social classes are responsible for a wide variety of delinquent acts, although according to a Montréal survey the toughest kinds of delinquency usually occur in urban slums. Other recent studies underscore the significance of poverty in explaining the distribution of delinquency.

Maximum delinquent activity occurs during middle adolescence. In 1981 the highest proportion (27.9%) of youths designated delinquent were 15 years old (juveniles aged 15 and 16 accounted for about 51% of all offences). Ratios were higher for boys, as expected, but the ratios for offences such as those relating to liquor and education as well as immorality and theft under $200 were much more balanced. Of the total number of officially reported delinquencies in 1981, 26% were for breaking and entering. Theft under $200 accounted for 13% of delinquencies; 6% were categorized as mischief. However, the violation of provincial statutes, which include less serious offences such as truancy, drinking under age and traffic violations, accounted for 23%. Of the 502 sexual offences (494 boys, 8 girls), juveniles aged 13 accounted for 15.5%, while youths aged 14 and 15 accounted for 55.7%. At 16 years of age this decreased to 14.6%. In 1981, 3 provinces accounted for about 65% of all juveniles designated delinquent: Québec 22.3%, Ontario 22% and Manitoba 20.1%. BC ranks fourth with 17.8%; in Alberta there was a decrease to 8.5%. The NWT, PEI and the Yukon together account for less than 1% of all officially designated delinquents.

Recent Research Research in CRIMINOLOGY and delinquency in Canada has increased considerably during the past 25 years, and the schools of criminology at the universities of Montréal, Toronto and Ottawa have developed into important centres of study. A new school of criminology has been founded at Simon Fraser University in Vancouver. Canadian research has been strongly influenced by American theory, eg, psychiatric theories, which argue that delinquency is a solution to psychological problems resulting from early, damaged family relationships; "sociogenic" theories, which emphasize the importance of learned behaviour; "subcultural" theories (gang and subcultural delinquency in Canada is not yet well documented), according to which working-class youths generate a new subculture of norms and expectations in which virtue consists of defying middle-class morality; labelling theories, according to which a delinquent career is a response to institutional processing by official agencies; and finally, control theories, proponents of which emphasize the importance of socialization in helping individuals develop appropriate emotions, beliefs and concerns that bond them to society.

In Canada techniques and mechanisms to control delinquency have not been effective. Treatment (a term that unfortunately implies delinquents have defective personalities that should be cured) programs are well established and include individualized treatment and counselling, group therapy and self-help groups, but their impact on delinquency has been no more impressive than behaviour-modification programs. Nonintervention programs are an attempt to minimize contact between the offender and the criminal justice system. This approach usually includes the idea of restitution and is likely to be successful with those who have committed harmless violations. However, modifications in the criminal justice system are not likely to have much effect on delinquent behaviour. Our understanding of delinquency will not develop without a considerable increase in the extent and quality of our knowledge about Canadian society and its seemingly endemic disparities in wealth, power and opportunities, and about the common motivations for crime and delinquency. Without a willingness to accept widespread reforms and solutions that require major readjustments to our way of life, a vast reduction in delinquency will never be achieved. EDMUND W. VAZ

Juvenile Justice Systems On 7 July 1982, Parliament enacted the Young Offenders Act (effective Apr 1984), which the government claimed would bring about a long overdue reform of Canada's juvenile justice system. This Act replaced the 74-year-old Juvenile Delinquents Act under which juveniles who contravened any federal, provincial or municipal laws were tried, convicted and sentenced. The system that evolved under that Act had permitted many injustices, eg, different age limits for juveniles from province to province, informal court proceedings, the criminalizing of young persons for acts and behaviour that were not illegal for adults, the subjecting of young offenders to indeterminate sentences that were not always related to the seriousness of the offence, and an arbitrary review process whereby the young offenders could be brought back to court at any time until they reached 21 to have new sentences imposed.

The main theme of the Young Offenders Act is that, although young people should be held responsible for their behaviour, they never-

theless have special needs which demand a lesser standard of accountability than that imposed on adults. At the same time, they should have the same right to fair and equal treatment before the law as adults.

Under the Canadian constitution, CRIMINAL LAW is a federal jurisdiction so this Act applies to persons between the ages of 12 and 18 who commit crimes and other offences that are defined in federal statutes. Persons under the age of 12 cannot be convicted of such offences, and those 18 and over who commit such offences must answer for them in adult court.

Generally a young person charged with committing an offence under this Act has the same rights and privileges as an adult who is charged with a crime, including the right to bail, to a hearing conducted according to the rules of evidence, to a lawyer, to a determinate sentence and to appeal. In addition, there are special safeguards for young persons charged under this Act; eg, offences are tried by a special Youth Court; notice of a young person being charged, arrested and detained is to be given to his or her parent(s); a young person, if detained in custody, is to be kept apart from adult prisoners; information which may identify young persons who are involved in Youth Court proceedings (as an accused, a witness or a victim) may not be published; the court may exclude persons from the courtroom; and access to a young offender's record is restricted.

Dispositions or sentences too are related to the needs and circumstances of young offenders. Where young persons are found guilty of an offence, the court may impose a variety of dispositions or sentences: including an absolute discharge; a fine (not exceeding $1000) and an order to pay compensation to the victim (in kind or by way of personal service); an order to perform community services; the placement of a young offender on probation for up to 2 years (or, in the case of certain serious offences, up to 3 years); and the placement of a young offender in custody for a period of up to 2 years or, for certain serious offences, up to 3 years.

Custody of a young offender may be open, ie, in a residential centre, group home, child-care institution or wilderness camp; or it may be secure, ie, the young offender is contained, either intermittently or continuously. An offender may only be sentenced to secure custody under certain circumstances related to the seriousness of the offence and to the offender's age and previous criminal record, and in cases where secure custody is considered necessary by the court for the protection of society and having regard to the offender's needs and circumstances. During the course of a disposition or sentence, it may be reviewed by the court (or by a review board, appointed by the province) and varied, if it is deemed necessary, because of changed circumstances of the offender or of the services available to him.

Where a young person 14 years of age or over is charged with certain serious offences, he or she may be ordered to stand trial in adult court, depending on the interests of society and the young person's needs having regard to the offence, the person's age, maturity, character and background, and the availability of treatment or correctional services.

The provinces, through provincially appointed officials, are responsible for providing care and supervision of persons dealt with under this Act. Youth workers prepare the predisposition reports for the court, supervise young offenders on probation, and assist young offenders in complying with their sentences. Provincial directors have certain authority to release young offenders from custody temporarily for medical, compassionate or humane reasons, for rehabilitative purposes, or to allow them to attend school or obtain employment. The provincial director may, under certain circumstances, transfer offenders from secure custody to open custody. The Act permits a province to set up "alternative measures" whereby, instead of answering in court for an offence, young offenders accept responsibility for it and agree to make compensation to the victim or to participate in a program of community service, education or rehabilitation.

Because the Young Offenders Act only applies to crimes and other federal offences, young persons who transgress provincial laws may answer for their offences differently in each province or territory. In 1984 only a few of the provinces and territories had legislation in place specifically dealing with young offenders of provincial laws. It appears that, in some provinces, provincial young offenders will be dealt with under special Acts; in others they will be dealt with under the same Acts that deal with adult provincial offenders; and in at least one other, they will be dealt with under the federal Young Offenders Act. It also appears that proceedings against young persons contravening provincial or territorial laws will contain most of the special safeguards contained in the federal Young Offenders Act. MARGARET DONNELLY

Kabalarian Philosophy, *see* NEW RELIGIOUS MOVEMENTS.

Kabloona (or non-Eskimo), the name given by Inuit to white Canadians who are long- or short-term residents in northern communities. Kabloona include missionaries, teachers, police, government personnel and their spouses or companions. Kabloonamuit, or "people of the white man," are those Inuit who are consciously imitative of Kabloona ways. They follow Kabloona-like customs, have a dependence on manufactured food and clothing, and seek wage employment whenever possible. RENÉ R. GADACZ
Reading: F.G. Vallee, *Kabloona and Eskimo* (1962).

Kahane, Anne, sculptor (b at Vienna, Austria 1 Mar 1924). Kahane is nationally recognized for dense, monumental and 3-dimensional figures carved in wood, portraying political satire, humour and human foibles. She immigrated with her parents in 1925, settling in Montréal at age 5. Kahane studied at Cooper Union School, New York C, 1945-47. Her entry took a prize at the first International Sculpture Competition sponsored by the Institute of Contemporary Arts, London, 1953. *Delegation* (Venice Biennale, 1953) is a strong statement on frustration and red tape. In the 1960s she carved large decorative panels for the Winnipeg airport and Winnipeg General Hospital, and figures for Montréal's Place des Arts. By 1978 Kahane had abandoned wood for thin, strong sheets of aluminum, which gave flexibility to figures flattened into abstraction. ANNE MCDOUGALL

Kain, Karen, dancer (b at Hamilton, Ont 28 Mar 1951). One of Canada's finest dancers, Kain graduated from the NATIONAL BALLET SCHOOL in 1969 and became a principal of the NATIONAL BALLET OF CANADA in her second season when she danced the Swan Queen in *Swan Lake.* In 1973 she won the women's silver medal and, with Frank AUGUSTYN, the prize for the best *pas de deux* at the Moscow International Ballet competition. Kain's strong technique, breadth of movement, sensitive musicality and daring attack are widely admired in both classical and contemporary works. She created major roles for Roland Petit (*Les Intermittences du cœur, Nana, Tales of Hoffmann)* and Constantin PATSALAS (*Inventions, Rite of Spring, Oiseaux exotiques)* and has been a guest artist with the Bolshoi Ballet, Petit's Ballets de Marseille, and, with Rudolf Nureyev, around the world. Kain starred in Norman CAMPBELL'S films of *Giselle* and *La Fille mal gardée. See also* BALLET. PENELOPE DOOB
Reading: D. Street, *Karen Kain, Lady of Dance* (1978).

Kaka, *see* QAQAQ ASHOONA.

Kale (*Brassica oleracea,* Acephala Group), cole crop (like CABBAGE, CAULIFLOWER, etc), belonging to the Cruciferae family. Native to the Mediterranean, kales are now more common in northern temperate parts of the Eastern Hemisphere. Types with attractive curly foliage and coloured centres are used as ORNAMENTALS. Kales are cold hardy but not heat tolerant; thus, they do best as spring or fall crops. Curly kales are 35-45 cm high, 65-75 cm wide. Upright, straight-leaved cultivars (commercial varieties) attain 75-90 cm in height. They mature in 55-65 days. They are vulnerable to aphids, cabbage worms, loopers, root maggots, damping-off and blackleg. Kales produce neither heads nor edible flowers, but are used mainly as a potherb, and are rich in vitamins A, B_1 and C. They are widely grown in Canadian gardens, but commercial production is limited. V.W. NUTTALL

Kallmann, Helmut, music historian, librarian (b at Berlin, Germany 7 Aug 1922). He is the foremost scholar of Canadian MUSIC HISTORY. The publication of his *A History of Music in Canada 1534-1914* (1960), the subject's first comprehensive treatment, delineated the field and encouraged other researchers. Since 1970 Kallmann has headed the Music Division of the NATIONAL LIBRARY OF CANADA, building there an unsurpassed collection of musical Canadiana — printed material, manuscripts and recordings. With K. Winters and G. Potvin he was editor of the ENCYCLOPEDIA OF MUSIC IN CANADA (1981) and responsible for its overall content.
BARCLAY MCMILLAN

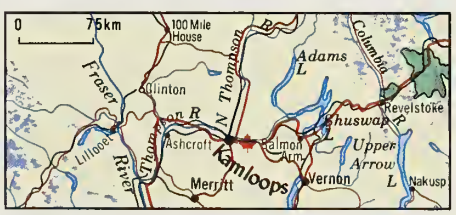
Kalm, Pehr, botanist (b in Sweden 6 Mar 1716; d in Finland 16 Nov 1779). Kalm was educated in Finland and Sweden. He met the leading European naturalist, Linnaeus, in 1741, and under his influence became an expert on botanical applications to agriculture. Linnaeus proposed a trip to N America to discover plants that might be viable in Scandinavia and chose Kalm, who reached Philadelphia in Sept 1748, to meet the foremost American naturalists. Arriving in New France in July 1749, he botanized near Lk Champlain before moving on to Montréal and Québec. His work there was financed by the French as a favour to Sweden. He met the leading scientific lights, including J.F. Gaultier and Gov LA GALISSONIÈRE. He returned to New York that autumn but made a botanical foray to Niagara during the summer of 1750. Returning to Sweden in 1751, he took up a professorship at Abo. Kalm's record of his visit to New France, published 1753-61, offers one of the best studies of intellectual and social life during the final years of the French regime. Besides providing new botanical information, it brought Canada to European attention. In his diary he stated that the scientific interest exhibited by the French was superior to that of the British Americans.
RICHARD A. JARRELL
Reading: P. Kalm, *The America of 1750: Peter Kalm's Travels in North America,* ed A.B. Benson (1927, repr 1966).

Kalvak, Helen, graphic artist (b on Victoria I, NWT 1901; d at Holman, NWT 7 May 1984). Although Kalvak only began to draw in her early 60s, she created over 3000 drawings vividly portraying the traditional life of the COPPER INUIT. Kalvak showed a deep interest in spiritual traditions, and her drawings are rich with references to legends, shamanism and ceremonial life. In the print *Kidnapper* (1973), Kalvak portrays Arnakafaluk, the legendary woman who appears out of the sea to kidnap children who wander away from their parents' camp. A recurring theme in her work is the interrelationship between the human and animal worlds. In the print *Don't Be So Noisy* (1969), the festive spirit of a drum dance attracts the curiosity of a polar bear. Kalvak's drawings, interpreted in stone relief or stencil prints by the printmakers of Holman, have drawn international attention. She was elected a member of the Royal Canadian Academy of Arts in 1975. *See* INUIT ART.
BERNADETTE DRISCOLL


Helen Kalvak, whose remarkable career as an artist did not begin until her early 60s (*courtesy Tessa Macintosh*).

Kamloops, BC, City, pop 64 048 (1981c), 71 722 (1982e); inc 1893 and amalgamated with N Kamloops 1967 to form the new city of Kamloops, is located in southern BC 420 km NE of Vancouver. It is situated at the confluence of the N and S THOMPSON rivers near their entrance into Kamloops Lk, and covers an area of 31 141 ha. Kamloops has a rapidly expanding role in mining, is the centre of BC's cattle industry, and is bidding to overtake PRINCE GEORGE as the largest city in the BC interior. It is governed by a mayor and 8 aldermen.

The region's first inhabitants were members of the Shuswap tribe of the SALISH nation, who named the area *cume-loups,* likely meaning "meeting of the waters." David Stuart of the Pacific Fur Co spent the winter of 1811 in the area and was impressed with the fur-trading possibilities. He built the first trading post, Ft Kamloops, in Sept 1812 — the first white settlement in southern BC. In Nov the NWC arrived and constructed a post, Ft Thompson, on the other side of the river. The HBC took over Ft Kamloops after the union with the NWC in 1821. In the 1850s gold seekers arrived; Kamloops became a depot for the region and farming began. The completion of the CPR 1885 encouraged further development, and by 1893 Kamloops had a population of 6000. Since the late 1950s, it has grown rapidly as a regional metropolis.



Served by the CPR and CNR and by Pacific Western Airlines, and situated at the junction of 2 large rivers and 2 highways, Kamloops is the natural trade and distribution centre in the southern BC interior, and is the financial, travel, cultural and administrative centre for Thompson-Nicola, Lillooet and Southern Cariboo regions. Initially, ranching and fruit and vegetable growing dominated the economy, but by the 1960s, the forest industry and mining had become more important. A large pulp mill and the province's only copper smelter are located here. Tourism is growing as well; the region's more than 200 lakes offer excellent fishing and boating, and several ski resorts are found nearby. Kamloops is served by the Royal Inland Hospital, by numerous provincial and federal agencies and by Cariboo Community College. It has 2 newspapers, a museum, art gallery, symphony orchestra and theatre company.
ALAN F.J. ARTIBISE

Kamouraska, Qué, Village, pop 442 (1981c), inc 1858, is located on the S Shore of the ST LAWRENCE R, 125 km NE of Québec City. In Algonquian its name means "rushes at the water's edge." In 1674 a seigneury was granted to Olivier

Morel de la Durantaye. In 1714 the parish of St-Louis was founded. In the 18th century, Kamouraska was one of the largest settlements on the S Shore. At the start of the 19th century, the seigneury belonged to the Taché family, one of whose members, Étienne TACHÉ, became prime minister of the PROVINCE OF CANADA 1854-56. Agriculture prospered in the area and the region was called "the granary of Lower Canada." In 1849 the first superior court outside Québec City was established here. Kamouraska was an important tourist area in the 19th and early 20th centuries. People came to admire the countryside, breathe the salt air and bathe in the sea. As the parishes grew in size, a number of them such as St-Pascal, St-Denis and Ste-Hélène separated from St-Louis, thus accounting for its small population today. Anne HÉBERT's novel KAMOURASKA recounts tragic events that occurred in 1839. ANTONIO LECHASSEUR

Kamouraska, novel by Anne HÉBERT (1970), is a psychological gothic romance based on an actual murder committed in 1839 in the village of KAMOURASKA, Qué, by a female ancestor of the author. The action takes place in Elizabeth's mind on the night of her second husband's impending death, transmuting the facts surrounding an earlier crime of passion into a haunting study of internalized guilt and the search for freedom. Attending Jérome Rolland's sickbed, she revisits in dream and memory her stifling childhood; her escape into an unhappy marriage to the squire of Kamouraska; an affair with Dr Nelson, with whom she plotted to kill her husband; her trial and acquittal; and her subsequent quest for respectability, leading to her second, equally stifling marriage. A fragmented juxtaposition of first- and third-person narration communicates Elizabeth's inner turmoil in an interior monologue with feminist overtones. Claude JUTRA's film *Kamouraska* (1973) captures the poetic quality of Hébert's writing, whereas Norman Shapiro's translation of the novel (1974) recaptures the jarring, schizophrenic quality of Elizabeth's narrative.
MICHÈLE LACOMBE

Kamsack, Sask, Town, pop 2688 (1981c), inc 1911, is located in E-central Saskatchewan, about 86 km NE of YORKTON and 27 km from the Manitoba border. The general area was fur-trading territory for many years, and the town was named after a well-known Indian. A DOUKHOBOR settlement was located nearby at the turn of the century. Kamsack primarily serves as an agricultural service centre for the surrounding district, which contains both grain and mixed farms. As a service centre, it provides a modern shopping area, medical, dental and hospital services, elementary and secondary schools, and a wide range of recreational facilities. DON HERPERGER

Kananaskis Country comprises 5200 km² of the front range of the Rocky Mts W of Calgary and adjoining the Trans-Canada and Kananaskis highways. It includes 4 zones. On the E are rolling sandstone foothills, with dry grassy areas and patches of lodgepole pine and aspen. Mammals include deer, hare, coyotes, moose and black bears. Higher up is a montane zone with a cooler, wetter climate that supports spruce, fir and birds (eg, warblers, thrushes, wrens). The alpine meadow zone displays carpets of wildflowers amid islands of larch and whitebark pine. Between 1830 and 2440 m is an alpine barren zone of rock, lichen and saxifrage, with glaciers prevailing along the Continental Divide. STONEY and SARCEE long occupied the area and, in the 19th century, numerous explorers, including John PALLISER (1858), penetrated the area searching for routes through the mountains. As settlement increased to the E, the area was exploited for RANCHING, logging, COAL MINING and HYDROELECTRICITY. Today, it is managed primarily for nature conservation and recreation. The area contains 3 provincial parks. Bragg Creek Park on the E (121 ha) offers swimming, fishing and camping. Bow Valley Park in the N has an extensive campground with many services. Kananaskis Provincial Park, a 508 km² section of mountain wilderness including an amphitheatre of glacier-clad peaks around the Kananaskis Lks, is 60 km S. It provides opportunities for outdoor recreation. JOHN S. MARSH

Kananginak Pootoogook, sculptor, designer, draftsman, printmaker (b at Ikerrasak camp, S Baffin I, NWT 1935). Son of the great camp leader Pootoogook, he came to Cape Dorset in 1957. In 1958, when James HOUSTON brought PRINTMAKING to the North, he became one of the 4 original printers. Kananginak works in all media, including silk-screen printing of textiles. However, he excels as an engraver and lithographer, particularly of wildlife art, which he has mastered completely while retaining a personal style with definite abstract qualities. His sister Napatchie and brother Paulassie are also good artists. GEORGE SWINTON



Dance of Love by Kananginak Pootoogook (*courtesy West Baffin Eskimo Co-operative, Cape Dorset, NWT*).

Kane, Paul, painter (b at Mallow, Ire 3 Sept 1810; d at Toronto 20 Feb 1871). The most famous of all Canadian artist-explorers, Kane emigrated with his family to York [Toronto] before 1822. He worked as a decorator of furniture, and in 1841-42 visited Italy to copy old masters. An exhibition of George Catlin's American Indian paintings in London so excited him that he returned to Canada determined to paint a similar series in the Canadian North-West. Kane left Toronto in 1845 to sketch Indians in their homelands and collect Indian legends. He travelled around the Great Lakes but, warned of the dangers of a solitary trip to the Pacific, he contacted Sir George SIMPSON, superintendent of the HBC, who arranged for him to accompany the fur-trade canoe fleets to the West. He joined the traders at FT WILLIAM [Thunder Bay, Ont] in May 1846 and travelled W with them to Ft Garry. He witnessed the last great BUFFALO HUNT in that region, continued to Norway House, and followed the Saskatchewan R to Ft Edmonton. After crossing the mountains on horseback, he descended the Columbia R to Ft Vancouver and sketched Mt St Helens and the coastal tribes around Victoria. He returned to Toronto in 1848, having made 700 sketches of western scenery and of Indians from some 80 tribes.



Paul Kane, the most famous of Canada's artist-explorers, shown here in his *Self-Portrait*, oil on paper (*courtesy Stark Museum, Orange, Tex*).

Kane lived quietly in Toronto after his return. He painted canvases from his sketches, rendered in a contemporary European genre style. One hundred canvases bought by George Allan are now in the Royal Ontario Museum, while 12 bought by the Canadian government are in the National Gallery. Kane's account of his travels was published in 1859 and translated into Danish, French and German. A Canadian classic, full of anecdotes, it complements his sketches in its vivid description of the life of Indians, Métis, HBC traders and missionaries in the 1840s.
J. RUSSELL HARPER

Reading: J.R. Harper, *Paul Kane's Frontier* (1971).

Kane Basin is a broad expanse of water, about 3900 km², that leads northward between the eastern shore of ELLESMERE I and the W coast of Greenland. It is relatively shallow; for the most part depths reach 180 m. Ice conditions are a severe impediment to navigation. The persistence and heaviness of sea ice prevent the southward drift of icebergs from the Arctic Ocean and those calved from glaciers coming off Greenland, which collect in groups at the glaciers' mouths. Favourable sea-ice conditions paradoxically increase the iceberg hazard, since these result in a marked increase in the outflow of formerly trapped icebergs. DOUG FINLAYSON

Kangaroo Rat, solitary, strictly nocturnal RODENT of the N American family Heteromyidae. The family comprises 75 species (*see* POCKET MOUSE). Of the 14 species of kangaroo rat only one occurs in Canada. Ord's kangaroo rat (*Dipodomys ordii*) of the Great Sand Hills of SW Saskatchewan and Alberta is one of Canada's rare desert-dwelling MAMMALS. Its front legs are weak; hindlegs, long and powerful. The tail, longer than the body, is used for support and balance. These features enable the rat to move by jumping. The kangaroo rat grows up to 30 cm long. Its body is tawny with white underparts. White patches occur on the upper lip, above the eyes and behind the ears; white stripes across the hips. Cheek pouches are used to carry grain to the burrow, where kangaroo rats shelter in winter. Insects are also eaten. Kangaroo rats drink little water, having adapted to minimal water loss. Although very agile, they are preyed on by carnivorous mammals, birds and snakes. The reproductive cycle is not fully understood: mating occurs in spring; gestation lasts 29-30 days. Females can produce 2 or more litters annually, each averaging 3.5 young. JEAN FERRON

Kapuskasing, Ont, Town, pop 12 014 (1981c), inc 1921, located on the Kapuskasing R, 493 km NW of North Bay. The name derives from an Indian term meaning "branch" (the Kapuskasing R being a branch of the Mattagami). Although the area had been explored since the 18th century by HBC and NWC fur traders, the site itself only came into existence in 1910 as a station along the National Transcontinental Ry, a line linking Québec City and Winnipeg, incorporated into the CNR system 1922. During WWI an internment camp was established near the town, its prisoner-of-war and "enemy alien" occupants developing what is now a federal ex-



perimental farm. After the war the community's agricultural base was further expanded by a government soldier-resettlement program. Kapuskasing's future lies in its rich surrounding forests; and since the 1920s the pulp and paper industry, represented by the Spruce Falls Power and Paper Co, and tourism have become its chief economic mainstays. Half of Spruce Falls's daily newsprint output goes to the *New York Times*.

MATT BRAY

Kap'Yong On 23 Apr 1951, during the KOREAN WAR, the 27th British Commonwealth Infantry Brigade was ordered to protect the withdrawal through the Kap'Yong R valley, about 20 km S of the 38th parallel in central Korea, of the ROK (S Korean) Division, which had been dislodged by a major Chinese offensive. The 2nd Battalion, Princess Patricia's Canadian Light Infantry, and the 3rd Battalion, Royal Australian Regiment, were assigned forward hilltop positions, the Canadians on the west side of the valley and the Australians to the east. The Australians bore the brunt of the initial attack and were forced to retreat, with 155 casualties, late Apr 24. The Chinese then turned their attention to the PPCLI, which managed in heavy all-night fighting on Apr 24-25 to stop their advance. Canadian casualties were 10 killed, 23 wounded. The battle contributed significantly to the defeat of the general Chinese offensive. Both the Canadians and the Australians received Distinguished Unit Citations from the American government.

DENIS STAIRS

Karlsefni, common name for Thorfinnr Thordarson (*fl* 1000-20). Sometime between 1003 and 1015 AD Karlsefni set out to colonize Vinland. Evidence for his adventure, based on the *Eric the Red's Saga* and the *Greenlanders' Saga* is vague and the location of the colony impossible to identify, but excavations at L'ANSE AUX MEADOWS ended doubts that the Vikings had reached America. *See* NORSE VOYAGES.

JAMES MARSH

Karoo Ashevak, artist (b near Spence Bay, NWT 1940; d there 19 Oct 1974). Gaining recognition only late in his short artistic career, Karoo is now acknowledged as an important figure in contemporary Canadian INUIT ART. He grew up living the traditional life on the land and began carving in the late 1960s after moving into Spence Bay. About 5 years later he and his wife perished in a fire at their home. Karoo brought to his work a lively imagination, a knowledge of traditional culture, a love of gadgets and tremendous skill as a carver. Working primarily in whalebone with stone, baleen and ivory highlights, he gave to his subjects — people, SHAMANS, animals and birds — a sense of life, humour and spirituality. The approximately 250 sculptures he produced during his lifetime are now eagerly sought after.

JEAN BLODGETT

Karsh, Yousuf, photographer (b at Mardin, Armenia-in-Turkey 23 Dec 1908). As a boy Karsh survived the Armenian massacres and escaped to Canada in 1924 to live with a photographer-uncle, George Nakash. Later he apprenticed under photographer John H. Garo of Boston, Mass, where he learned the dramatic use of lighting that characterizes his work. He opened a studio in Ottawa in 1932 and met with growing success. In 1941 he photographed the visiting British PM Winston Churchill. That portrait, the first to carry the copyright "Karsh of Ottawa," brought him international fame and remains one of the most widely reproduced portraits in the history of photography. Karsh photographed famous personalities on every continent and his portraits of political, literary, artistic, theatrical and scientific figures made being "Karshed" (Field Marshal Viscount Montgomery's term) a mark of achievement. His work hangs in major art galleries in Europe and N America and his *Portraits of Greatness* (1958) set new standards for Canadian publishing. In 1965 Karsh was awarded the Canada Council Medal and in 1968 the Medal of Service of the Order of Canada.

IAN MONTAGNES

Reading: Y. Karsh, *Karsh: A Fifty-Year Retrospective* (1983) and *In Search of Greatness: An Autobiography* (1962).



Yousuf Karsh, a photo montage of the internationally known portrait photographer, Sept 1960 (*courtesy Public Archives of Canada/PA-123864/Duncan Cameron*).

Karst Landform feature created on the Earth's surface by the drainage of water into the ground or its discharge at springs. The term derives from an area on the coast of Yugoslavia where these features (eg, sinkholes, CAVES, natural bridges, sinking streams, etc) are common. Karst landforms are an important variant of landforms created by flowing water. In the former, water is routed underground via solutional cave systems, instead of flowing at the surface in normal RIVER channels (*see* RIVER LANDFORM). The development of karst landforms is limited to areas where comparatively soluble rocks, principally limestones and dolomites (carbonate rocks) and gypsum and anhydrite (sulphate rocks), occur. Approximately 8% of the Earth's land surface is karst terrain. There are 1.2 million km^2 of karst rock outcroppings in Canada. They are common in all GEOLOGICAL REGIONS except the Canadian Shield.

There are 2 solution processes important to karst terrain formation. Gypsum, anhydrite and very soluble substances such as natural salt dissolve in the presence of water. For example, gypsum dissociates until there are 2500 mg dissolved per litre of water (at 25°C). The solution is then saturated and may precipitate gypsum crusts, eg, at mineral SPRINGS. Calcite (the limestone mineral) and dolomite are dissolved by carbonic acid produced by the solution of atmospheric carbon dioxide (CO_2) in water. Rates of limestone solution are determined, therefore, by the amounts of water and CO_2 available in an environment. CO_2 may build up to high concentrations in soils, where it is dissolved by rainwater. Rates of limestone solution range from less than 5 m^3 per km^2 per year in deserts and very cold regions to more than 100 m^3 in rain forests.

The most widespread surface karst landforms are small solution pits, grooves and runnels, termed karren. Individual features are rarely longer or deeper than 10 m, but frequently they are densely clustered to dissect larger areas, termed limestone pavement. Solution pavement is particularly well developed in Île d'ANTICOSTI, Qué, BRUCE PENINSULA and MANITOULIN I, Ont. Small patches may be seen within the city limits of Hamilton, Montréal, Ottawa, etc. In Winnipeg, approximately 3500 km^2 of solution pavement is preserved beneath later glacial-lake clays and forms an important industrial water store.

The diagnostic karst landform is the sinkhole (doline). This is a bowl-, funnel- or cylinder-shaped depression feeding water underground. There may be a periodic or permanent pond in the base. The length or diameter of sinkholes ranges from 10 to 1000 m. Most are formed by solution focused in the funnel or by collapse of the roof of an underlying cave. In southern Saskatchewan, collapse-solution cavities in salt have extended through as much as 1000 m of overlying insoluble rocks to produce shallow sinkholes at the surface. Sinkholes often occur in lines or clusters. In some karsts (eg, central Kentucky) their frequency exceeds 500 per km^2, giving the terrain a shell-pitted appearance. Thousands are known in southern Canada, from gypsum terrains in western Newfoundland to limestones on Vancouver I. There are many large, spectacular examples in WOOD BUFFALO NATIONAL PARK, the Franklin Mts and W of Great Bear Lk, where limestones and dolomites have collapsed into cavities in gypsum. Some new collapses occur each year, the hole appearing in a matter of seconds. These are a hazard to settlement on gypsum terrains in parts of Newfoundland and NS.

Larger karst landforms include dry valleys and gorges, carved by past rivers which now flow underground, and poljes, which are major sinkholes with alluviated, flat floors. Medicine Lk in JASPER NATIONAL PARK is a polje measuring 6 km by 1-2 km. The Maligne R drains into it and floods it to a depth of 25 m during the summer melt season. In winter, the lake reduces to small pond sinkholes in the polje floor. The sinking water is discharged 16 km NW at some 60 springs in the floor of Maligne Canyon. With an aggregate discharge that may exceed 65 m^3 of water each second, these are the largest karst springs known in Canada.

Karst landform development is rather limited in Canada when compared to countries that have not undergone repeated GLACIATION. Glacier action has eroded or infilled much karst. Our finest karstland, NAHANNI Karst, is found in a region of the Mackenzie Mts, NWT, which has escaped glaciation for the past several hundred thousand years. Major karst forms have developed without interruption or destruction and include hundreds of sinkholes up to 150 m deep, giant solution grooves intersecting to form a natural labyrinth, several poljes and dry canyons. Parts of the karst have reached a very advanced stage, displaying residual rock towers and natural bridges, features rarely seen in northern latitudes.

Alpine karst, comprising fields of karren and shaft sinkholes above the TREELINE that drain into deep caves, is well developed in parts of the Rocky Mts and Vancouver I. The largest icefield in the Rockies, COLUMBIA ICEFIELD, is mostly

drained by sinkholes surviving in the limestone beneath it. The waters flow in great caves through a mountain, to emerge as spectacular springs in the valley of Castleguard R. D.C. FORD

Kasba Lake, 1342 km², elev 336 m, max length 79 km, is located very near the common border of the NWT, Manitoba and Saskatchewan, about 700 km S of the Arctic Circle. It is fed by Snowbird Lk and other smaller lakes, and drains N via the KAZAN R into CHESTERFIELD INLET and thence to Hudson Bay. Discovered by Samuel HEARNE (1770-72), it appears on his map as Rock Partridge Lk. DAVID EVANS

Kasemets, Udo, composer, educator, writer (b at Tallinn, Estonia 16 Nov 1919). Following musical studies in Estonia and Germany, Kasemets immigrated to Canada in 1951 where he established himself as a teacher, conductor and music critic in the Hamilton-Toronto area. In the 1960s he was involved in several performance groups specializing in experimental music and multimedia presentations. He derived his experimental aesthetic in large part from the controversial work of American composer-philosopher John Cage. The result has been, since 1960, the creation of a series of musical and mixed-media works exploiting chance operations and game situations with the intention of blurring the lines of demarcation between composer, performer and listener, thereby enhancing the sensory awareness of audiences by involving them more directly in the creative process itself. ALAN M. GILLMOR

Kaska live in the mountainous region drained by the LIARD R of the southern Yukon and northern BC, primarily in the communities of Lower Post, Upper Liard (near Watson Lake), and Ross River in the Pelly drainage. With their TAHLTAN and TAGISH neighbours, they speak dialects of a single variety of Athapaskan and, in 1982, numbered about 500. The territory was one of the last regions explored by the HUDSON'S BAY COMPANY, after 1834. At that time parts of the region were only seasonally exploited, in winter by the Tahltan and in the spring by Kaska from the upper Pelly R. The Tahltan considered much of this district their territory and defended their middleman trade position between the coast and interior groups by attempting to keep the HBC out.

Early contact period Kaska material culture and subsistence was basically similar to that of other Athapaskan peoples of the subarctic plateau, especially those who similarly lacked salmon and migratory herds of barren-ground caribou. Woodland caribou, moose, Dall sheep, berries and whitefish are among the principal traditional resources of the rugged upper Liard region.

During the middle to latter half of the 19th century there were 4 regional Kaska bands — Frances Lake, Upper Liard, Dease R and the Nelson Indians — though these divisions were not cohesive social units. The primary unit of Kaska society was the local band, consisting of an extended family with a male leader. Although most Kaska belonged to one of 2 exogamous matri-moieties, Wolf and Crow, with reciprocal obligations, moiety bonds appear to have been weak.

Many Kaska only formed village communities following the 1873 Cassiar gold rush, when other Indians, Métis, Europeans and Chinese entered the region. By 1888 the number of miners had dwindled, but many natives, referred to as Cascar, remained. The backgrounds of the families aligned with the Lower Post and McDame trading posts were diverse, though Athapaskan speakers made up the majority, but intermarriage between the offspring of the immigrants represented the first step towards integration of the communities. As wage-labour opportunities declined, hunting and fur trapping provided the most stable resources. Their exploitation played a primary role in the emerging social pattern, especially through the formation of trapping alliances. Upon marriage, each couple had to consider the situation at hand and no simple rules regarding exogamy, postmarital residence or household composition were formulated.

After the 1920s, when Lower Post was linked into the air route between Edmonton and Whitehorse, Euro-Canadian influences increased again. The WWII period provided good returns from trapping and wage labour: Watson Lake was a supply station during construction of the ALASKA HIGHWAY, and Lower Post became a depot. After the war governmental services increased dramatically, though interaction with Euro-Canadians, channelled into administrative and educational functions and mining operations, became more formal. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE.

Reading: J. Helm, ed, *Handbook of North American Indians,* vol 6: *Subarctic* (1981).

Kaslo, BC, Village, pop 854 (1981c), inc 1893, located 70 km N of Nelson, overlooking Kootenay Lk. It was established 1892 to service the silver-mining boom sweeping the Kootenays; destroyed 1894 by the great flood on the Kootenay-Columbia system, it was immediately rebuilt. Mining declined at the end of WWI, but fruit farming and logging grew in the 1920s. In 1942, 964 JAPANESE were relocated there. Lumbering was spurred by the need for housing and other services. Kaslo protested the removal of this energetic community to New Denver in 1946. The present population is supported mainly by logging, sawmilling and catering to the increasing flow of tourists exploring the region's excellent fishing and sightseeing. Kaslo is the anglicized spelling of the name of a prospector, John Kasleau, who arrived in the vicinity *c*1880. WILLIAM A. SLOAN

Kattan, Naim, writer, literary critic (b at Baghdad, Iraq 26 Aug 1928). Kattan studied law at U of Baghdad before studying literature at the Sorbonne. His fictionalized memories of these years appeared as *Adieu, Babylone* (1975) and *Les Fruits arrachés* (1977). He immigrated to Canada in 1954 and in 1984 headed the writing and publishing division of the CANADA COUNCIL. Kattan has contributed to magazines and newspapers in the Near East, Europe and N America, and has written several books, distinguishing himself in the genres of the essay, novel, short story and theatre. In *Le Réel et le théâtre* (1970), a collection of essays that won the Prix France-Canada (1971), Kattan pondered the elements that over the ages have differentiated and distinguished cultures and civilizations, the relationship of oriental and occidental man with nature, other men and the beyond. He continued this reflection in *La Mémoire et la promesse* (1978) and *Le Désir et le pouvoir* (1983). In addition, Kattan has long been interested in Canadian, American and Latin American writers. His 3-vol *Ecrivains des Amériques* (1972, 1976 and 1980) has helped to make these writers better known in Canada. JACQUES COTNAM

Kavik, John, sculptor and potter (b in Gjoa Haven, NWT 1897). Having moved inland to hunt in the Barren Lands, he almost died during "the great starvation" of the 1950s. He eventually moved via Baker Lk to Rankin Inlet, where he took up carving in the early 1960s, as well as working in clay in 1964. Like the work of his great friend TIKTAK, Kavik's work is primary and stark, but his is filled with narrative content. This is particularly evident in his totally original pots, which are covered with 3-dimensional protruding figures full of humour and folklore. *See* INUIT ART. GEORGE SWINTON

Kawartha Lakes are 14 interconnected lakes stretching across Peterborough and Victoria counties in S-central Ontario. Ranging in size from 5 to 45 km², they are Katchiwano, Clear, Stony, Lovesick, Lower Buckhorn, Buckhorn, Chemong, Pigeon, Sturgeon, Cameron, Scugog, Balsam, Mitchell and the man-made Canal Lk. Lake Katchiwano in the SE drains through the Otonabee and Trent rivers to Lk Ontario. On the W the chain drains into Lk SIMCOE. The resources of these beautiful, wooded lakes were first exploited by native people, chiefly the Mississauga who were occupying the region when European settlers arrived early in the 19th century. There is an Indian reserve on Chemong Lk.

Once the centre of a thriving logging industry, the island-studded lakes became a popular vacation area after 1890, especially for sportfishermen. Steamboats carried visitors to several palatial resort hotels. Today cottages line the shores and pleasure craft crowd the waters. The lakes form part of the Trent-Severn navigation system linking Lk Ontario and Georgian Bay. Locks at 9 locations allow pleasure boats to connect with all the lakes. Major towns include LINDSAY, Fenelon Falls and Bobcaygeon. The name is a corruption of an Indian work meaning "bright waters and happy land." DANIEL FRANCIS

Kayak All INUIT groups used some form of kayak, except for the most northerly polar Eskimo. Essentially a one-man closed-deck hunting craft, it was employed sometimes for transport of goods. Fast and seaworthy and ranging from 4 m to 7 m in length, it was built to hold from one to 3 persons. Covered with dehaired seal or caribou skins, the frame was often of driftwood, with ribs of willow branches. Both single and double-bladed wooden paddles were used. To make the entire craft watertight, even when tipped, the hunter wore a PARKA which was tied around the hatch hole rim.

RENÉ R. GADACZ

Kazan River, 732 km long (from Ennadai Lk), rises in the SE Northwest Territories near the Saskatchewan border. Flowing N it follows an irregular course through several lakes, draining a large part of the Barren Lands. It joins the THELON R on the S shore of Baker Lk, not far from the Inuit hamlet of the same name. It is a popular wilderness canoe route. The name comes from an Indian word for white partridge.

DANIEL FRANCIS

Kean, Abraham (Abram), "Killer Kean," master mariner, legislative councillor (b at Flowers Island, Nfld 8 July 1855; d at St John's 18 May 1945). The archetypal sealing captain, Kean is accused, in legend and popular mythology, of responsibility for the loss of 77 lives in the *Newfoundland* sealing DISASTER of 1914. William Coaker accused Kean of irresponsibly leaving 132 men from his son's ship on the ice where many froze to death during a violent storm. Exonerated by a court of inquiry, Kean kept his formidable reputation as "the greatest seal killer of all time." In 1934, when he surpassed his personal goal of 1 million seals killed (with 1 008 100 seals), he was fêted by the Board of Trade, awarded the Blue Ensign and created OBE. He wrote his autobiography, *Old and Young Ahead* (1935). LINDA WHALEN

Reading: Cassie Brown, *Death on the Ice* (1972); G.A. England, *The Greatest Hunt in the World* (1969).

Keefer, Samuel, engineer (b at Thorold, UC 20 Jan 1811; d at Brockville, Ont 7 Jan 1890). The first chief engineer of the Board of Public Works of the Province of Canada in 1841, he built the first suspension bridge in Canada in 1843 spanning the Ottawa R at Chaudière Falls. He resigned his government post in 1853 to become an engineer for the GRAND TRUNK RY. As supervising engineer for the Brockville and Ottawa Ry, he built the first railway TUNNEL in

Canada at Brockville. In 1857 he re-entered government service as inspector of railways and deputy commissioner of public works; having selected the plans for the PARLIAMENT BUILDINGS in Ottawa in 1859, he directed their construction. He retired again from public service in 1864 and 5 years later built the Clifton Bridge over the Niagara R. For the design and construction of this bridge, he received the 1878 Gold Medal at the Paris Exposition. PHYLLIS ROSE

Keefer, Thomas Coltrin, civil engineer (b at Thorold, UC 4 Nov 1821; d at Ottawa 7 Jan 1915). He was involved in a number of important engineering works, and his pamphlet *Philosophy of Railroads* (1849) was widely used. He himself began the survey for a railway connecting Kingston, Ont, and Toronto (1851), was in charge of the survey for a line between Montréal and Kingston, and determined the site for the Victoria Bridge over the St Lawrence R at Montréal. His essay *The Canals of Canada* (1850) brought him work in hydraulic engineering. He served as chief engineer of the Montréal Water Board and designed the water-supply system for Hamilton, Ont (1859), as well as the waterworks in Ottawa (1874). His Hamilton Pumping Station, with its working Gartshore beam engines, has been declared a national historic site. Keefer was a founding member and first president of the Canadian Soc of Civil Engineers (1887). As the "dean of Canadian engineers," he received many honours including the presidency of the American Soc of Civil Engineers. PHYLLIS ROSE

Keen, George, salesman, co-operative leader (b at Stoke-on-Trent, Eng 8 May 1869; d at Brantford, Ont 4 Dec 1953). Keen immigrated to Canada in 1904. In 1906 he helped organize the Brantford Co-operative Soc, a consumer co-operative. In 1909 he called the meeting that organized the Co-operative Union of Canada, the national organization for co-operatives in English Canada, and was its general secretary 1909-45. Keen believed that all economic activities should be organized co-operatively and was particularly devoted to encouraging consumer co-operatives. Between 1922 and 1939 he visited western Canada annually and Atlantic Canada frequently, thereby playing a significant role in developing the CO-OPERATIVE MOVEMENT in those regions. He also became an authority on legislation for the co-operative movement, and he frequently defended it before provincial and federal governments.

IAN MACPHERSON

Reading: G. Keen, *The Birth of a Movement* (1952).

Keene, Minna, née Bergman, photographer (b at Arolsen, Germany 5 Apr 1861; d at Oakville, Ont Nov 1943). A self-taught photographer, she was a member of the Linked Ring and the London Salon, societies devoted to the promotion of pictorial photography. In 1908 she became the first woman to be admitted as a fellow to the Royal Photographic Society. Immigrating to Canada about 1913, she was commissioned by the CPR to photograph the Rockies (1914-15), opened a studio in Toronto in 1920 and relocated to Oakville in 1922. Keene travelled, exhibited and lectured widely. She received medals for photographic excellence in Japan, South Africa and Australia. Her photographs are in the collections of the Public Archives of Canada and the Smithsonian Institution, Washington, DC.

LAURA JONES

Keenleyside, Hugh Llewellyn, public servant (b at Toronto 7 July 1898). Joining the Dept of External Affairs in 1928, Keenleyside served in Tokyo 1929-36. During WWII he was secretary of the Canadian section of the PERMANENT JOINT BOARD ON DEFENCE, and an opponent of the INTERNMENT of Japanese-Canadians. He was ambassador to Mexico 1944-47 but then left the department, disillusioned with diplomatic life. He was deputy minister of mines and resources and commissioner of the NWT, 1947-50, and director-general, UN Technical Assistance Administration, 1950-58. Chairman of the BC Power Commission 1959-62 and the BC Hydro and Power Authority 1962-69, he was deeply involved in the COLUMBIA RIVER TREATY negotiations. Keenleyside wrote *Canada and the United States* (1929, rev ed 1952) and 2 impressive volumes of *Memoirs* (1981-82). NORMAN HILLMER

Kejimkujik National Park (est 1968, 375 km^2). Tranquillity is the keynote of this glacier-scarred PARK situated 170 km SW of Halifax in central NS. Its brooding forests and dark waters are disturbed only by the loon's cry or the swirl of a paddle. In the past, most of the park was logged over and burned, but the primeval character of the forest is once again intact, and scattered stands of ancient hemlocks can still be found. The wildlife is diverse. The park's marshes, bogs and shallow lakes support more species of REPTILES and AMPHIBIANS than occur anywhere else in Atlantic Canada, including such rarities as the ribbon snake and Blanding's turtle. The woods are home to mammals common to eastern Canada, eg, black bear, mink, flying squirrel, red fox. The area's first inhabitants, the Micmac, left hundreds of petroglyphs depicting legends and events. The waterways linking the Atlantic Ocean and Bay of Fundy provided the Micmac and French with a major canoe route, and the park is still a canoeist's paradise. Scottish and Irish immigrants settled as early as the 1760s, and wealthy Boston families used the area as a summer retreat in the late 1800s. The name derives from a Micmac word referring to the exertion required in paddling across the lake. LILLIAN STEWART

Kelly, Leonard, "Red," hockey player (b at Simcoe, Ont 9 July 1927). He was a star with the powerhouse St Michael's College junior teams of the 1940s and was one of the best defencemen in the NHL with Detroit, winning the JAMES NORRIS TROPHY in its first year. In 1960 he was traded to TORONTO MAPLE LEAFS, where as a centreman he was a key figure in 4 STANLEY CUP victories. He coached Los Angeles, Pittsburgh and Toronto. He scored 281 goals, 542 assists in regular season play, and 33 goals, 59 assists in playoffs. A smooth skater and effective playmaker, he won the LADY BYNG TROPHY 4 times. He served 2 terms as an MP for the Liberal Party. JAMES MARSH

Kelly, Peter Reginald, Methodist-United Church of Canada cleric, Indian activist and leader (b at Skidegate, BC 21 Apr 1885; d at Nanaimo, BC 2 Mar 1966). A member of the HAIDA nobility, Kelly was educated at Coqualeetza Institute and Columbia College, both Methodist institutions. Before becoming a lay preacher, he taught school for 5 years at Skidegate. By 1911 he had begun to distinguish himself in the BC LAND CLAIMS issue and in 1927, as president of the Allied Tribes of BC, he testified on Indian grievances before a special parliamentary committee. Prominent in the Native Brotherhood of BC in the 1930s, he was a key figure in the consultations of the late 1940s that led to a revision of the Indian Act. A clergyman as well, he also served in several pastorates and as captain of the *Thomas Crosby III* and *Thomas Crosby IV* mission ships. E. P. PATTERSON II

Kelowna, BC, City, pop 59 916 (1981c), inc 1905, located in S-central BC on the E shore of Okanagan Lk. The area was first visited by David Stuart, a Scottish fur trader 1811. Oblate missionaries built a mission on the present site 1859, and planted the first fruit trees 3 years later. The townsite was laid out in 1892, and the name chosen — from an Indian word meaning "grizzly bear." At incorporation, population was 600, and shortly after there were 11 sawmills, 3 fruit-packing plants and 2 canneries. Main-line rail service did not arrive until 1925, and population increased to 5100 in 1941, reaching 13 000 by 1961. Kelowna is the main marketing and distribution centre of the central OKANAGAN VALLEY. The city's large area contains many orchards and vineyards, numerous canning plants and BC's largest winery (started 1932). A bridge, with a long section floating on pontoons, was built across the lake in 1958. The city is served by road to Calgary and Vancouver, and has the third-busiest airport in BC. It has the Sunshine Theatre Co, a symphony orchestra, museum and art gallery. Okanagan College, begun 1963, offers adult education and a 2-year transfer program. With the largest beach on Okanagan Lk, a sunny climate and a pretty harbour for thousands of boat owners, the city is a popular tourist centre. The main summer attraction is the Kelowna Regatta, begun 1906. JAMES MARSH

Kelsey, Henry, explorer (b at East Greenwich? Eng 1667?; d there and buried 2 Nov 1724). He was apprenticed to the HBC in Mar 1684 and served the company nearly 40 years — all but 3 of them at Hudson Bay. He is chiefly remembered for his journey to the Canadian plains 1690-92. His exact route is unknown, but he left YORK FACTORY in June 1690 and with his Indian guides travelled the Hayes and Saskatchewan rivers and wintered near The Pas, Man, before striking out on foot across the prairie, possibly as far as the Red Deer R. Kelsey's journal of the trip, which opens with some curious, rhyming doggerel, describes buffalo, grizzly bears and an Indian group — possibly the Sioux or Gros Ventres. The company's hold on the bay was tenuous, and Kelsey twice negotiated surrender of York to IBERVILLE (1694 and 1697). His reward for loyal service was his appointment as chief trader at Albany (1705) and governor of all the bay posts (1717). *The Kelsey Papers*, a single, paperbound volume dated 1693, were not known to historians before 1926, and mysteries still surround them. JAMES MARSH

Kelso, John Joseph, social reformer (b at Dundalk, Ire 31 Mar 1864; d at Toronto 30 Sept 1935). While a reporter for the *World* and the *Globe*, Kelso founded the Toronto Humane Society in 1887 for the prevention of cruelty to children and animals, the Fresh Air Fund and the Santa Claus Fund in 1888 to provide excursions and cheer for poor women and children, and the Children's Aid Society in 1891. In 1893 he was appointed the first superintendent of neglected and dependent children in Ontario and, until his retirement in 1934, directed the establishment of children's aid societies throughout Ontario and played a key role in their acceptance in other provinces. He also advocated special juvenile courts, mothers' allowances and the legalizing of adoption, and was active in closing reformatories and organizing playgrounds. In these reforms he was not an original thinker but a popularizer and promoter of policies and programs developed elsewhere. After 1895 he was recognized as Canada's leading expert in child welfare and gloried in the title the "children's friend." ROSEMARY SHIPTON

Reading: A. Jones and L. Rutman, *In the Children's Aid: J.J. Kelso and Child Welfare in Ontario* (1981).

Kemp, Sir Albert Edward, businessman, politician (b at Clarenceville, Qué 11 Aug 1858; d at Pidgeon Lake, Ont 12 Aug 1929). After establishing himself in business as owner and president of a sheet-metal manufacturing company, Kemp was a Conservative MP for East Toronto, 1900-08 and 1911-21. As minister of militia and defence 1916-17 and minister of the overseas military forces 1917-20, Kemp helped restore order to the chaos created by former defence minister Sam HUGHES, but he was careful not to surrender ministerial authority to the soldiers. He served in the Senate from 1921 until his death.

STEPHEN HARRIS

Kempt, Sir James, soldier, colonial administrator (b at Edinburgh, Scot 1764; d at London, Eng 20 Dec 1854). He attained the ranks of lieutenant (1784), captain (1794) and major (1803) in the British army. He saw active service during the Napoleonic Wars in the Mediterranean, the Peninsular War and the Battle of Waterloo. He was promoted lieutenant-colonel and served as quartermaster general of British N America 1807-11, as lieutenant-governor of Nova Scotia 1820-28 and as administrator of the government of Canada 1828-30. Although seen as little more than a caretaker administration, Kempt's short term in Canada temporarily eased the tensions that had arisen between Gov DALHOUSIE and the Parti PATRIOTE led by Louis-Joseph Papineau.
DAVID EVANS

Kemptville, Ont, Town, pop 2362 (1981c), inc 1963, located on Kemptville Cr, a branch of the Rideau R, 60 km S of Ottawa. Named after Sir James Kempt, administrator of UC 1828-30, it was first called Clothier's Mills after Lyman Clothier, who developed it on an 81 ha site. Its growth speeded with the arrival of the Bytown and Prescott Ry, then of the CPR. Once an active manufacturing centre of stoves and leather, it is now an agricultural servicing centre, site of the Kemptville School of Agricultural Technology and of a provincial forestry station. It was the birthplace and home base of G. Howard FERGUSON, premier of Ontario in the 1920s.
K.L. MORRISON

Kenderdine, Augustus Frederick, painter (b at Manchester, Eng 31 Mar 1870; d at Saskatoon 3 Aug 1947). With James Henderson, he was the most significant painter in Saskatchewan before 1950. He arrived at Lashburn to farm in 1907 and began recording prairie life in his paintings. He trained at the Manchester School of Art and the Académie Julian in Paris, exhibited at the Royal Academy in London, and had an established commercial reputation in England. In keeping with his training, Kenderdine's interpretation of the prairie landscape was romantic. He relied on rich tonal effects and subtle colour to convey with European dignity a sensuous ruggedness in the mood of the Prairies. Kenderdine joined the art department at U Sask in 1920, and in 1935 started the Summer School of Art at Emma Lk, Sask. KATHLEEN LAVERTY

Kennedy, Garry Neill, artist, teacher (b at St Catharines, Ont 6 Nov 1935). Since 1967 he has been president of the NOVA SCOTIA COLLEGE OF ART AND DESIGN (Halifax), Canada's only degree-granting art college. Kennedy's other life is that of a nihilist artist, rooted in conceptual art, suspicious of art systems and traditions, and doubtful that valid art is possible unless founded in irony and disenchantment. A series of 1976-77 paintings began from the premise that the traditional reasons for painting were exhausted and that only the craft and the material conditions of painting — paint, brush, canvas — were realities. Scornful of references to taste, he produced a series of unexpectedly strange and beautiful works. With a shrewd sense of humour his subsequent work has probed the systems that operate in museums, commercial galleries and the art world in general. ROALD NASGAARD

Kennedy, Sir John, civil engineer, harbour authority (b at Spencerville, UC 26 Sept 1838; d at Montréal 25 Oct 1921). Educated at McGill, he first worked under Thomas KEEFER on the St Lawrence Ship Channel below Montréal. Attracted by early railway building, he moved to Ontario and became a divisional chief engineer of a branch of the GREAT WESTERN RY. In 1875 he returned to Montréal as chief engineer, Montreal Harbour Commission. For 44 years he was in charge of developing the port to its international status. In 1907 he became blind but continued as consulting engineer to direct all engineering work for the harbour. A man of wide interests, he presided over the founding meeting of the Canadian Engineering Standards Assn. R.F. LEGGET

Kennedy, Leo, poet, critic (b at Liverpool, Eng 22 Aug 1907; moved to Montréal 1912). Kennedy helped change the direction of Canadian poetry in the 1920s and, through critical manifestos and literary journals, shared in avant-garde literary movements (1925-38). After only 6 years of education, Kennedy took to the sea and then had a variety of jobs. Friend of A.J.M. SMITH, F.R. SCOTT, A.M. KLEIN and Leon Edel, he contributed to the *McGill Literary Supplement, McGill Fortnightly Review* and *Canadian Mercury* and was part of a politically active circle of intellectuals in Montréal and Toronto in the 1930s and an editor of *New Frontier* 1936-38. In 1933 he published *The Shrouding* (poems) which, marked by a fascination with death and symbolic resurrection, reflects his wit and forceful personality. Most of his life he worked as a copywriter in the US; recently he has lived in Montréal, writing poems for children, satiric verse and broadsides. PATRICIA MORLEY

Kennedy, Theodore, Ted or "Teeder," hockey player (b at Humberstone, Ont 12 Dec 1925). He played senior hockey at Pt Colborne and joined TORONTO MAPLE LEAFS 1942-43. Hardworking and tenacious, he typified the powerful, tough checking Maple Leaf teams built by Conn SMYTHE. He lacked skill as a skater but was a resourceful playmaker and scored 231 goals and 560 points in 696 games. He won the HART TROPHY (most valuable player) in his last full season, 1955. He later operated a thoroughbred training centre in St Mary's, Ont. JAMES MARSH

Kennedy, Thomas Laird, farmer, politician, premier of Ontario (b at Dixie [Mississauga], Ont 15 Aug 1878; d there 13 Feb 1959). An army officer in WWI and later a militia brigadier, he was a Conservative member of the Ontario Legislature 1919-34 and 1937-58, serving as minister of agriculture 1930-34 and 1943-53. An amiable, homespun man, he was widely popular and respected among farmers. He was appointed premier temporarily (1948-49) in recognition of long public service. ROGER GRAHAM

Kennedy, William, explorer (b probably at Cumberland House, Rupert's Land 26 Apr 1814; d 25 Jan 1890). He was the son of a fur-trading father and an Indian mother, was educated in the Orkney Is and worked for the HUDSON'S BAY CO, 1833-45, serving mostly at posts in Québec. In 1851-52 he led the 13th expedition in search of Sir John FRANKLIN. In what was unknown territory, he and Joseph-René Bellot sledged along the E coast of Somerset I, crossed Bellot Str to Ommanney Bay on Prince of Wales I, then trekked N to Cape Walker and back to base at Batty Bay. Kennedy settled at St Andrews, Man. He was a strong advocate of the annexation of Rupert's Land to Canada and worked diligently for an all-Canadian route from Toronto to the RED RIVER COLONY, and for the development of the seaport at Churchill. SHIRLEE ANNE SMITH

Kennedy, William Paul McClure, historian, jurist, educator (b at Shankill, Ire 8 Jan 1879; d at Toronto 12 Aug 1963). He was educated at Paris, Vienna and Berlin, and at Trinity College, Dublin, where he majored in modern history, jurisprudence and constitutional law. He came to Canada in 1913 and taught English at St Francis Xavier. In 1915 he was hired by U of T as lecturer in English and history. He was a special lecturer on federal institutions in the dept of political economy 1922, and became professor of law and political institutions 1926. Largely through his efforts a separate department of law was created in 1930, and he became its first head. Kennedy was founder-editor of the U of T *Law Journal* and a prolific author. Through such books as *The Constitution of Canada* (1922) he influenced a generation of students with his "Actonian" view of nationalism. He advised many government commissions, including the federal Royal Commission on DOMINION-PROVINCIAL RELATIONS (1937); He was respected rather than liked; his colleagues found him "mercurial" and "somewhat erratic." M. BROOK TAYLOR
Reading: C Berger, *The Writing of Canadian History* (1976).

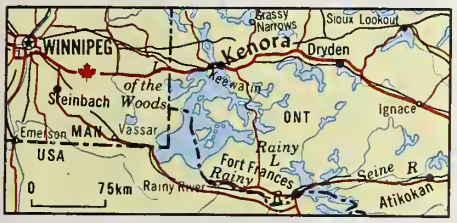
Kenojuak Ashevak, artist (b at Ikerrasak camp, S Baffin I, NWT 3 Oct 1927). She is perhaps the best-known Inuk artist for her famous print *The Enchanted Owl*. The first woman to become involved with the newly established PRINTMAKING shop at Cape Dorset, Kenojuak began drawing in the late 1950s; her works have inspired about 200 prints produced since then. Her drawings, primarily of birds, are character-



Inuk artist Kenojuak Ashevak preparing a drawing that will later be made into a print, Cape Dorset, NWT *(courtesy National Film Board/Photothèque)*.

ized by a strong sense of composition, colour, design and draughtmanship. Although best known as a graphic artist she also carves, making sculptures and (with her late husband Johnniebo) a mural for the 1970 World's Fair in Osaka, Japan. The recipient of numerous awards, including the Order of Canada (companion in 1982) and participant in many exhibitions, Kenojuak has travelled to southern Canada and Europe. She was featured in a National Film Board film in 1962 and in a limited edition book published in 1981. Kenojuak became a member of the Royal Canadian Academy of Arts in 1974. *See* INUIT ART.

JEAN BLODGETT



Kenora, Ont, Town, pop 9817 (1981c), located on LAKE OF THE WOODS, 50 km E of Manitoba border, seat of Kenora Dist (about 441 000 km²). The LA VÉRENDRYES built Ft St-Charles on the NW arm of the lake in 1732. Incorporated as Rat Portage by Manitoba 1882 during a boundary dispute with Ontario, and subsequently by Ontario 1892, the current site was renamed Kenora 1905. The name derives from *Kee*watin, *Nor*man and *Rat* Portage, interdependent communities clustered where the lake spills into the Winnipeg R. Kenora's scenic location on a major international waterway determined its growth patterns. A prehistoric dependence on caribou, fish and wild rice continued through the FUR-TRADE era. By 1836 the HBC established a post within the present town limits. Construction on the Pacific railway beginning 1879 brought lumbering, steamships, gold mining, fisheries, hydroelectric development and flour milling. Seaplanes and the TRANS-CANADA HWY (1935) swelled summer traffic. Kenora's economy is based on a pulp-and-paper mill, tourism, CP Rail and government offices. Neighbouring reserves affirm a significant Ojibwa presence. Nearby Manitoba and the US exert a strong social, economic and political influence. E. BARR

Reading: F. Mead, ed, *Through the Kenora Gateway* (1981); F.E. Jackson, *North Wind Blowing Backwards* (1977).

Kent, John, merchant, politician, premier of Newfoundland (b at Waterford, Ire 1805; d at St John's 1 Sept 1872). First elected to the Assembly in 1832, Kent championed Catholic rights and aroused the sectarian disorders that led to a modified constitution, 1842-48. Thereafter the Reform movement stalled, especially when Kent accepted an executive appointment as collector of customs 1849-52. However, when Philip LITTLE, a more Reform-minded and less intemperate leader, led the province to self-government in 1855, Kent became colonial secretary and in 1858 succeeded Little as premier. Easily re-elected in 1859 Kent was forced to the polls in 1861 when his government was dismissed by the governor. Kent's campaign, fought along sectarian lines, led to murderous riots and a narrow victory for Protestant Conservatives. He soon retreated from the Liberal leadership and joined a coalition government favouring denominational amalgamation and confederation. His tenure as receiver general, 1865-69, concluded his illustrious political career.

JOHN GREENE

Kent, Tom, journalist, public servant (b at Stafford, Eng 3 Apr 1922). An Oxford graduate, Kent worked for the *Manchester Guardian* and *The Economist* before coming to Canada, where he became editor of the *Winnipeg Free Press* (1954-59). In 1963-66 he was PM PEARSON's principal policy adviser, then served as deputy minister in the depts of Manpower and Immigration and Regional Economic Expansion. He headed Devco and Sydney Steel in NS, became dean at Dalhousie, and in 1980-81 headed a royal commission on the press.

ROBERT BOTHWELL

Kentville, NS, Town, pop 4974 (1981c), inc 1886, is located on the Cornwallis R, 103 km NW of Halifax. Kentville was settled in the 1760s by New Englanders with lots at the western end of Horton, one of 13 townships established by the NS government after the expulsion of the ACADIANS. Known to the Micmac as *Penook* ("fording place") and to the New Englanders as Horton Corner, it was, because of its location at a bend in the Cornwallis R, a natural crossing point between Horton and Cornwallis townships. It became shiretown of Kings County at the end of the 18th century and, being at the junction of 7 roads, grew into a commercial centre, serving agricultural villages and hamlets in the Annapolis Valley. Named Kentville in honour of Prince Edward, duke of Kent, in 1826, the community thrived when the Windsor-Annapolis Ry (later Dominion Atlantic) established its headquarters there in 1868 and began shipping Annapolis Valley apples to British markets. Government facilities followed, including a militia installation at Camp Aldershot (1904) and the 183 ha Kentville Regional (agricultural) Research Station (1910). Although the British fruit market collapsed with WWI and trucking of freight replaced rail transport, Kentville has survived, remaining the area's financial centre.

DEBRA MCNABB



Keremeos, BC, Village, pop 830 (1981c), inc 1956, is located in the fertile bench beside the Similkameen R, 42 km S of Penticton. Its name likely derives from an Indian phrase meaning "wind channel in the mountain." Site of a prehistoric Indian village, the area was visited by fur trader Alexander Ross in 1813. An HBC post located at Cawston was moved to Keremeos in 1864 and was shut down in 1872. Barrington Price, an Englishman, pre-empted land in 1873, founded a cattle ranch and built a gristmill in 1877. Keremeos Land Co, mainly interested in orchards, was formed in 1906. The Great Northern Ry arrived in 1907. Hedley Camp, an important gold producer, operated nearby 1904-58. Agriculture is the most important economic sector today, with grape growing recently showing an increase. Many roadside stands service the travelling public. Mining is still an important activity.

WILLIAM A. SLOAN

Kerr, Illingworth Holey, "Buck," painter, illustrator, writer (b at Lumsden, Sask 20 Aug 1905). Kerr attended Central Technical School, Toronto, and the Ontario College of Art. He also studied at the Westminster School of Art, London, in 1936 and, after returning to Canada, taught at the Vancouver School of Art (1945-47). In 1947 he became director of the Calgary Art School, Provincial Institute of Technology. His early landscape style reflects the influence of Lawren HARRIS in his long, curving brush strokes and emphasis on design. He applied paint heavily, giving relief to an otherwise flat, spatial quality in his work. In later works Kerr has used a broken brushstroke style that creates visual tension to counteract this 2-dimensionality.

KATHLEEN LAVERTY

Kerr, Robert, track and field athlete, coach (b at Enniskillen, Ire 1882; d at Hamilton, Ont 12 May 1963). Despite the "marathon craze" of the time, Kerr took advantage of the speed required for his occupation as a Hamilton fireman and won the 100-, 440- and 880-yd races at the 1902 Coronation Games. He could not afford to attend the unofficial 1906 Athens Olympics, but at the 1908 London Olympics he won the 220-yd gold and 100-yd bronze. Though he set the 50-yd record and was selected to the 1912 Stockholm Olympics team, Kerr chose retirement. He was captain of the 1928 Olympics team and manager of the 1932 team, the last to win an Olympic gold medal in TRACK AND FIELD for Canada.

TED BARRIS

Kerwin, Larkin, physicist, research director (b at Québec C 22 June 1924). Kerwin joined Laval's physics department in 1946 after study at St FX, U of T and the Massachusetts Inst of Technology and after earning his DSc at Laval rose to become its rector in 1972. He was one of the first French Canadians to specialize in atomic physics, the first layman to become rector of Laval, and the first French Canadian appointed president of the NATIONAL RESEARCH COUNCIL (1980). At the NRC he prepared a 5-year expansion plan focused on industrial research and laid the foundations of a closer relationship between the NRC and the Cabinet.

DONALD J.C. PHILLIPSON

Kestrel, *see* FALCON.

Ketchum, Jesse, businessman, politician (b at Spencertown, NY 31 Mar 1782; d at Buffalo, NY 7 Sept 1867). Ketchum moved to Upper Canada as a youth and became a leading merchant and landowner in York [Toronto]. A noted philanthropist, he is most often remembered for his dedicated work to establish common schools, though he himself had little formal education. However, he generously donated time and money to set up benevolent and relief societies, to construct churches, Sunday schools and Bible societies, and the York Mechanics' Institute. In politics Ketchum opposed the FAMILY COMPACT, and helped organize numerous Reform committees and associations. He held office once — from 1828 to 1834 he was in the House of Assembly. He did not participate in the 1837 Rebellion but following its collapse moved his business to Buffalo. There he soon was similarly successful, becoming a leading merchant and generous philanthropist.

VICTOR RUSSELL

Kettle Valley is a dry, forested area in the Okanagan Highland of southern BC. The name relates either to rock formations in the falls at the confluence of the Kettle and COLUMBIA rivers in Washington state or to the shape of baskets woven by Salish there. Bypassed during the gold rush into nearby boundary country in the 1880s, the Kettle Valley developed a stable silver-mining industry after becoming the final link of the railway system between the Kootenays and the Pacific Coast. Begun in 1910, the CPR's Kettle Valley Division included a passenger service between Midway and PENTICTON (terminated 1964) popular with railway buffs. The Highland Bell mine complex has produced silver-bearing ore continuously since 1922. The valley's forests supply sawmills at Midway and Grand Forks and local cattle ranches with forage.

PETER GRANT

Keynesian Economics is a method of analysing the behaviour of key aggregate economic variables such as output, employment, inflation and interest rates. British economist John Maynard Keynes initially developed this analytic structure (and as a result virtually established the modern field of macroeconomics) during the 1930s, as a method of understanding the GREAT DEPRESSION. Prior to this time, economists generally believed that cyclical swings in employment and output would be relatively small and self-correcting; if for some reason overall demand in the economy weakened, causing a tem-

porary drop in production and jobs, the resulting slack labour and product market conditions would force a rapid drop in both wages and prices, which in turn would operate to restore full employment.

The trauma of the Depression severely challenged such an optimistic view of macroeconomic behaviour. In his *General Theory of Employment, Interest and Money* (1936) Keynes argued that rigidities existed that would prevent the necessary equilibrating fall in wages and prices. As a result, a drop in demand could cause a fall in output and employment that was not quickly self-correcting and, indeed, might endure for some time. Keynes also identified a number of characteristics of market economies that would cause any demand decrease to be magnified into an even larger decline in overall demand. For example, worsening business conditions can cause firms to reduce investment in new plants and equipment with a consequent drop in overall expenditures. Keynes argued that the answer to such destabilizing private-sector behaviour was an activist public-sector STABILIZATION policy. He specifically argued for increased government expenditures and lower taxes to raise demand and pull world output and employment out of their Depression slump. Subsequently, other economists used Keynesian ideas to assert that stabilization policy could be used not only to prevent prolonged economic declines, but also to dampen inflationary booms and to promote high economic growth.

Canadian economics scholar Mabel TIMLIN's book, *Keynesian Economics* (1942) influenced thinkers in Canada and abroad and affected economics teaching in Canadian universities. Canadian government policy also was affected by the new Keynesian concepts, chiefly through the persuasion of several able young civil servants, especially Robert BRYCE, who eventually became deputy minister of finance. Indeed Canada was one of the first countries of the world to commit itself to active use of fiscal (and later monetary) policy to stimulate domestic output and employment. The buoyant economic period of the 1960s and 1970s seemed to support the appropriateness of such a Keynesian approach. However, the higher rates of both unemployment and inflation from the mid-1970s through the early 1980s caused critics, in academic and government circles, to argue on both theoretical economic and political grounds that Keynesian-style interventions are more likely to increase, rather than dampen, economic fluctuations. Furthermore, they claim that such actions have an inherent inflationary bias which has created severe long-term economic problems both in Canada and in other countries. Keynesian economists counter that many of the difficulties of the last decade can be attributed to events (such as the rapid rise in world oil prices) that are largely outside the control of national economic policies. Furthermore, while they acknowledge that some policy errors have been made, they assert that the application of Keynesian principles has kept the world from experiencing another Depression. *See* ECONOMICS. R. WIRICK

Keys, David Arnold, physicist (b at Toronto 4 Nov 1890; d at Ottawa 28 Oct 1977). He was a much-loved professor at McGill 1922-47 and thereafter the "mayor of Chalk River" — administrative manager of the Canadian atomic project. After research on antisubmarine warfare with J.C. MCLENNAN in WWI, Keys earned PhDs at both Harvard and Cambridge before joining in 1922 the McGill physics department, where he became Macdonald research professor in 1941. His own special field was geophysics, for which he wrote one of the earliest textbooks in 1929. During WWII he was research director of the bureau of technical personnel, in charge of assigning Canadian scientists to war work, and organized special classes at McGill that trained 2000 radar technicians for the RCAF. The NATIONAL RESEARCH COUNCIL appointed Keys VP in charge of the Chalk River Nuclear Laboratories in 1947 and he retired in 1961 after serving as London liaison officer for ATOMIC ENERGY OF CANADA LTD. A lifelong diarist, in retirement Keys wrote his memoirs, unpublished to date. DONALD J.C. PHILLIPSON

Khorana, Har Gobind, scientist (b in Raipur, India 9 Jan 1922). His mother was illiterate and his family impoverished. His first class was in the open on the edge of the Rajastan Desert. Gobind's brilliance was obvious early and, with scholarships, he earned degrees in organic chemistry at Punjab U. He obtained a PhD at Liverpool (1948) and then spent 3 years studying proteins and nucleic acids at Cambridge. In spite of his ability, his race precluded him from appointment as a professor in Britain. In search of an outstanding young scientist, Gordon Shrum, a physicist from UBC, hired Khorana to do organic chemistry at the BC Research Council in Vancouver in 1952. Gifted with a photographic memory, relentless drive, high standards and exquisite experimental dexterity, Khorana soon made an international reputation. Attracting a group of brilliant scholars, he succeeded in synthesizing pure ATP, the cellular source of energy. He made co-enzyme A, a complex molecule, important in metabolism. He showed how enzymes break down DNA, he studied cyclic precursors of DNA, and he discovered how to join building blocks into chains of DNA. Each discovery opened up new vistas for research.

In 1960 Khorana went to the US where he proved the triplet DNA code and synthesized a gene in a test tube. When he earned a Nobel Prize for medicine in 1968, he pointed out the importance of the Vancouver work and acknowledged 3 scientists, all at UBC. DAVID T. SUZUKI

Kicking Horse Pass, elev 1627 m, straddles the Continental Divide on the BC-Alberta border, 10 km W of LAKE LOUISE. Sir James HECTOR and a party of the PALLISER EXPEDITION explored the pass in 1858. The peculiar name derives from an incident in which Hector was kicked in the chest by a packhorse. The pass was selected as the route for the transcontinental CANADIAN PACIFIC RY, despite its severe inclines; construction was completed in 1884. The steep rail grades of 4.5% on the BC side of the pass were lessened to 2.2% by construction of Spiral Tunnels (1909), now a popular tourist attraction. The pass, which connects Yoho and Banff national parks, is also crossed by the Trans-Canada Hwy. GLEN BOLES

Kidd, James Robbins, "Roby," adult educator, internationalist b at Wapella, Sask 4 May 1915; d at Toronto 21 Mar 1982). Founder and first secretary-general of the International Council for Adult Education (ICAE), Kidd was a leader in the movement to recognize adult education as an important field of endeavour in Canada and abroad. Kidd's own formal education was completed while he worked for the YMCA (1935-47) in Montréal, Ottawa, and New York. He joined the Canadian Assn for Adult Education in Toronto, in 1947, and worked there 13 years, the last 10 as director. In 1959 he founded the Overseas Book Centre (now Canadian Organization for Development through Education), and in 1961 the Overseas Institute (now Canadian Council for International Cooperation). The ICAE was incorporated in 1973, with 26 countries as members; more than 70 national and regional associations were members in 1984. Kidd was professor (1972-82) and chairman (1965-66) of the dept of adult education at the Ontario Institute for Studies in Education; he participated fully in international activities, notably as chairman of the Second Unesco World Conference on Adult Education at Montréal in 1965. He defined the central goal of education as "learning to be, learning to become, learning to belong." His best known book is *How Adults Learn* (1952), widely translated. SUSANNE MOWAT

Kidder, Margot, movie actress (b at Yellowknife, NWT 17 Oct 1948). With no theatrical training, she performed in numerous Canadian TV shows as a teenager, before being cast in the American movie *Gaily, Gaily* (1969) by director Norman JEWISON. With *The Amityville Horror* (1979) and *Superman* and *Superman II* (1978, 1980), where she played reporter Lois Lane, Kidder achieved widespread recognition. Her starring role in Don SHEBIB's *Heartaches* (1981) won her praise. ALLAN M. GOULD

Kidnapping, historically, indicated the seizing and carrying away of children to make them slaves or servants or for some other nefarious purpose, eg, the marriage of an infant heiress to acquire a claim to her property. The term now applies to any taking or carrying away of persons against their will, either by transporting them out of the country or by confining them within the country to secure a ransom or some other concession in return for their freedom. Kidnapping is expressly condemned in the Canadian Criminal Code. Anyone who confines or imprisons another against his will, or causes another to be sent without lawful justification out of Canada, or, and this is the most usual and popular conception of the offence, holds another against his will for ransom or services is liable to life imprisonment. It is also an offence to imprison a person unlawfully, not necessarily holding him in a jail, but, for example, without lawful cause detaining him for any purpose, even without seeking a ransom or other concession for his freedom (*see* CIVIL LIBERTIES). Such unlawful imprisonment is punishable by a 5-year sentence. The code treats the kidnapping of a female or a child under 14 as the distinct offence of ABDUCTION, regarding such an act as usually being for sexual purposes. In 1981, there were 1205 reported cases of kidnapping, and 782 charges were laid against 300 males, 33 females and 13 juveniles.

Perhaps the most famous recent case of kidnapping (1970) in Canada was that of James Cross (a British trade commissioner) and Pierre LAPORTE by the Front de libération du Québec (see OCTOBER CRISIS). The 1973 Treaty on the Prevention and Punishment of Crimes against Diplomats made the kidnapping of diplomats criminal by international law. Canada is a party to this treaty, and under the Criminal Code (s 381.1) the kidnapping of a diplomat is recognized as a separate crime. L.C. GREEN

Kierans, Eric William, economist, politician, businessman (b at Montréal 2 Feb 1914). Educated at Loyola Coll and McGill, Kierans was director of the School of Commerce at McGill 1953-60, president of the Montreal Stock Exchange 1960-63, and minister of communications and postmaster general of Canada 1968-71. Kierans achieved political prominence despite brief service in only 2 governments, partly because those governments — Jean LESAGE's QUIET REVOLUTION and Pierre TRUDEAU's first Cabinet — made beginnings of significance to Canadian politics and partly because Kierans stirred up controversy outside government. Examples include his attack on Walter GORDON's 1963 budget; his 1967 challenge to René LÉVESQUE to abandon separatism or quit the Québec Liberal Party; his candidacy for the national Liberal leadership in 1968; and his sustained criticism of Trudeau's economic policies. Although he is often labelled an "economic nationalist," his views are rooted more in his belief in the primacy of politics over economics, his distrust of econom-



Izaak Walton Killam, who built a Canadian and Latin American investment empire, and was said to be the richest Canadian of his day (*courtesy Izaak Walton Killam Hospital for Children*).

ic, political and intellectual "monopoly," his insistence that Canada's natural resources belong to the public, and his conviction that things do not improve unless somebody speaks out.

JOHN MCDOUGALL

Killaly, Hamilton Hartley, engineer, civil servant (b at Dublin, Ire 1800; d at Picton, Ont 28 Mar 1874). Killaly attended Trinity Coll, Dublin, and worked as an engineer on canal projects before immigrating to Upper Canada in 1835. He worked on the WELLAND CANAL and in 1841 was appointed chairman of the Board of Works of the Province of Canada. Canada was then building CANALS between Lk Erie and Montréal, a program Killaly pursued vigorously and competently. Unfortunately, he was notoriously casual about financial controls and resistant to political restraint, and by 1846 the government had removed him. In 1851, however, he was appointed assistant commissioner of public works. He was soon challenging the chief commissioner, and in 1859 legislative action forced him out. Thereafter, Killaly, responsible for so many public works, worked in various temporary government positions, including a royal commission on fortifications in 1862. DOUG OWRAM

Killam, Izaak Walton, financier (b at Yarmouth, NS 23 July 1885; d at Grand-Cascapedia, Qué 5 Aug 1955). Born into a family of merchants and shipowners, Killam had little formal education but great entrepreneurial drive. He joined the Union Bank of Halifax as a clerk in 1901 and was transferred to head office 2 years later. He befriended Max AITKEN and like him gravitated to Montréal. From 1909 to 1913 Killam managed the London office of Aitken's Royal Securities Co. In 1915 he became president and 4 years later bought out Aitken, remaining president until 1954. Killam built an investment empire in Canada and Latin America with holdings in publishing, utilities (International Power, Calgary Power, Ottawa Valley Power Co), pulp and paper (BC Pulp and Paper, Mersey Paper), construction and films. The epitome of the financial power of Montréal's St James Street, secretive and austere, Killam was said to be the richest Canadian of his day. In 1922 Killam married Dorothy Brooks Johnston (b at St Louis, Mo 1900?; d at Villefranche-sur-Mer, France 27 July 1965). After his death she more than doubled her $40-million inheritance and carried out her husband's wishes to assist the arts, education and sciences. The CANADA COUNCIL was partially launched (1957) from inheritance taxes on the Killam estate. Izaak Walton Killam Hospital for Children in Halifax is a leading facility of its kind. The Killam Memorial Prize honours eminent Canadian scholars, and Killam research fellowships are presented to Canadian scientists and scholars.

DUNCAN MCDOWALL

Killam, Thomas, merchant, shipowner, politician (b at Yarmouth, NS 8 Feb 1802; d at Digby, NS 15 Dec 1868). He became the central figure in a group of related families who dominated the commercial and social activities of Yarmouth from the 1840s into the 1860s. He was the senior partner of Thomas Killam and Co 1849-62, a marine-insurance company director 1837-57, and on the board of the Bank of Yarmouth 1865-66. He emerged from municipal politics to become an influential member of the Legislative Assembly 1847-67 and the first MP for Yarmouth County in 1867. GERRY PANTING

Killinek Island, 269 km^2, is located off the northern tip of the Labrador Pen on the S side of the entrance to HUDSON STR. The provincial boundary passes across the island, so that its eastern portion belongs to Newfoundland and the rest is part of the NWT. It is only 29 km long and about 13 km wide, with a high, rocky coastline, and is separated from the mainland by the narrow, steep-sided MacLellan Str. Port Burwell on the SW side of the island has been an important arctic harbour since the 1880s. Sheltered behind precipitous cliffs, it has been the site of an Inuit camp, a trading post and a Moravian mission. DANIEL FRANCIS

Kimberley, BC, City, pop 7375 (1981c), inc 1944, is located on the slope (elev 1120 m) of Sullivan and North Star mountains, 29 km NW of Cranbrook. Since the Sullivan and North Star mines were discovered 1892, Kimberley has been mainly a mining centre. Consolidated Mining and Smelting gained control of the Sullivan Mine 1920 and used advanced technology to separate the ore components. By 1937 the Sullivan was the largest zinc-lead-silver mine in the world, producing 10% of the world's output. Tin and iron were processed at Kimberley until 1972. By-products led to the building of a fertilizer plant. Cominco has begun mechanization of its methods to increase productivity and improve working conditions. Renowned for its sports, Kimberley won the Allan Cup and World Hockey Championship 1937-38 and the Allan again 1978. Its downtown renewal on a "Bavarian" theme and potential expansion of ski facilities promise a future as a tourist centre.

WILLIAM A. SLOAN

Kincardine, Ont, Town, pop 5778 (1981c), inc 1875, is located along the shore of Lk Huron, about 225 km NW of Toronto and 80 km SW of Owen Sound. In the earliest settled part of Bruce County, the community was first named Penetangore (1848). It was subsequently named (1851) for the earl of Elgin and Kincardine, governor general of N America 1847-54. By 1867 it had 5 hotels and numerous services and small industries, including cabinet shops, 4 carriage and wagon shops, water-powered gristmills and sawmills, 2 foundries, pearl-ash factories, woollen factories, blacksmiths, tinsmiths, tanneries, harness and saddlery shops, a bakery and confectionery and a brewery. Until the mid-1960s the town still had some notable furniture factories, but today it depends on summer tourists and particularly on the Bruce Nuclear Power Development about 16 km N; over 1200 Ontario Hydro employees live within the municipality and faced an uncertain future after the announcement (1984) that the Douglas Point plant was being phased out. Long a popular summer resort, the town boasts a new community centre that features year-round sports and social facilities. JAMES J. TALMAN



Lighthouse and Huron Terrace Bridge at Kincardine Harbour, Ont (*photo by Sean Murphy*).

Kindergarten, conceived by Friedrich Froebel in 19th-century Germany, refers to a program of education of 4- and 5-year-old children. Although the first public-school kindergarten in Canada was established in Toronto in 1883, kindergarten programs in public schools are not yet available to all Canadian children. Whether public or private, kindergartens continue to reflect Froebel's belief that education must be attuned to the child's level of development and his belief in play as an avenue for learning. Recently, however, the extent to which kindergarten should emphasize the preparation of children for the school's academic program has become an issue. Some educators see such emphasis as desirable; others believe it would detract from kindergarten's historic concern with the development of the "whole child."

ELLEN M. REGAN

Kindersley, Sask, Town, pop 3969, (1981c), inc 1911, is located in W-central Saskatchewan, 200 km SW of SASKATOON and 65 km E of the Alberta border. The town quickly developed into a service centre for the surrounding agricultural area after the CNR laid steel through the townsite in 1909. By 1911 it had a population over 1000. Sir Robert Kindersley, a heavy stockholder in the CNR at that time, was honoured by having the town named after him. Agriculture remains the most important element in Kindersley's economy; however, oil and natural-gas wells N of the town have provided some diversification.

DON HERPERGER

Kindle, Edward Martin, paleontologist, sedimentologist (b at Franklin, Ind 10 Mar 1869; d at Ottawa 29 Aug 1940). Educated at U of Indiana, Cornell and Yale, Kindle moved from the staff of the US Geological Survey to that of the Geological Survey of Canada as an invertebrate paleontologist in 1912. He was chief of the paleontology division 1919-38. His early work was mainly on the Palaeozoic fossils of north-central US, Greenland, Alaska and northern Canada. Later he made pioneer observations and experiments on the origin and significance of sedimentary deposits. He wrote on the resources and development of the N American Subarctic, and he inaugurated a catalogue of Devonian type fossils. Under him the paleontological research and museum displays of the Geological Survey were greatly expanded. L.S. RUSSELL

King, Allan Winton, filmmaker (b at Vancouver 6 Feb 1930). King was involved in the Vancouver Film Society before joining CBC Vancouver in 1954. He formed his own company in England in 1961 to produce documentaries, and at the time shot his first dramatized documentary, *Running Away Backwards* (1964). He returned to Canada in 1967 and soon commanded international attention with 2 documentaries, *War-*

rendale (1966) and *A Married Couple* (1969). His growing interest in fiction resulted in the "staged" documentary *Come on Children* (1973). Devoting his attention to drama, he directed a number of distinguished films for the CBC: "A Bird in the House" (1974), "Six War Years" (1975), "Red Emma" (1976) and "One Night Stand" (1977). He made a successful transition to the fiction feature with his adaptation of W.O. MITCHELL's *Who Has Seen the Wind* (1977); his second dramatic feature, *Silence of the North* (1981), was not a commercial or critical success.

PIERS HANDLING

King, George Edwin, lawyer, politician, judge, premier of NB (b at Saint John, NB 8 Oct 1839; d at Ottawa, 7 May 1901). First elected MLA for Saint John in 1867, he was minister without portfolio in the Confederation Cabinet of A.R. WETMORE. In 1870 he won the election as government leader but resigned to a stronger leader, G.L. HATHEWAY. As attorney general, King was chief architect of the NB Common Schools Act of 1871, which aroused religious and cultural animosity (*see* NEW BRUNSWICK SCHOOL QUESTION). In 1872 he was chosen Liberal-Conservative premier, retiring in 1878. He was appointed judge of the NB Supreme Court in 1880 and was raised to the Supreme Court of Canada in 1893.

DELLA M.M. STANLEY

King, William Frederick, astronomer (b at Stowmarket, Eng 19 Feb 1854; d at Ottawa 23 Apr 1916). King worked as a Dominion land surveyor and topographical surveyor in western Canada. With E.G. DEVILLE and O.J. Klotz he formed the astronomical branch of the Dept of the Interior and was appointed chief astronomer in 1890. A small observatory, built in 1890, was succeeded in 1905 by the larger Dominion Observatory, of which he was named first director. He directed plans for the 72-inch (1.8 m) telescope at the Dominion Astrophysical Observatory in Victoria, BC, but died before its completion. He was appointed superintendent of the Geodetic Survey of Canada, was named international boundary commissioner several times and awarded the CMG for his work. He was a president of the Royal Soc of Canada and founding president of the Ottawa centre of the Royal Astronomical Soc of Canada.

MALCOLM THOMSON

King, William Lyon Mackenzie, politician, prime minister (b at Berlin [Kitchener], Ont 17 Dec 1874; d at Ottawa 22 July 1950), grandson of William Lyon MACKENZIE. Leader of the LIBERAL PARTY 1919-48, and prime minister for almost 22 of those years, King was the dominant political figure in an era of major changes. King graduated from U of T in 1895 and studied economics at Chicago and Harvard. In 1900 he became Canada's first deputy minister of labour; in 1908 he was elected in North York as a Liberal and in 1909 entered Sir Wilfrid LAURIER's Cabinet as minister of labour.

His interest in labour coincided with an expansion in manufacturing and a concern with industrial relations. King acted as conciliator in a number of strikes, his major legislative achievement being the Industrial Disputes Investigation Act of 1907, which delayed strikes or lockouts in public utilities or mines until a conciliation board achieved a settlement or published a report. He was defeated in the 1911 federal election and the 1917 CONSCRIPTION election. He maintained his connections with the Liberal Party but during the war acted as a labour consultant and was employed by the Rockefeller Foundation. His book *Industry and Humanity* (1918) outlined his view that there were 4 parties to industry — capital, management, labour and society — and that the government, acting on behalf of society, had an interest in the peaceful resolution of industrial disputes.



PM William Lyon Mackenzie King broadcasting to Canada from San Francisco, VE-Day, 8 May 1945 (*courtesy Public Archives of Canada/C-26989*).

At the 1919 Liberal convention King was appointed Laurier's successor. Two years later the Liberals won a bare majority in the federal election and King became prime minister. He set out to regain the confidence of the farmers in Ontario and western Canada who had supported the new Progressive Party, but his reductions in tariffs and freight rates were not enough, and in the 1925 election the Liberals could stay in office only with Progressive support. During the first session of the new Parliament, when it was clear this support would be withdrawn because of a scandal in the Dept of Customs, King asked Gov Gen Viscount BYNG for a dissolution. Byng refused and called on Arthur MEIGHEN to form a Conservative government, which was defeated in the House a few days later. In the 1926 election King stressed the alleged unconstitutionality of Meighen's government, but the Liberal victory stemmed from the support of Progressives who preferred the Liberals to the high-tariff Conservatives (*see* KING-BYNG AFFAIR).

In the prosperous years after 1926 the Liberal government provided a cautious administration which reduced the federal debt. Its only initiative was an old-age pension scheme. King insisted on Canadian autonomy in relations with the UK and contributed to the definition of Dominion status at the 1926 Imperial Conference. In 1930 he was reluctant to acknowledge that there was an economic crisis and the Liberals were defeated by the Conservatives under R.B. BENNETT.

King was an effective Opposition leader, keeping his party united as he attacked Bennett for unfulfilled promises and rising unemployment and deficits. His only alternative policy, however, was to reduce trade barriers. In 1935 the Liberal Party campaigned on the slogan "King or Chaos," and was returned to office with a comfortable majority. King negotiated trade agreements with the US in 1935 and with the US and Great Britain in 1938. The economic downturn in 1937 left the government with high relief costs but no coherent economic response. King was forced to pay more attention to international affairs, from the Ethiopian crisis to the Munich crisis, and he hoped war could be averted through appeasement. He insisted that the Canadian Parliament would decide on Canada's participation if war came, and to make such a decision more palatable, particularly to French Canadians, he promised there would be no conscription for overseas service. Britain declared war on Germany in Sept 1939; the Canadian Parliament was recalled in an emergency session, and, with only token opposition, declared that Canada was at war.

King called a snap election early in 1940 and his government was returned with an increased majority. Co-operation between the government and business and labour leaders shifted Canadian industrial production to a wartime footing. The remarkable industrial expansion involved special financial arrangements with the US and economic planning on a continental scale. Early German victories led some Canadians to advocate conscription but, fearing a political crisis, King tried to compromise. He introduced conscription for the defence of Canada in 1940. In a 1942 plebiscite a majority of Canadians favoured relieving the government of its promise not to introduce conscription for overseas service, but Québec voters were opposed. High casualties in 1944 and a declining rate of voluntary enlistment led to prolonged debates within the government and the resignation of the minister of defence, James Layton RALSTON. In Nov, King abruptly agreed to send some of the home-defence forces to Europe, a decision grudgingly accepted, even by French Canadians.

To placate Canadians who feared the return of the Depression after the war and who looked to the government for greater social security, King introduced unemployment insurance in 1940, and his reconstruction program, based on KEYNESIAN ECONOMICS, included family allowances and proposals for health insurance. The Liberals narrowly won the 1945 election. King did not play a decisive role in the postwar era, preferring a minimal role for the government at home and abroad. He was persuaded to resign as prime minister in 1948 and was succeeded by Louis ST. LAURENT. He died 2 years later.

Mackenzie King has continued to intrigue Canadians. Critics argue that his political longevity was achieved by evasions and indecision, that he failed to provide creative leadership; his defenders argue that King gradually altered Canada, a difficult country to govern, while keeping the nation united. Recent revelations show that this apparently proper and colourless man was a spiritualist, in frequent contact with his mother and other dead relatives and friends.

H. BLAIR NEATBY

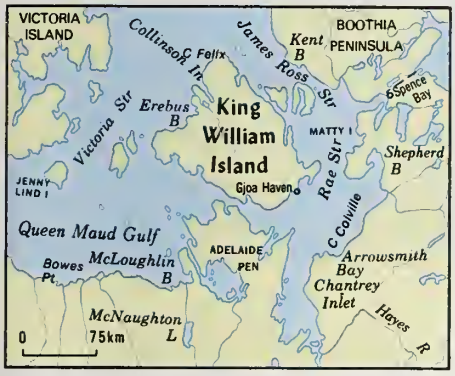
Reading: R.M. Dawson wrote the first vol of the official biography *W.L. Mackenzie King 1874-1923* (1958), followed by 2 vols by H. Blair Neatby for the years 1923-32 and 1932-39 (1963, 1976). J.W. Pickersgill and D.F. Forster edited King's diary as *The Mackenzie King Record*, 4 vols (1960-70); C.P. Stacey, *A Very Double Life* (1976), and J.E. Esberey, *Knight of the Holy Spirit* (1980), discuss King's personality.

King-Byng Affair After the 29 Oct 1925 federal election, Parliament supported the minority Liberal government until 25 June 1926, when it defeated a motion to remove censure from a motion of no-confidence. PM Mackenzie KING asked Gov Gen Lord BYNG to dissolve Parliament before the vote was taken. Byng refused: a request for dissolution while a motion of censure was under debate was unprecedented. The previous election, only 8 months before, had been held at King's request; an alternative government in the existing Parliament seemed possible. King resigned, and Conservative leader Arthur MEIGHEN was asked to form a government. The House of Commons then carried the motion of censure on King's government, defeated 4 motions of no-confidence in Meighen's, then passed a fifth no-confidence motion. The House had now censured both governments; no alternative in the existing House was now possible. Lord Byng granted Meighen a dissolution, and King won the ensuing election with a majority.

EUGENE A. FORSEY

King George's Sound Company (Richard Cadman Etches and Co), fd 1785 in London to trade for furs on the NORTHWEST COAST. Nathaniel Portlock and George Dixon, veterans of James COOK's third voyage, commanded the company's first 2 vessels, which were licensed by the SOUTH SEA COMPANY and the EAST INDIA COMPANY. The company effectively merged on 23 Jan 1789 with that of John Meares, and its commercial activities virtually ended with the NOOTKA SOUND CONTROVERSY that year. BARRY M. GOUGH

King William Island, 13 111 km², in the ARCTIC ARCHIPELAGO, is a lake-studded, gently rolling plain, with a maximum elevation of 137 m. Its vegetation, a polar semidesert, serves as summer range for mainland caribou. It was discovered 1830 by Sir John Ross and named after the British monarch King William IV. Remains of the ill-fated FRANKLIN Expedition have been found here. S.C. ZOLTAI



Kingbird, *see* FLYCATCHER, TYRANT.

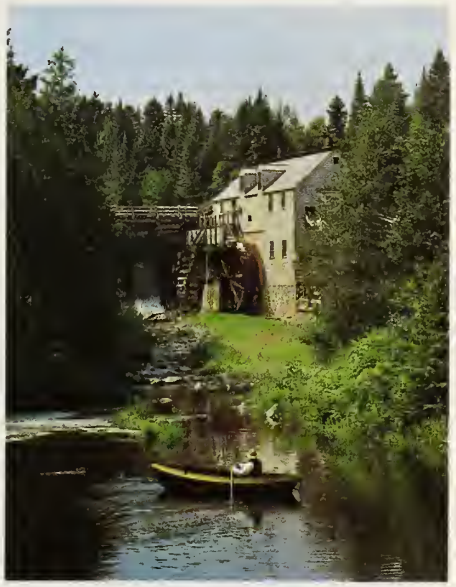
Kingfisher (Alcedinidae), family of robust BIRDS, with large heads, strong, pointed bills, short tails and small feet. The middle and outer toes are joined together for over half their length. The family comprises 87 species worldwide. The only representative in Canada, the belted kingfisher (*Megaceryle alcyon*), is 30-33 cm long, white underneath and blue grey on the back, with a large, ragged, double crest on its head. Belted kingfishers defend feeding territories along edges of water bodies. Kingfishers perch on dead branches, watching for minnows, frogs and large aquatic insects. They dive headfirst into the water to capture prey, often submerging completely. Prey are returned to the perch, struck against it several times, tossed into the air and swallowed headfirst. Nests are burrows, 1-3 m long, dug into dirt banks. Once the female starts incubating the 5-8 white eggs, the male feeds her on the nest. Newly hatched kingfishers intertwine into a compact mass for warmth. Burrows are often reused in subsequent years, regurgitated fish scales and bones from the previous season supplying nesting material. PHILIP H.R. STEPNEY

Of 87 species of kingfisher worldwide, only one occurs in Canada: the belted kingfisher (*Megaceryle alcyon*), which dives headfirst into water to capture prey, often submerging completely (*photo by Tim Fitzharris*).



Kinglet, tiny, highly active, insectivorous songbird, olive grey with brightly coloured crown, sharp, slender bill and short, stubby tail. Kinglets belong to the large (about 1400 species) Old World family Muscicapidae, subfamily Sylviinae (Old World warblers). This subfamily was sometimes elevated to family status. In Canada, it is represented by golden-crowned kinglet (*Regulus satrapa*), ruby-crowned kinglet (*R. calendula*) and blue-gray GNATCATCHER. Kinglets summer in forested parts of Canada, from Aklavik, NWT, southeast to northern Québec and then into the US, parts of Mexico and the Guatemalan highlands. They are migratory, although both species winter in southern Canada, where they frequent coniferous or mixed-deciduous woodland. Breeding occurs from mid-May to mid-July. Nests are pensile (suspended) or semipensile, made of moss and lichens, and take up to a month to build. Clutch includes 5-11 eggs. Kinglets are parasitized, rarely, by brown-headed cowbirds (*Molothrus ater*). Ruby-crowns have a loud, bubbling, musical song; that of golden-crowns is similar but higher-pitched. The scrub-dwelling arctic warbler (*Phylloscopus borealis*) occurs only accidentally in Canada. J.C. BARLOW

Kings Landing Historical Settlement, an outdoor museum covering about 160 ha, established in the early 1960s in the tranquil beauty of the Saint John R valley about 40 km W of Fredericton, NB. It is a crown corporation under the New Brunswick Historical Resources Administration, a provincial government department. Officially opened in 1974, the settlement contains more than 70 restored buildings, including homes, a school, store, church, forge, carpenter's shop and inn. This living-history site depicts the period from the LOYALIST era to late Victorian times. A unique attraction is a reproduction of a pre-Confederation Saint John R woodboat. *See* HISTORIC SITE. ROBERT S. ALLEN



Kings Landing, NB (*photo by Malak, Ottawa*).

King's Posts, a name applied during the French regime to FUR TRADE and fishing posts in the King's Domain (Domaine du Roy), the vast territory N of the St Lawrence R to the Hudson Bay watershed, between the E end of the seigneury of Les Éboulements (E of Québec City) and Cape Cormorant. The land was owned by the king but leased to a private company; posts included TADOUSSAC, CHICOUTIMI, SEPT-ÎLES and LA MALBAIE. The term "King's Posts" was also applied to forts farther N toward Hudson Bay, such as Mistassini, and farther W, such as Lachine, FT FRONTENAC, Ft Rouillé and FT DUSQUESNE. After the CONQUEST the King's Domain was leased to private individuals and companies, including the HBC (1842-59). In 1859 the government took over the administration of the land, continuing to lease fishery and timber rights, while the HBC continued to operate several fur-trade posts.

Kingsmere, Qué, a property left to the nation by former PM William Lyon Mackenzie KING (although it is not named for him, but an early pioneer family), is administered by the NATIONAL CAPITAL COMMISSION. Located in Gatineau Park 12 km from Hull, Qué, this domain of about 240 ha includes the Moorside ruins, a peculiar collection of materials from old Ottawa buildings. "The Farm" has become the residence of the Speaker of the House of Commons. CLAUDINE PIERRE-DESCHÊNES

Kingsmill, Sir Charles Edmund, naval officer, public servant (b at Guelph, Canada W 7 July 1855; d at Portland, Ont 15 July 1935). He joined the Royal Navy as a midshipman in 1869, served in the Sudan in 1884 and as British vice consul and agent at Zeyla, Aden. He rose to captain by 1898 and subsequently commanded ships on the Australia, China and Home stations. In 1908 he retired from the RN as a rear admiral and took charge of the Canadian Marine Service. He played a prominent role in the founding of the Royal Canadian Navy in 1910, and, as vice admiral, became the first director of the Naval Service. He commanded the RCN throughout WWI and was promoted admiral in 1917. MARC MILNER

Kingston, Ont, City, pop 52 616 (1981c; 59 045, 1971c), located at the eastern end of Lk ONTARIO, 170 km SW of Ottawa. Its position at the junction of the Great Lks and ST LAWRENCE R has been crucial to its economic and political history.

Settlement and Development The French entered the region 1673 and constructed a fort and trading post on the site, Ft Cataraqui, which developed into the elaborate FT FRONTENAC, and became an important base for mounting military forays against the Iroquois and the British to the S and explorations along the lakes to the W. In 1758 the fort was captured by the British.

In 1784 the British government negotiated with the Mississauga Indians who were occupying this area for lands on which to settle LOYALISTS from the American colonies. King's Town, as it was then named (in honour of King George III), was made capital of the new district (Mecklenberg) encompassing townships along the Upper St Lawrence and eastern end of Lk Ontario. The town was not negatively affected by the WAR OF 1812. Instead, the significant military and naval presence there stimulated the local economy. Being at the junction of lake and river transport, Kingston was also the site of much transshipment activity for the chief staples of the export trade, lumber and grain, and for inward-moving merchandise and passengers. The construction of the RIDEAU CANAL, linking Upper and Lower Canada by the Ottawa R rather than the vulnerable St Lawrence, reinforced this commercial function. Kingston remained the capital of the district (Midland) and rapidly became the largest town in the province, but not the capital, as hoped — a severe psychological as well as economic blow. By mid-century however, the flow of grain down the St Lawrence had diminished; improvements in navigation of the St Lawrence allowed more through traffic; rail transport became a competitor to water transport, and larger lake vessels posed problems for Kingston's exposed and shallow harbour. The resulting commercial erosion was accompanied by the formal closing of the naval base in 1852, followed by the departure of the imperial garrison 1871.

Rail ventures were explored to extend Kingston's hinterland, leading to its inclusion in 1856 in the E-W GRAND TRUNK RY system. By the 1880s the Kingston-Pembroke railway had trains running over 160 km N to Renfrew. Despite offers of bonuses and tax relief, Kingston could not attract significant capital. Not until WWII, with its stimulus of shipbuilding and other productivity, did large new industries (Alcan Aluminum, Dupont Nylon) enter the city's economy.

Kingston's society and economy have a distinctive institutional base instead. Ft Henry, the Royal Military College, the National Defence College and the extensive military establishment at Barriefield are part of a continuing military presence in the city. Similarly, the Provincial Penitentiary, opened in 1835, led governments to locate a number of other federal and provincial correctional institutions in Kingston and its environs. "Queen's College at Kingston," a college of the Presbyterian Church in Canada, was founded in 1842, developed into QUEEN'S UNIVERSITY, and by the early 20th century had a national reputation in arts and science, medicine and theology. Finally, hospitals and other medical establishments, along with branch offices of government agencies, are part of the institutional presence in Kingston. Lacking dominant industries and significant population increase, Kingston retains much of the physical fabric and employment structure of its 19th-century form.

Cityscape As in the original town plot of 1783, Kingston's downtown continues to be focused on the few blocks around Princess (Store) and Brock streets between Barrie and Front, near the waterfront. Apart from commercial activities, it is characterized by edifices of institutional and architectural note. The imposing KINGSTON CITY HALL and magnificent St George's Cathedral are the focal points of several buildings from the last century. The Customs House, Grand Trunk and Kingston and Pembroke stations, Martello towers and Ft Frontenac all reflect a former way of life. A few blocks away are Kingston's residential areas, featuring the city's traditional limestone construction. There are grand contemporary residences as well, making Kingston a pleasing mixture of architectural styles reflecting the community's different periods of construction and social structure.



Kingston, with Fort Henry in the foreground (*photo by Malak, Ottawa*).

Since 1945, suburbanization — particularly to the W in Kingston Township (in such communities as La Salle Park, Collins Bay and Amherstview) — has been a feature of Kingston's urban growth. After a shift of much retailing to suburban shopping malls in the 1960s and 1970s, the city's waterfront has witnessed a major revitalization through the introduction of condominiums, hotels, restaurants, apartment houses and boutiques.

Population Kingston's failure to grow economically in the 19th century on a scale with other large Ontario communities such as Toronto, Hamilton and Ottawa has meant a slow population growth, even some periods of decrease. From a permanent population of about 2000 just after the War of 1812, the city grew to almost 12 000 by mid-century and 14 000 by 1881. With 30 000 in 1941, population expanded beyond the city limits after WWII in to the Kingston Urban Area (about 50 000, 1951). By 1981 almost half of the KUA population resided outside the city, in Kingston and Pittsburgh townships.

Kingston was bypassed by the immigrants of the late 19th and early 20th centuries. From 59% in 1851, its foreign-born population decreased to 14% in 1951. Over 75% of this group were British, Irish or American born. Only in the 1960s and 1970s did a more ethnically diverse population develop, with substantial groups of Portuguese, Italians, Dutch and Asians. Even so, the city remains dominantly Anglo-Celtic in its heritage and social structures.

Economy As commercial activities eroded in the late 1800s, institutional employers, such as the university, penitentiaries, the military and hospitals, became more important in the city's economy. In the period up to 1940 some industries such as Canadian Locomotive Co and Kingston Cotton Mills were attracted, but these were the exceptions. Others were added by the early 1950s — Alcan, Dupont and Celanese Canada — but institutional employers like Queen's, Kingston General Hospital and Frontenac County Board of Education still dominate the employment picture.

Government and Politics Though governed by English law as part of UC under the Constitution Act of 1791, Kingston was a "police town" until well into the 19th century, administered by the Court of Quarter Sessions. In 1838 Kingston was incorporated as a town with a mayor and elected aldermen and councillors serving 4 wards. John A. MACDONALD promoted Kingston's incorporation as a city (1846), and a new 20-man council of councillors and aldermen who elected the mayor from among themselves was created. In 1850 Kingston extended its limits to annex some outer suburbs, but not until 1952 were the city's limits again extended — W to Cataraqui Cr and N to the present Hwy 401. With the city's shortage of land for industrial and residential development — readily available in the adjoining townships — some are promoting a regional government system for the KUA.

Cultural Life Kingston has a diverse cultural life, with a symphony orchestra of some distinction, several local theatre groups, the Agnes Etherington Art Gallery and a full calendar of visiting artists, scholars and entertainers. Queen's and RMC have long contributed to the musical, theatrical and general cultural scene, and St George's Cathedral choir has achieved recognition beyond the community. The *Whig Standard* is one of Canada's oldest newspapers. Among Kingston's numerous tourist attractions are Ft Henry, Belleview House (the home of Canada's first prime minister), the Thousand Islands, the Rideau Canal and the architecture of "Old Kingston."

Kingston's chief claim to sporting fame — apart from Queen's football Gaels — is the superlative sailing throughout the Kingston Bay-Bay of Quinte area, accompanied by extensive moorings and docking facilities at the site developed for the 1976 sailing Olympics.

BRIAN S. OSBORNE

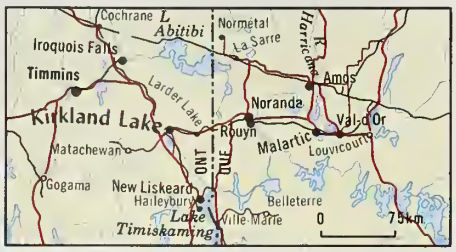
Kingston, George Templeman, meteorologist, (b at Oporto, Portugal 5 Oct 1816; d at Toronto 21 Jan 1886). For successfully promoting and organizing one of Canada's first scientific services, Kingston has been called the father of Canadian METEOROLOGY. He was a Cambridge graduate and came to Canada in 1852; 3 years later he became professor of meteorology at U of T and director of the Toronto Observatory, a position he held until 1880. He was founding director of the national meteorological service 1871-80. With new federal resources in 1871-72, he initiated a daily exchange of weather data with the US and a few years later began the dissemination of daily storm warnings and weather forecasts to eastern ports and cities.
MORLEY THOMAS

Kingston City Hall and market was begun in 1842, a year after Kingston had been named capital of the PROVINCE OF CANADA. Designed by George BROWNE, one of Canada's leading architects of the 19th century, it was an ambitious plan for the period. All civic offices — the town hall, municipal offices, post office, custom house, police station, market hall and mechanics' institute — were to be housed in one massive complex. Its heroic scale would have dwarfed all surrounding buildings and reflected the pride of the city fathers in the new status and future growth of their city. Though the capital was moved in 1843, the building was completed the following year. The city hall and market was Browne's most important commission and the design, with its dome and monumental portico which dominated the main facade, represented a superb example of civic architecture in a neoclassical style. JANET WRIGHT
Reading: M. Angus, *The Old Stones of Kingston* (1966).

Kirby, William, novelist, journalist (b at Kingston-upon-Hull, Eng 23 Oct 1817; d at Niagara-on-the-Lake, Ont 23 June 1906). Author of a classic English Canadian historical novel, *The* GOLDEN DOG (1877), Kirby also edited the *Niagara Mail*. Immigrating with his parents to the US in 1832, Kirby arrived in Niagara in 1839, where his house still stands. A grandmother had been a United Empire Loyalist. He married into a family of prominent LOYALISTS and established himself as a major figure in that tradition, delivering the principal address at the 1884 UEL centennial celebration. Still in print in an abridged edition, *The Golden Dog* is a swashbuckling historical romance. Based upon historic figures, the product of meticulous research, the novel depicts moral progress leading from the corruption of the last days of NEW FRANCE to French Canada's incorporation into the loyal, upright Canadian state. A Loyalist version of history also informs his epic poem, *The U.E.: A Tale of Upper Canada* (1859). DENNIS DUFFY

Kirk, Lawrence Eldred, agriculturist (b at Bracebridge, Ont 27 May 1886; d at Saskatoon 27 Nov 1969). Kirk's most significant contribution was the breeding and introduction in 1932 of Fairway, the first variety of crested wheat grass, to the great plains of Canada. The use of this grass was a contributing factor in bringing the "dust bowl" of the 1930s under control. Fairway crested wheat grass is still the main grass used to reseed rangeland. Kirk taught at U of Sask and Moose Jaw Collegiate Inst before joining the Experimental Farms Service as Dominion Agrostologist in Ottawa. He then became dean of agriculture at U Sask before moving to Rome as head of the plant-industry branch in the UN Food and Agriculture Organization, a position he held until retirement in 1954. T H ANSTEY

Kirke, Sir David, adventurer, governor of Newfoundland (b at Dieppe, France *c*1597; d near London, Eng 1654). Accompanied by his brothers **Sir Lewis** (b at Dieppe *c*1599; d 1683), **Thomas** (b at Dieppe *c*1603; d after 1641), **John** and **James**, he captured TADOUSSAC in 1627. His demand that CHAMPLAIN surrender QUÉBEC was refused and he retired, capturing a French supply fleet off Gaspé. He returned in 1629 and the destitute French surrendered Québec July 19. Thomas was left in charge of the post as governor. The brothers were ordered to restore Québec to the French in 1632, but David was made coproprietor and became first governor of Newfoundland in 1637. He took possession of FERRYLAND, but came into conflict with the fishing merchants and was recalled in 1651 to answer charges of withholding taxes. He was imprisoned on a suit resulting from his seizure of Ferryland and died in jail. A hero to some English writers and a pirate in the eyes of the French, Kirke remains controversial. JAMES MARSH



Kirkland Lake, Ont, Town, pop 12 219 (1981c), inc 1972, located 241 km NW of North Bay. Named after a secretary in the Ontario Dept of Mines, Winnifred Kirkland, the lake around which the town grew has been filled with the tailings of the GOLD mines that brought the town to prominence. Sir Harry OAKES was not the first prospector into the district in the summer of 1911, but he and others such as Bill Wright and the Tough brothers were responsible for discovering and developing the gold mines (Lake Shore, Wright-Hargreaves, Kirkland Minerals) that were the basis for the town's growth and prosperity during the 1920s and 1930s. The population reached a peak of nearly 25 000 at the outbreak of WWII. Since then, downward fluctuations in gold mining have deflated the town's fortunes, although the decline was ameliorated in the 1960s and 1970s by the growth of iron mining and the tourist industry.
MATT BRAY
Reading: S.A. Pain, *Three Miles of Gold: The Story of Kirkland Lake* (1960).

Kitamaat The contemporary Kitamaat Band is an amalgamation of the 2 Haisla-speaking tribes, the Kitamaat of upper Douglas Channel and Devastation Channel and the Kitlope of upper Princess Royal Channel and Gardner Canal in BC. The Kitamaat call themselves *Haisla* ("dwellers downriver"); and the Kitlope *Henaaksiala* ("dying off slowly"), a reference to their traditional longevity. The official designations *Kitamaat* ("people of the snow") and *Kitlope* ("people of the rocks") were adopted from the names used by their TSIMSHIAN neighbours. The Haisla language is the northernmost of the North Wakashan division of the Wakashan language family.

No formal estimates of precontact population exist, although native tradition asserts that each tribe numbered about 1000. Epidemics and endemic diseases brought by Europeans reduced that population, and after the 1918 influenza pandemic, fewer than 300 survived. The decline was arrested around 1930, and by 1982 the population of the combined tribes had reached 1000. There are also additional persons of Haisla ancestry who have lost their status (*see* INDIAN ACT).

Unlike those of other Wakashan-speaking tribes, the Kitamaat and Kitlope social system was based on the matrilineal CLAN. This principle was also followed by the Tsimshian tribes, with whom the Haisla enjoyed close economic and social relations. Aboriginally, there were 8 clans (Eagle, Beaver, Raven, Crow, Killer Whale, Salmon, Wolf and Frog), each composed of a number of family units or lineages, occupying one or more communal dwellings housing up to 30 individuals (*see* HOUSE). The highest-ranking members of each house or lineage formed a council of nobles for the clan chief, who himself acted as counsellor to the tribal chief. Each clan controlled its own resource sites within the general tribal territory, and each occupied an independent winter village. With the population decline, the Wolf and Frog clans disappeared entirely. The survivors of other clans formed linkages, in which they united to occupy a common winter village, and co-operated economically and socially, as in the planning and amassing of wealth for the POTLATCH. Eventually the whole tribe began to occupy the same village, although clan distinctions and linkages remain.

The remoteness of their villages, situated far up northern inlets, enforced isolation on the Kitamaat and Kitlope until the 1890s, when a mission and residential school were established at Kitamaat. Missionaries and government agents believed that the flamboyant, theatrical aspects of traditional culture were impediments to "civilization" and should be eradicated. They exerted pressure to abandon feasts, dancing and potlatches; the traditional communal houses were pulled down, and the children were forbidden to speak the native language. During the same period, the decline in population shattered the clans and lineages and disrupted orderly lines of succession to titles and property in the traditional social order. After several decades of strain and dislocation, a culture has emerged that combines elements of both their traditional heritage and Euro-Canadian culture. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE. JOHN PRITCHARD
Reading: R. Olson, "The Social Organization of the Haisla of BC," *Anthropological Records* 2, no 5 (1940).

Kitchener-Waterloo are twin cities in central southwestern Ontario, 110 km SW of Toronto. Kitchener, larger of the two (139 734, 1981c), is also county seat and judicial and financial centre of the new Regional Municipality of Waterloo (pop 305 496, 1981c) formed 1973 by combining Waterloo County and several communities within its boundaries, including the newly created city of CAMBRIDGE. Waterloo has a population of 49 428 (1981c).

Settlement The cities and entire regional area were originally part of a tract of more than 243 000 ha set aside by the British Crown in 1784 as a reserve for the Six Nation Indians. In 1798 this land was subdivided and sold, Block 2 becoming the future Waterloo Township. Purchased first by speculators, then in 1805 by Pennsylvania MENNONITES, it was the nucleus of a large German-speaking settlement, swelled by the 19th-century exodus from Germany of skilled craftsmen, artisans and tradesmen as well as farmers and agricultural labourers. Both communities were included as villages in the 1850s, Kitchener being known then as Berlin. (It was renamed for Lord Kitchener during WWI.)

Development of the communities was determined primarily by the entrepreneurial skills and cohesive nature of the German community. Even in 1911, 70% of the inhabitants of Berlin and Waterloo were of Germanic origin. Economic growth was aided by Berlin's location on the GRAND TRUNK RY. An effective system of municipal support and "bonusing" for industrial growth led by prominent German Canadian families aided Berlin's industrial pre-eminence in the area. After 1900 external investment and branch-plant industries, particularly in rubber and automotive parts, brought Kitchener and Waterloo more fully into Canada's economy.

Population: Kitchener 139 734 (1981c); Waterloo 49 428 (1981c); 287 801 (CMA); 305 496 Regional Municipality

Rate of Increase (1971-81): Kitchener 5.1%; Waterloo 3.02%

Rank in Canada: Eleventh (by CMA)

Date of Incorporation: Kitchener 1912 (Town of Berlin 1876); Waterloo 1943

Land Area: Kitchener 133.95 km²; Waterloo 66.37 km²

Elevation: 335 m

Climate: Average daily temp, July 19.9°C, Jan 10.5°C; Yearly precip rain 686 mm, snow 157.5 cm; Hours of sunshine 1936.4 per year



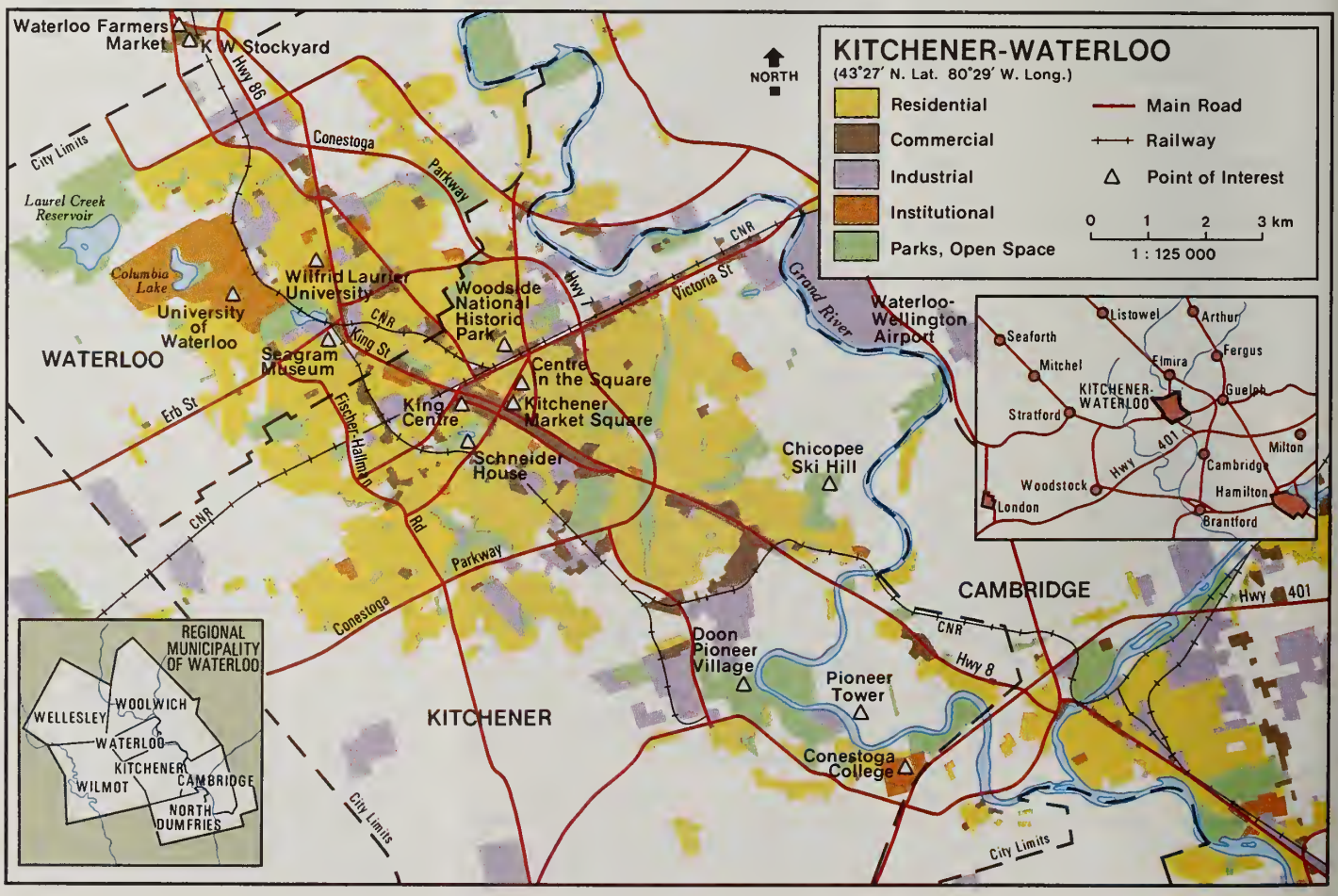
The economic growth of Berlin (later named Kitchener) was greatly aided by the arrival of the Grand Trunk Ry, shown in this view of 1854 (*courtesy Waterloo Historical Society*).

The transmission of inexpensive Niagara hydroelectric power to Berlin in 1911 — the first inland Ontario community to have access to this new source of power — reinforced the industrial growth of the communities.

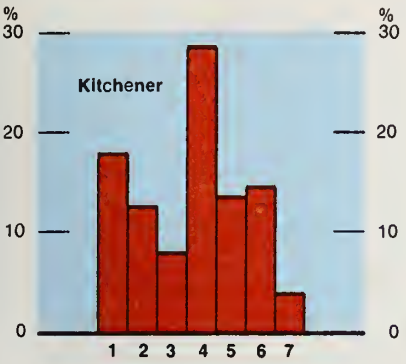
Cityscape The swampy terrain along the Great Road from Dundas determined the location of the first urban settlement of Berlin and Waterloo. Population slowly encroached on existing farmlands, but without large annexations from nearby townships until the rapid population growth of the 1950s. Early housing, generally of white or yellow brick, featured a unique Germanic vernacular. After WWI, styles began to conform to national stereotypes: bungalows, "ranch style," and row housing. Strenuous efforts began in the 1980s to halt the erosion of the cities' central cores, but little of the 19th-century ambience remains.

Population Though the prevalent German language and culture of Kitchener and Waterloo at the turn of the century made them unique in Canada, immigration from the fatherland ceased with the outbreak of war in 1914. The rise of Hitler, the Great Depression and WWII stifled subsequent German immigration, and by 1941 less than half the population saw itself as German. However, new German refugees who had fled or been expelled from eastern Europe (Romania, Yugoslavia, Poland, the USSR) reached Kitchener and Waterloo after the war. By the 1970s the cities were once more extolling their German identity though an annual Oktoberfest, which became a national tourist attraction. Other ethnic groups — Poles, Greeks, Portuguese, Italians, Chinese and West Indians — created a new population mixture throughout the 1960s and 1970s. With more than 45% of the population being British by ethnic origin as well, the community, like the nation, had become multicultural.

Economy and Labour Force The business and artisan skills of the German immigrants created a diversified industrial base. J.M. Schneider, a meat packer, began making sausage. Joseph E. Seagram's distillery was an auxiliary enterprise to a gristmill. Kuntz brewery (now Labatt's) began producing German lager beer, and Electrohome was aided in its early growth by the presence of skilled craftsmen. Some 20 furniture companies flourished in the early 20th century. Fire-insurance companies, particularly the Economical in Kitchener, and life-insurance companies in Waterloo, such as Mutual, Dominion and Equitable Life, drew on the local community's stability. The rubber industry came with the automobile era, as B.F. Goodrich, Uniroyal and Kaufman established factories and head of-



Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



Industry groupings

1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figure II, Catalogue 31-209, Statistics Canada.

fices in Kitchener. An excellent road and rail transportation system gave access to the Canadian and American markets and a stable and efficient labour force (about 37% unionized) provided additional incentives. Technically oriented Conestoga College and UNIVERSITY OF WATERLOO (with Canada's largest engineering school and co-operative work-study programs with industry) have continued the community's original orientation.

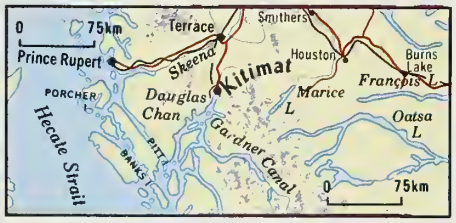
Government and Politics From the beginning, Kitchener and Waterloo maintained independent municipal governments with few shared services or mutual concerns. With the establishment of a 2-tiered REGIONAL GOVERNMENT in 1973, city councils remained, but the regional government assumed control over services such as police, fire, planning, engineering, health and social development. Rather than drawing Kitchener and Waterloo more closely together, their rivalries were now provided with a forum for discontent. Administrative bureaucracies expanded dramatically and professionals and elected officials asserted control. Kitchener and Waterloo created or encouraged "neighbourhood" or residents' associations to make their councils more amenable to the wishes of constituents. Though local politics have lacked the fractiousness of some municipal governments, Kitchener has had its share of maverick mayors.

Cultural Life German cultural events predominated in the 19th century: saengerfests, turnvereins and celebrations of the birthdays of Kaiser Wilhelm and Chancellor von Bismarck were highlights. The love of music has survived and flourished in the 20th century, particularly the symphonic and choral traditions as well as a penchant for band music. Live theatre, by contrast, has not fared well. Organized sports, particularly hockey, have a prominent role in the community. WILFRID LAURIER UNIVERSITY and U of Waterloo, Kitchener's multipurpose Centre-in-the-Square theatre, the Kitchener-Waterloo Symphony Orchestra and Art Gallery provide local access to international performances. Kitchener's Saturday Farmer's Market is a popular southern Ontario attraction.

K.M. McLAUGHLIN

Kitimat, BC, District Municipality, pop 12 814 (1981c), inc 1953, is located at the head of Douglas Channel, 110 km E of Prince George. Named for the nearby KITAMAAT ("people of the snow") by the HBC around 1837, its modern founding occurred in the early 1950s. The ALCAN aluminum smelter was located at the head of the Douglas Channel because it provided a deep-water port with access to world markets; the alluvial plain of the Kitimat R provided flat land for the smelter and town. The massive hydroelectric power required for the smelting of ALUMINUM was provided by a dam on the Nechako R, which diverted its flow westward through a tunnel to a gigantic generating station at Kemano. Although one of the great metallurgical plants in the world, Alcan is no longer the only employer. The Eurocan pulp-and-paper complex plays a secondary role and logging also extracts timber for conversion at southern mills. A new methanol plant has pioneered a potential for petrochemical activities, and natural-gas export may also prove important. *See* COMPANY TOWN.

WILLIAM A. SLOAN



Kittigazuit Site, archaeological site located at the mouth of the MACKENZIE R, was the largest INUIT village in arctic Canada during the 19th century. It was occupied by the Kittegaryumiut band of the MACKENZIE INUIT, who used it primarily as a summer beluga-hunting camp. As many as 1000 people lived in the village during the WHALING season and up to 200 kayakers joined in communal hunts, which involved driving herds of beluga onto shoals in the river. Several hundred of the small whales could be killed in a single day by this technique. During the winter a much smaller population remained at the village, living in large multifamily houses built of driftwood and covered with turf. Archaeological research indicates that the site had been used in this way for about 500 years. Most of the Kittegaryumiut died in a measles epidemic in 1902, and the village was abandoned except for occasional use as a trading post. *See also* ARCHAEOLOGY.

ROBERT McGHEE

Kitwanga Fort, a Northwest Coast Indian village on the Kitwankul R in BC, was part of a complex trading network. In 1979 field research conducted at Kitwanga, combined with records of oral traditions, indicated that intertribal trade and warfare were prevalent along the coast. Periods of war involving Kitwanga Ft began before 1700, continuing to the 1830s. Twenty-two trails were plotted along the Skeena, Nass, Stikine R system where this trade and warfare activity took place. Archaeological discoveries showed that after 1741 trade was undertaken primarily with Russian traders. Warfare was motivated by the desire to gain control over new resources, particularly metals and weapons. The exploits of Nekt, a warrior who became a legendary archetype, demonstrate the struggle for economic superiority and honour along the Northwest Coast. Kitwanga Fort has been declared a National Historic Site. *See also* ARCHAEOLOGY.

LILLIAN STEWART

Kiugak Ashoona (also known as Kiawak), sculptor (b 16 Sept 1933). Son of renowned Inuit artist PITSEOLAK Ashoona, Kiugak recounts that his own prodigious artistic career began in his childhood, while the family was still living at a camp on the land. His first carving, made from walrus tusk, was taken by his brother QAQAQ Ashoona to exchange for supplies at the Baffin Trading Co. While focusing on typical Inuit subject matter — people engaged in traditional activities, mythological and fantasy creatures — Kiugak, who resides at CAPE DORSET, NWT, earns his reputation as an artist for the elegance and formal beauty of his work. His sculpture of the Inuit sea goddess Sedna was featured on a 1980 Canadian postage stamp. *See* INUIT ART.

MARIE ROUTLEDGE



Kiugak Ashoona's *Woman Holding Fish*, typical of the elegance and formal beauty of the artist's work (*courtesy West Baffin Eskimo Co-operative, Cape Dorset, NWT*).

Klee Wyck, collection of literary sketches by Emily CARR (Toronto 1941). *Klee Wyck* — the Indian name given Carr, meaning "Laughing One" — is an evocative work that describes in arrestingly vivid detail the central influence on Carr of Northwest Coast Indian life. Carr's clear, poetic prose summons up totems, abandoned villages, Indian character, broken-English dialogue and natural scenery without lapsing into nostalgic sentimentality, sociology or romance. Her writing inevitably invites comparison with her PAINTING: Carr's gifts with words are of a different but not a lesser order; she achieves a remarkable purity of effect through her careful translation of images, perceived by a keenly sympathetic eye, into translucent language. *Klee Wyck* has been translated into French (Montréal, 1973).

NEIL BESNER

Klein, Abraham Moses, poet, writer (b at Ratno, Ukraine 14 Feb 1909; d at Montréal 20 Aug 1972). One of Canada's greatest poets and a leading figure in Jewish-Canadian culture, Klein was raised in the working-class Jewish immigrant district of Montréal. He studied classics and political science at McGill (1926-30) and as a student began to publish poetry and prose in Canadian and American periodicals. An excellent speaker and debater, he became active as a



Abraham Moses Klein, poet whose work is remarkable for its linguistic exuberance, wit and moral fervour (*courtesy Public Archives of Canada/C-64042*).

writer, editor and educator in the Zionist youth organization Young Judaea. His close friends at McGill included David LEWIS, F.R. SCOTT, A.J.M. SMITH, Leo KENNEDY and Leon Edel. After graduating from Université de Montréal law school (1933) he practised law until his retirement in 1956. Editor and principal columnist (1938-55) of the weekly *Canadian Jewish Chronicle*, he worked as a ghostwriter and public-relations consultant for Samuel BRONFMAN during the same period. He was a visiting lecturer in poetry at McGill (1945-48) and was affiliated with the *Preview* group of Montréal poets. In 1949 he ran unsuccessfully as a CO-OPERATIVE COMMONWEALTH FEDERATION candidate. In the early 1950s he suffered a mental breakdown, withdrew from public activity and gradually lapsed into silence for the remainder of his life.

Much of Klein's verse (*Hath Not a Jew...*, 1940; *Poems*, 1944) was infused with Jewish images and ideas. In *The Hitleriad* (1944) he vented his spleen against the Nazis. His last and finest collection, *The Rocking Chair* (1948), is a sentimental and satirical portrayal of Québec. His short allegorical novel *The Second Scroll* (1951) was based on his 1949 journey to Europe, Israel and Morocco. Klein also published many newspaper articles, stories, book reviews and translations from Hebrew and Yiddish. His work is remarkable for its linguistic exuberance, wit, learning and moral fervour. Klein has rightly been called the "first contributor of authentic Jewish poetry to the English language." His writings articulate the feelings of a generation that witnessed the destruction of European Jewry and the fulfilment of the Zionist dream. USHER CAPLAN

Reading: Usher Caplan, *Like One That Dreamed: A Portrait of A.M. Klein* (1982). Klein's collected works are being published by the University of Toronto Press.

Klein, George Johnn, design engineer (b at Hamilton, Ont 15 Aug 1904). Possibly the most productive inventor in Canada in the 20th century, he spanned in his career the "stick and string" era of aviation to the Space Shuttle. Klein worked 1929-69 at the NATIONAL RESEARCH COUNCIL and as a consultant after retirement. He designed the NRC's first wind tunnels and undertook research on fitting skis to aircraft, which led in turn to designing the Weasel army snowmobile (mass-produced in the US as the M-29) and ultimately to studying the mechanics of snow, on which he became an authority. Gearing systems were a lifelong speciality. During WWII he designed aiming systems for artillery and naval anti-submarine mortars and in his 70s he was chief consultant on gear design for the CANADARM. In 1951 he invented the STEM (*S*torable *T*ubular *E*xtendible *M*ember), a radio antenna that can be retracted into a flat reel and rolled out again on command. First used in space by the Alouette 1 satellite of 1962, the STEM increased the maximum size of satellite antennas from 6 metres to 45 metres, and was subsequently adopted as standard space technology. In 1944-54 Klein headed the team that designed the Zero Energy Experimental Pile, the first atomic reactor outside the US. His other inventions ranged from a wheelchair for quadriplegics to a microsurgical staple gun used to suture blood vessels. DONALD J.C. PHILLIPSON

Reading: W.E.K. Middleton, *Mechanical Engineering at the National Research Council of Canada, 1929-1951* (1984).

Kleinburg, Ont, straddles a hogback between 2 branches of the Humber R, 40 km NW of Toronto. It has no legal entity, being part of the sprawling rural Town of Vaughan (formerly Vaughan Township), and therefore no official boundaries; but its population is generally reckoned at 1250. Founded around 1847 by an Alsatian immigrant, John Kline (*sic*), who built the first gristmill, it is known today as the site of one of Canada's largest art galleries, the MCMICHAEL CANADIAN COLLECTION; for the Toronto International Film Studios, a major centre for TV and motion-picture production; and for the annual Binder Twine Festival, which attracts 30 000 people to the main street each Sept. Once an important farming centre, it has become a bedroom community for Toronto, its residents lured by the unspoiled beauties of the Humber Valley and the rural atmosphere of the village they struggle fiercely to preserve. PIERRE BERTON

Klinck, Carl, literary historian, educator (b at Elmira, Ont 24 Mar 1908). Klinck helped make CANADIAN STUDIES a central part of the curriculum: his *Canadian Anthology* (edited with R.E. Watters, 1955, 1974) established a canon of poetry, short fiction and critical essays. A graduate of Waterloo College (U of Western Ontario) and Columbia, Klinck taught Canadian works in a continental context. Introductions to Frances BROOKE's *The History of Emily Montague* (1961), Susanna MOODIE's *Roughing It in the Bush* (1962) and John RICHARDSON's *Wacousta* (1967) stirred interest in early Canadian novels. Perceptive and historically searching articles, and book-length studies of W.W. CAMPBELL (1943), E.J. PRATT (1947), "Tiger" DUNLOP (1958) and Robert SERVICE (1976) were capped by his integrative work as general editor of *The Literary History of Canada* (1965, 1976). He is a fellow of the RSC and an Order of Canada officer. ELIZABETH WATERSTON

Klondike Gold Rush, touched off by the 16 Aug 1896 discovery of placer gold on Rabbit (later Bonanza) Creek, a tributary of the Klondike R, by George Washington Carmack and his Indian brothers-in-law, "Skookum Jim" and "Tagish Charley." This accidental find was the result of a tip by a Canadian prospector, Robert Henderson, now credited as codiscoverer. The GOLD RUSH that followed was confined that first year to the Yukon interior. Miners already on the scene staked every creek in the Klondike and Indian river watersheds, including the fabulously rich Eldorado.

The world did not learn of the strike until some of these newly rich pioneers reached the West Coast by steamship in mid-July 1897. The Seattle *Post-Intelligencer*'s description of "a ton of gold" actually touched off the stampede. The effect on the depressed economy was instantaneous as hoarded funds were freed to finance some 100 000 amateur goldseekers who started N that fall and winter. The rich went all the way by water; the poor struggled over the WHITE PASS and CHILKOOT PASS, then down the Yukon R in handmade craft; the foolhardy took the "all-Canadian" routes through BC or out of Edmonton and found themselves spending 2 years on the trail. Soon much of Alaska and the Canadian Northwest was speckled with men and pack animals. Every Canadian community from Winnipeg to Victoria was permanently affected by the boom. The Canadian North was seen as something more than frozen wasteland: Klondike fever was the catalyst for a chain of later mineral discoveries. Sixty steamboats plied the Yukon. The new town of DAWSON at the Klondike's mouth, with a floating population of some 30 000, became the largest community N of Seattle and W of Winnipeg, boasting telephones, electricity and motion picture theatres. PROSTITUTION was tolerated; saloons, dancehalls and gaming parlours ran wide open except on Sundays. The NORTH-WEST MOUNTED POLICE kept

Prospectors' camp at Teslin Lake, BC, June 1898, en route to the Klondike (*courtesy Public Archives of Canada/PA-16141*).



Dawson a law-abiding town while the YUKON FIELD FORCE, a military unit, maintained Canadian sovereignty in the face of a predominantly American population. The Spanish-American War and the news of a strike at Nome, Alaska, ended the stampede in the summer of 1899. By then, it is estimated, the goldseekers had spent some $50 million reaching the Klondike, a sum about equal to the amount taken from the diggings in the 5 years following Carmack's discovery. PIERRE BERTON

Reading: Pierre Berton, *Klondike* (1958).

Klotz, Otto Julius, astronomer (b at Preston, Canada W 31 Mar 1852; d at Ottawa 28 Dec 1923). With W.F. KING and E.G. DEVILLE, Klotz was responsible for the formation of the astronomical branch of the Dept of the Interior, and for the building of the Cliff Street Observatory in 1890. With King he planned the Dominion Observatory and in 1917 succeeded him as director. As an astronomer he established positions along the CPR right-of-way through BC in 1885, participated on the team that determined the longitude of Montréal W of Greenwich, and in 1903-04 extended the longitude from Vancouver across the Pacific along the new cable route, closing the link previously established from England eastward to Australia. MALCOLM THOMSON

Kluane National Park (est 1972, 22 000 km^2) is an area of unclimbed peaks, vast ice fields, clear lakes, GLACIERS and spectacular wildlife. Tucked in the SW corner of YT, 150 km W of Whitehorse, the PARK contains Canada's highest peak, Mt LOGAN. Surrounding its jagged 5951 m summit and dominating the park is the world's largest concentration of icefields and glaciers. The landscape includes alpine meadows, tundra and lush, forested valleys. The park is well known for its abundant wildlife, including ground squirrels, mountain caribou, moose, grizzly and black bears, Dall sheep and mountain goats. Over 170 bird species, from golden eagles to golden-crowned sparrows, inhabit the park. Archaeologists believe humans may have lived in the area at least 30 000 years ago. More recently the Tutchone Indians hunted there. Explorers, prospectors, climbers and hunters settled around Kluane beginning in the 1890s. Today, those seeking adventure can camp at Kathleen Lakes, hike and climb, or fish (June-Aug). There are winter facilities for cross-country skiing, ice fishing and camping. Nearby towns of Haines Junction and Destruction on the ALASKA HWY provide essential services. The park is a UNESCO World Heritage Site. LILLIAN STEWART

Lowell Glacier, in Kluane National Park, YT. The park was established in 1972 (*courtesy Parks Canada/Prairie Region*).



Kluane Ranges, the easternmost of the St Elias Mtns in the Yukon Territory, extend 350 km NW from the Tatshenshini R to just beyond the Yukon-Alaska boundary. The ranges rise in a wall-like front at the SW edge of Shakwak Valley to elevations of 2000-2800 m and are bordered on the W by a succession of valleys and plateaus collectively known as the Duke Depression. Several large valleys drained by wide, braided rivers cut across the ranges. Although not as high as the Icefield Ranges farther W, the Kluanes show a unique ruggedness typified by serrated narrow ridges, steep slopes and long talus screes. They are sculpted mainly from Paleozoic and Mesozoic volcanic and sedimentary rocks that are laced with faults, some of which may still be active. Spruce forest is common below about 1200 m elevation, but the upper slopes of the ranges are treeless. The area supports an abundance of wildlife, including grizzly and black bear, timber wolf, Dall sheep, mountain goat, caribou and moose. The ranges are partly within KLUANE NATIONAL PARK and are a popular destination among hikers and climbers. JOHN J. CLAGUE

Knight, Harry Upperton, photographer (b at Tillington, Eng 6 July 1873; d at Victoria 28 Dec 1973). After operating a PHOTOGRAPHY studio in Cranleigh, Eng, Knight immigrated to Canada in 1910. He sold real estate in Vancouver, and in 1917 he established a studio in Victoria. Knight spent the next 47 years taking portraits and creating a vision of the city that mixed Old World sentiment with soft-focus Pictorial moodiness. Although his career spanned nearly half a century, and he witnessed profound social and cultural changes, his style remained firmly rooted in turn-of-the-century concepts of photography as an inferior cousin of painting. DAVID MATTISON

Knights of Labor, the major labour reform organization of the late 19th century, organized Dec 1869 by Philadelphia garment cutters. Growing slowly in the 1870s, the secret organization emphasized co-operation and education. The Knights believed in organizing all workers, without regard to skill, sex or race. Their major organizational breakthrough was the mixed assembly of various types of workers, which allowed the order to expand into small towns and villages. Entering Ontario, perhaps in 1875, and certainly in 1881 in Hamilton, the order organized some 450 local assemblies across Canada. Strongest in Ontario, Québec and BC, the Knights also enjoyed success in Nova Scotia and Manitoba and established locals in New Brunswick and present-day Alberta.

In Ontario and Québec, leading Knights played key roles in organizing the TRADES AND LABOR CONGRESS of Canada, and were prominent in independent labour political campaigns in the 1880s and 1890s and in considerable parliamentary lobbying. The Knights peaked in Ontario and the West in 1886, but were most successful in Ottawa and Québec in the 1890s. Their expulsion for dual unionism from the TLC in 1902 at Berlin (Kitchener) abetted the development of distinctive Québec unions. Key Knights' strongholds were Toronto, Hamilton, Montréal, Québec, Ottawa, St Catharines, St Thomas, London, Kingston, Winnipeg and Victoria. Canadian Knights such as A.W. Wright, Thomas Phillips THOMPSON and D.J. O'DONOGHUE made important contributions in the US as well. The Knights' major contributions to the Canadian working class lay in the notion of the organization of all workers and in their efforts to formulate social alternatives to the growth of monopolistic capitalist society. G.S. KEALEY

Knowles, Dorothy Elsie, artist (b at Unity, Sask 7 Apr 1927). Knowles studied at the Emma Lake Summer School (Sask), at U Sask with Eli BORNSTEIN, and at the Goldsmith School of Art in London. Married to painter William PEREHUDOFF, she was one of those artists stimulated by the Emma Lake Artists' Workshops, especially that of 1962 led by Clement Greenberg, who encouraged her interest in landscape. Her work is distinguished by a delicate, broken touch influenced by Cézanne and by thin paint surfaces that owe to a suggestion from Kenneth Noland. Knowles's long-standing interest in watercolours aligns her with the traditions of English landscape painting so important in Saskatchewan since the arrival in 1907 of Augustus KENDERDINE. An important exhibition of her work was organized by the Edmonton Art Gallery in 1983. KEN CARPENTER

Knowles, Stanley Howard, politician (b at Los Angeles, Calif 18 June 1908). The best-known and respected of Canada's Opposition MPs, Knowles represented Winnipeg N Centre for the CCF/NDP 1942-58 and 1962-84 using a legendary knowledge of parliamentary procedure to promote social justice. Born in the US of Nova Scotian/New Brunswick parentage, Knowles had a profoundly religious upbringing in the SOCIAL GOSPEL tradition of the Methodist Church. He never forgot his mother's death from tuberculosis in 1919 or his father's being fired from a machinist's job in 1932; both incidents marked his choice for theological studies at United College, Winnipeg, and then for political action via the CO-OPERATIVE COMMONWEALTH FEDERATION in 1935. He had to change laws rather than souls. From 1942 (when he won the by-election after the death of J.S. WOODSWORTH), he did so by an increasing mastery of the rules of procedure: for almost 40 years he badgered successive governments into enlarging Canada's nascent WELFARE STATE. The PIPELINE DEBATE of 1956 was the most publicized illustration of his parliamentary skills; the founding of the NDP in 1961 confirmed his promotional abilities. Knowles's political life took a heavy personal toll but his sense of duty, his will power and the public esteem he commands sustained him through multiple sclerosis (since 1946), marital estrangement (since the 1950s) and a massive stroke

(1981). In 1984 Parliament, in an extraordinary retirement gift, named him an honourary officer of the House with a place, for life, at the Clerk's Table. SUSAN MANN TROFIMENKOFF

Readings: Gerry Harrop, *Advocate of Compassion: Stanley Knowles in the Political Process* (1984); Stanley Knowles, *The New Party* (1961); Susan Mann Trofimenkoff, *Stanley Knowles* (1982).

Knox, Walter, track and field athlete (b at Listowel, Ont 1878; d at St Petersburg, Fla 3 Mar 1951). Knox was one of the most versatile and successful performers in Canadian sport. From 1896 to 1933, he obtained 359 1sts, 90 2nds and 52 3rds in competition. He won 5 Canadian titles in one afternoon in 1907 — 100 yds, broad jump, pole vault, hammer throw and shot put — and he defeated various champions during his international career as a gambling "gypsy athlete." In 1914 Knox defeated British champion F.R. Cramb for "world all-round championship" at Manchester, Eng, winning 6 of 8 events. Coach of the Canadian track and field team at the 1920 Antwerp Olympics, he also coached Ethel CATHERWOOD, gold-medal high-jump winner at the 1928 Amsterdam Olympics. GERALD REDMOND

Knudson, George, golfer (b at Winnipeg, Man 28 June 1937). Knudson was introduced to golf as a teenager at St Charles Country Club, Winnipeg, and later moved to Toronto. Fascinated with the golf swing, he was determined to make his reliable and efficient. He became known as a superior ball-striker and, after turning professional in 1958, won 8 events on the US tour. In 1968 he won consecutive events in Phoenix and Tucson, Ariz, and in 1969 finished 2nd by a stroke in the prestigious Masters. During the late 1970s he turned to teaching golf. LORNE RUBENSTEIN

Koerner, Leon Joseph, lumberman, philanthropist (b at Nový Hrozenkov [now in Czechoslovakia] 24 May 1892; d at Vancouver 26 Sept 1972). Born into a prominent Austro-Hungarian lumbering family, Koerner was a founder of the European Timber Exporters Convention and once served as Czechoslovakia's timber controller. After the dismemberment of Czechoslovakia in 1938, Koerner, who was of mixed Slav and Jewish ancestry, came to Vancouver where 3 brothers joined him. In 1939 he bought a defunct lumber mill in New Westminster. Applying curing techniques developed in Europe and using his British trade connections, his Alaska Pine Co sold hemlock, hitherto a waste wood in BC, as Alaska Pine. In 1955 he and his wife established the Leon and Thea Koerner Foundation which continues to provide financial aid for higher education, cultural and creative arts, and public welfare (*see* FOUNDATIONS). BC was a special beneficiary of Koerner's philanthropy. PATRICIA E. ROY

Koffman, Morris, "Moe," flautist, saxophonist (b at Toronto 28 Dec 1928). One of Canada's most popular instrumentalists, Koffman began as a saxophonist with dance bands in Toronto and, from 1950 to 1955, the US (Sonny Dunham, Jimmy Dorsey, etc). He moved to the forefront of Toronto's jazz and studio worlds, especially with a flute recording in 1957 of his "Swinging Shepherd Blues," a tune subsequently recorded by more than 300 artists. Koffman's pop-jazz bands have been a fixture at George's Spaghetti House restaurant in Toronto for over 25 years; he has been a soloist with other Toronto jazz bands, including Rob MCCONNELL's Boss Brass. His recordings (19 albums 1957-82) combine versatility with a sure commercial instinct, mixing jazz lightly with other styles of music, from classical (*Moe Koffman Plays Bach, Master Sessions*) to disco (*Jungle Man, If You Don't Know Me by Now*). MARK MILLER

Kogawa, Joy, poet, novelist (b at Vancouver, BC 6 June 1935). During WWII she and her parents were among the thousands of JAPANESE Canadians forcibly removed from the coastal areas and interned in the interior of BC: an experience Kogawa dealt with in her 1981 novel *Obasan*. Prior to its publication she was known mainly as a poet, as evidenced in *The Splintered Moon* (1967), *A Choice of Dreams* (1974) and *Jericho Road* (1977), collections of tightly controlled verse in which her Japanese ancestry becomes a growing preoccupation. Her cool appraisal of such themes and her natural dignity and understated literary power have won her numerous awards.

Kohlrabi (*Brassica oleracea*, Gongylodes Group), sometimes called stem turnip or cabbage turnip, an important Canadian garden VEGETABLE of the Cruciferae family. Seedlings and leaves resemble those of most cole crops (eg, BROCCOLI; CAULIFLOWER). Plant height ranges from 25-40 cm. The edible part of the kohlrabi is an enlargement of a small portion of the above-ground stem. In shape the swollen stem varies from nearly round to a flattened globe; in outer colour, from greenish white to reddish purple. Kohlrabi is cold tolerant, like CABBAGE. It matures in 45-60 days and can be direct seeded, but a GREENHOUSE or hotbed start results in earlier maturity. INSECT PESTS and diseases include aphids, cabbage worms, damping-off and blackleg. Kohlrabi is a good source of potassium. It is a common Canadian garden crop, but commercial production is limited to large-city market gardens. V.W. NUTTALL

Koje-Do, island 40 km SW of Pusan, S Korea, location of a series of disorders in American-operated POW camps during the KOREAN WAR. Quartered in huge compounds containing as many as 6000 men, the 160 000 N Korean and Chinese prisoners were inadequately controlled, and in May-June 1952 had to be dispersed with the help of tanks after they captured the camp commander and extorted a "confession" of inhuman treatment. Hoping to distribute POW administration more widely among UN powers, the Americans, without consulting the governments concerned, requested guard duty contingents from British Commonwealth units. A company of the Royal Canadian Regiment thus served on Koje-Do from 25 May to 8 July 1952. Fearing possible political implications, Ottawa delivered a public diplomatic protest to the US government, officially on the grounds that it was government policy to keep Canadian troops unified under Canadian command. American authorities were accommodating, although privately infuriated. DENIS STAIRS

Koksoak, Rivière, 874 km long (to head of Caniapiscau R), final leg of a river system that drains a vast area (133 000 km^2) of northern Québec. The main branch is formed by the Caniapiscau R, which rises in Lac Caniapiscau, and its main tributary, the Swampy R, and flows generally NNW. The more westerly branch is formed by Rivière aux Mélèzes and its tributaries R du Gué and R Delay. The Caniapiscau and Mélèzes join to form the Koksoak, which flows N 145 km past Ft Chimo to UNGAVA BAY. The name is likely a translation of an Inuit word meaning "big river," and the Koksoak is over 1600 m wide near its mouth. A dam on the Caniapiscau R has tripled the size of Lac Caniapiscau, and water is being diverted to the JAMES BAY hydroelectric development via LA GRANDE RIVIÈRE. JAMES MARSH

Komagata Maru, a Japanese-owned freighter chartered out of Hong Kong in Apr 1914 by 376 Punjabis, mostly SIKHS, bound for Canada. At the time, EAST INDIANS were kept out of Canada by an order-in-council requiring them to come to Canada by continuous passage from India, when no steamship line provided the service.



East Indian immigrants waited for 2 months aboard the SS *Komagata Maru* while immigration officials maneuvered to keep them out of Canada (*courtesy Vancouver Public Library/6232*).

Before the Canadian government, under tremendous pressure, closed the door in 1908, about 2000 Sikhs had settled in BC. In 1913, 38 Sikhs contested the continuous-passage order and were admitted. This encouraged others to charter the *Komagata Maru*. When it arrived at Vancouver in May 1914, most of the passengers were detained on board. They waited for 2 months while immigration officials maneuvered to keep them out of court and, after they had lost their case, while their leaders negotiated departure terms. The arrival of the RCN cruiser RAINBOW on July 20 added to the Canadian pressure, and on July 23 *Komagata Maru* sailed for Calcutta, where it was met by police suspicious of the organizers' politics. On disembarkation, 20 passengers were killed in a shooting exchange. The affair strengthened Indian nationalist feeling, but did not significantly soften Canadian immigration law. HUGH JOHNSTON

Kootenay are divided into "Upper" and "Lower" divisions, respectively occupying eastern and western portions of their plateau habitat. The Kootenay R in southeastern BC served as the unifying centre of their aboriginal territory and culture, provided many of their subsistence needs, and was also the location for their villages and a means of transportation. The term "Kootenay" is an anglicized form of either a Peigan or an old Kutenay word. Kutenay is a language isolate.

The various bands of the Upper and Lower Kootenay were well adapted to their somewhat different natural environments. The Upper Kootenay exploited a greater abundance of big-game animals (deer, caribou, elk, mountain sheep and goat) while the Lower Kootenay relied more on fish and other aquatic resources. The Upper Kootenay undertook annual bison hunts over the Divide, probably after acquiring the HORSE. This intensified their contact with Plains cultures, resulting in their adoption of a veneer of Plains culture traits apparent after 1800 (*see* NATIVE PEOPLE: PLAINS).

The lands along the Kootenay R were segmented into BAND or group territories. Shifting residence patterns allowed utilization of various economic resources according to the season. Men fished, hunted and, when necessary, cared for horses. In addition to child rearing, women were responsible for root gathering, preparation of food and hides, and making clothing. The Kootenay kinship system was bilateral, but lacked lineages or clans (*see* CLAN). Reciprocal exchange among relatives was the principal means of redistributing economic goods, acquiring protection and achieving social status. When the Kootenay bands were in their winter villages, each was under the relatively informal leadership of a man respected for his success in accumulating wealth and for his generosity. With adoption of the horse, certain bands came

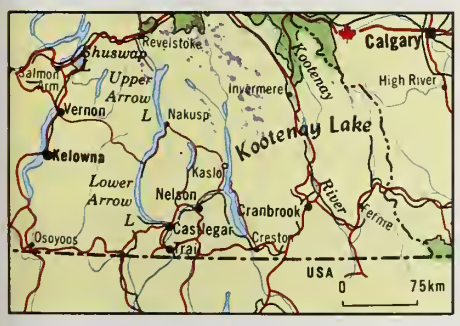
to rely more on the bison, and more powerful leaders emerged. A principal sodality, the "Crazy Dogs," was composed of warriors who functioned as a police unit within the band and during bison hunting and was probably borrowed from the Plains. Other sodalities included the "Crazy-Owl" society for women and shamanistic groups such as the Conjuring or Blanket societies (*see* SHAMAN).

As seen in their mythology, Kootenay regarded the Earth as an island surrounded by water, covered by the dome of the sky. The supernatural side of man was his soul, but humans also possessed numerous personal spirits who were often associated with the rivers and their cascades. The spirits offered their powers to Kootenay, who sought them through "vision quests." The principal ceremonies today are the Conjuring or Blanket ceremony and the SWEAT LODGE ceremony. Other rites include the SUN DANCE, the Bluejay Dance and the Grizzly Bear, Game Calling and First Fruits ceremonies.

Although semi-subterranean pit houses have been reported, the Lower Kootenay usually occupied long, mat-covered lodges similar to those of the neighbouring Interior SALISH. During summer, temporary conical lodges covered by boughs of spruce or fir bark were used. After adopting the horse, the Upper Kootenay replaced brush shelters by the skin-covered TIPI.

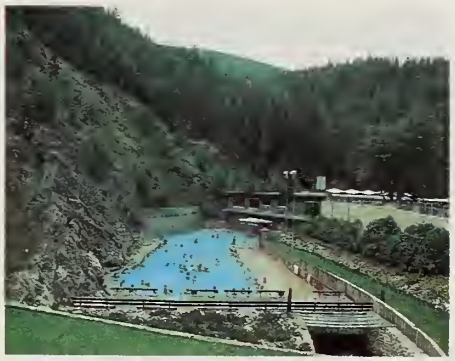
Most of the contemporary Kootenay of Canada are located on 5 INDIAN RESERVES: Columbia Lake, Lower Kootenay, St Mary's, Shuswap and Tobacco Plains. Although severely decimated by epidemics in the 18th and 19th centuries, the Kootenay population appeared to stabilize in the late 19th century and had increased from 543 in 1893 to 580 in 1980. They earn their living from wage labour and a few tribal enterprises. Their tribal councils are working to improve health and education, and are participants in the movement to secure LAND CLAIMS settlements for their extensive aboriginal territory. *See also* NATIVE PEOPLE: PLATEAU and general articles under NATIVE PEOPLE. DEWARD E. WALKER, JR

Reading: H. Turney-High, *Ethnography of the Kutenai* (1941).



Kootenay, Lake, 407 km², elev 532 m, is situated in the mountainous SE interior of BC. A long, narrow lake squeezed between the SELKIRK and Purcell mountain ranges, it is a widening of the Kootenay R, which rises in the Rocky Mts and flows S into the US before looping sharply N back into Canada. The lake drains W to the COLUMBIA R. The town of NELSON is on the W arm. David THOMPSON visited in 1808 during one of his fur-trading ventures across the Rockies and found the area occupied by the Kootenay Indians. Late in the century the logging and mining industries moved into this corner of the province. The name derives from an Indian word meaning "water people." DANIEL FRANCIS

Kootenay National Park (est 1920) is located on the W slope of the Continental Divide. The PARK, stretching N and S for 104 km, is bounded on the E by BANFF and on the N by YOHO. Vegetation ranges from alpine TUNDRA to forests of Douglas fir. Large mammals found in the park



Radium Hot Springs in Kootenay National Park. Ancient pictographs suggest that plains and mountain Indians met regularly at these hot springs (*courtesy Parks Canada/Ted Grant*).

include mountain goat, bighorn sheep, elk, mule deer, black bear and the occasional grizzly, as well as numerous smaller mammals and over 150 species of birds. Kootenay has always been a travel route. Ancient pictographs suggest that plains and mountain Indians met regularly at what is now Radium Hot Springs. Later, the Kootenay Indians settled there, but still made regular trips across the Rockies to hunt bison on the plains. David THOMPSON, who was exploring a route to the Pacific, was the first European to travel through the area. Today the Banff-Windermere Parkway passes through the park and provides dramatic views of snow-capped peaks and narrow canyons. The park offers year-round camping and swimming at the hot springs, as well as outdoor recreational facilities. LILLIAN STEWART

Korean War In Dec 1947 PM Mackenzie King chastised his external affairs department for agreeing to membership on the UN Temporary Commission for Korea. Nevertheless, on 27 July 1950, after King's funeral, his former colleagues decided in principle to contribute a Canadian Army unit to assist UN forces in Korea. In the government's view, Canada would fight not for Korea but for the UN and the principle of collective security.

The war had begun 25 June 1950. The next day Gen Douglas MacArthur informed US Pres Harry Truman that S Korean defences were collapsing and defeat was imminent. The Americans decided to help the south defend itself against the communist north, but through the UN. The UN General Assembly was dominated by Western countries and, since the Soviets were boycotting the Security Council because of the UN's refusal to seat the new communist Chinese regime in Council, they could not exercise a veto. The Security Council thus condemned the N Koreans and called on UN members "to render every assistance" to the beleaguered south. The Americans quickly offered air and naval assistance. On 28 June 1950 Lester PEARSON, Canada's secretary of state for external affairs, commended them, believing that Canada must respond as well through the UN and under US military leadership.

In 1950, perhaps the worst period for COLD WAR fears, Canadians accepted and even encouraged American leadership in resistance to communist expansion. There was, however, some fear that the Americans were too impetuous in defending the "free world." Pearson therefore emphasized that Canada's participation was part of a UN, not an American, operation. Initially, Canada contributed 3 destroyers and an air-transport squadron. The Americans, thinking this inadequate, used UN Secretary General Trygve Lie to pressure Canada and other nations to expand their efforts. The Canadian government needed little external pressure; domestic interests exerted the necessary influence. Even the socialist CCF urged the government to commit ground forces. Canada's major difficulty was the weak state of the armed forces, but on Aug 7 Prime Minister Louis ST LAURENT announced rearmament measures and plans for a Canadian Army Special Force to carry out Canada's UN obligations.

At first it appeared that Canadian soldiers would never fire a shot. Under MacArthur UN forces drove the N Koreans back to the border at the 38th parallel. Canadians and most others expected MacArthur, having vanquished the aggressor, to halt. To Pearson's shock and disappointment, he did not. Canada nevertheless publicly supported the US decision to carry the war into the north. Now the Canadians sought to restrain the American-dominated military action lest the Chinese communists be drawn into battle. By the end of Oct Chinese "volunteers" crossed the Yalu R, driving back the UN forces. Pearson's concern was expressed publicly in mid-Nov when he emphasized that Canada had always sought a "confined and localized" war that did not imperil the security of "Korea's neighbours." MacArthur did not exaggerate when on 28 Nov 1950 he called it "an entirely new war." Canadians would not escape the battles.

In Feb 1951 the Princess Patricia's Canadian Light Infantry landed in Korea, and in May the CASF followed. The Canadians fought on rough terrain and in an unfamiliar environment. The UN forces established a stable front near the 38th parallel, and until the war ended 8 June 1953, the fighting took place along this line. Canadians distinguished themselves at KAP'YONG in Apr 1951 and at KOJE-DO in May-July 1952. There were 21 940 Canadians who served in the army and approximately 3600 naval personnel. Eleven army officers, 298 other ranks and 3 sailors fell in action. Fifty-nine officers and 1143 other ranks were wounded or injured. By all accounts, the Canadians performed admirably.

Pearson and his colleagues had thought American leadership essential, but its character became increasingly troubling. First, there were careless remarks by Pres Truman about Gen MacArthur's right to decide alone on the use of atomic weapons. Then MacArthur clearly indicated that he wanted to expand the war into China, an action that might have caused World War III. Even Truman's firing of MacArthur on 10 Apr 1951 failed to remove many concerns. During the war, Canadian diplomats sought to "constrain" the American decision-makers from the risky actions they sometimes considered. Certainly the Canadians worked with exceptional zeal and skill in UN corridors and in Washington offices to advance arguments for a negotiated peace. Their influence, however, remains open to question. Although some Canadians believe Canada's actions did restrain American aggressiveness, it must be admitted that American evidence offers little support. The Korean War has thus become part of a larger historical controversy concerning the nature of CANADIAN-AMERICAN RELATIONS. JOHN ENGLISH

Reading: L.B. Pearson, *Mike,* II (1973); J.W. Pickersgill and D.F. Forster, *The Mackenzie King Record,* IV (1970); Denis Stairs, *The Diplomacy of Constraint* (1974); Herbert F. Wood, *Strange Battleground* (1966).

Koreans Korea is a mountainous peninsula E of China and W of Japan. In June 1950 the country was divided into northern (communist) and southern (American-influence) zones. Almost all Korean immigration to Canada has been from the S. The earliest known contacts with Canadians occurred in 1890 through Canadian missionaries working in Korea. Subsequently, Koreans emigrated to Canada through these same church connections, seeking opportunities for economic independence and a future for their families. Immigrants came not only from S

Korea, but also from Europe, Vietnam, S America and the US. Most Korean Canadians are highly skilled workers or professionals, eg, doctors, professors, engineers, or are engaged in business, eg, food stores, restaurants, printing shops, real-estate and insurance agencies. Others have entered the labour force as skilled and semiskilled workers.

Most Koreans have settled in urban centres, particularly in Toronto, Vancouver, Edmonton and Calgary. The number of Koreans in Canada today exceeds 25 000.

Social and Cultural Life In traditional Korean social structure, the clan system, with its emphasis on hierarchical relationships, is important. Customs derived from Confucianism, the philosophical system of traditional Korea, have been retained by Korean Canadians, although Christianity, with its modern education system, has had a profound effect on the shaping of modern Korea. The first Korean United Church was established in Vancouver; 9 United Church congregations now serve Koreans in Vancouver, Winnipeg, Edmonton, Toronto, Hamilton, Windsor and Montréal. The Korean Presbyterian and Korean Catholic churches are also well established. Koreans are rich in folk traditions. Contributions to Canadian culture range from dance, music and Tae Kwon Do (the art of self-defence) to specialized Korean cuisine such as *bul-go-gi* and *kimchee*.

Club Coreana was founded in 1970 for social gatherings of Korean students at U of T. Other organizations include the Cultural Centre for Korean Canadians and the Association of Korean Scholars. A Korean Canadian association in Toronto has started a Korean-language school. The Ad Hoc Committee for the Orientation of Korean Immigrants (1972) in Vancouver was founded to assist new immigrants, as was the Korean Human Rights Council in Ontario, which also serves the community.

Canada News and *New Korea Times* are weekly publications, as is the Korean journal *Sangjo*, published by the Korean Vancouver Society.

Although there is a tendency for them to be assimilated easily to the Canadian way of life, Koreans are also conscious of maintaining their independent identity. National celebrations include National Independence Day on 1 March, which is related to the 1919 movement for independence. DAVID BAI

Kotcheff, William, "Ted," filmmaker (b at Toronto 7 Apr 1931). He studied literature at U of T, joined the CBC in 1952 and soon began directing. He left for England in 1957, directing many TV productions, stage plays and his first films. After making *Outback* (1971) in Australia, he returned to Canada to adapt Mordecai RICHLER's novel about a young Jewish hustler living in Montréal. At the time, *The Apprenticeship of Duddy Kravitz* (1974) was the most expensive privately financed film produced in Canada, but it did not sacrifice artistic integrity for commerce. Kotcheff has subsequently worked entirely in the US. PIERS HANDLING

Kouchibouguac National Park (est 1969, 238 km^2), on the eastern NB shore of Northumberland Str, is a delicate blend of beaches, sand dunes and salt marshes framed by a mixed maritime forest. A 25 km long barrier-island system shelters placid lagoons from the often violent sea. Concealed within the PARK's forested plain are extensive bogs and cedar swamps, home to over 25 species of orchids. The broad band of salt marshes and lagoons provides food and shelter for a wide variety of creatures: herds of grey seals, colonies of terns, vast migrating flocks of WATERFOWL. Inland, common wildlife species include deer, moose, black bear, red fox and, most recently, coyote. French, English and Indian cultures have shaped the traditions of farming, fishing and self-sufficiency in the area around the park, and the Acadian spirit adds a special touch to the region's character. Visitors can swim, camp, beachcomb and observe lagoon life by canoe or rowboat. LILLIAN STEWART

Kreiner, Kathy, alpine skier (b at Timmins, Ont 4 May 1957). She began skiing at age 3, racing at 7 and World Cup competition at 14, winning her first World Cup race at Pfronten in 1974. She won Canada's only 1976 Olympic gold medal in the giant slalom, for which she was named Canada's Outstanding Female Athlete of 1976. MURRAY SHAW

Kreisel, Henry, novelist, professor, administrator (b at Vienna, Austria 5 June 1922). He was one of the first people to bring the experience of the immigrant to modern Canadian literature. Drawing on personal knowledge of fascist pre-WWII Austria, Kreisel has powerfully dramatized the anguish experienced by Jews there. He left Austria for England in 1938 and was interned for 18 months during WWII. After studying at University of Toronto, he began teaching in 1947 at University of Alberta, where he has remained. He served as vice-president, 1970-75 and in 1975 was named University Professor. In both Kreisel's novels, Canadian security is contrasted with European turbulence. In *The Rich Man* (1948), an immigrant who has achieved modest success in Toronto returns to Vienna to discover that his claims to wealth deceive and harm his despairing Austrian relatives. *The Betrayal* (1964) explores questions of guilt and revenge that arise when a man who has escaped from the Nazis finds his would-be betrayer in Edmonton. *The Almost Meeting* (1981) is a collection of short stories with a variety of Canadian and European settings. THOMAS E. TAUSKY

Krieghoff, Cornelius David, painter (b at Amsterdam, Holland 19 June 1815; d at Chicago, Ill 8 Mar 1872). Krieghoff's colourful paintings of Québec habitants, sporting life and Indians have fascinated succeeding generations. Of German parentage, Krieghoff spent his youth in Düsseldorf and Schweinfurt, Germany, and studied at the Düsseldorf Academy, famous for its genre painters. He and his brother Ernst emigrated to America 1835 or 1836 and fought with the Americans in the Seminole War in Florida. He met Louise Gauthier (or Gautier) from Boucherville, Qué, in New York and by 1840 they were living in Montréal, where he worked as a musician and painter. He was in Rochester, NY, in 1842-43, but went to Paris for study in 1844.

Krieghoff lived in Longueuil, a village across the St Lawrence from Montréal, in 1845-49. He also maintained a studio in Montréal, where he was establishing himself as a major artist. His paintings of local habitant life embodied satirical humour, ironical anecdote and brilliant colours. Typical is one which portrays with suppressed mirth a priest tyrannically guarding his parishioners' morals by catching them eating meat during Lent. In others, men cheat at cards, lovers flirt on winter evenings, and neighbours gossip. Indians greet each other along the frozen river while Montréal gentlemen sweep by in handsome sleighs. All Krieghoff's canvases read like gripping narratives. The family moved to Montréal in 1849, where he continued painting, but sales of his works were poor.

Krieghoff moved to Québec, likely in 1853, at the urging of John Budden, whose auction firm sold his canvases. For 11 years he fraternized with the affluent Québec sporting fraternity of wealthy lumber merchants, army officers and businessmen, and painted many well-known canvases. *Merrymaking* is a rowdy winter party at a country inn. Others picture incidents on winter hunting and sleighing trips and fishing expeditions in autumn woods. There are picturesque waterfalls and Indian groups in the forest. Habitant life is the theme in paintings such as *Spill My Milk!* in which a girl is being scolded for carelessness. In *Bilking the Toll,* youths evade the old keeper unable to collect the fee from a speeding sleigh. Krieghoff was commissioned to paint canvases for the chamber of the new Québec Legislative Assembly.

The artist left Québec in late 1863 or early 1864 and lived in Paris and Munich, where he painted additional versions of Canadian subjects. He visited Québec in 1867 and moved back in 1870. His former patrons, the garrison officers, had returned to England, and he could not pick up his old carefree life. Krieghoff moved to Chicago late in 1871, where his daughter was living, only to die there suddenly. His 2000 canvases of popular, anecdotal, genre subjects had brought new dimensions to the Canadian scene and a colourful romanticism unsurpassed by contemporary artists. J. RUSSELL HARPER

Reading: J. Russell Harper, *Krieghoff* (1979).

Krill, *see* CRUSTACEANS; ZOOPLANKTON.

Kroetsch, Robert, writer, editor, teacher (b at Heisler, Alta 26 June 1927). He grew up on his



Cornelius Krieghoff, *The Habitant Farm* (1856), oil on canvas (*courtesy National Gallery of Canada/gift of the estate of the Hon W.C. Edwards, 1928*).

father's farm and studied at University of Alberta and University of Iowa. He taught at State University of NY, Binghamton, until the late 1970s, meanwhile writing a series of novels set mostly in Alberta that won him a growing critical reputation.

Kroetsch's first novel, *But We Are Exiles* (1966), was a serious affair lacking the ribald comic energy of his later works. His major theme of Dionysian chaos versus Apollonian order was present, though he had not found the proper style to explore it. In *The Words of My Roaring* (1966), he began to use the tall-tale rhetoric of prairie taverns. Both *The Studhorse Man* (1969), which won the Governor General's Award, and *Gone Indian* (1973) call the conventions of realistic fiction hilariously into question. *Badlands* (1975), a comic triumph, could be called an example of feminist fiction-making because of the questions it raises about masculine conventions of behaviour and storytelling. In 1975 Kroetsch also published his first 2 books of poetry. *The Ledger* (1975), the first book of the ongoing *Field Notes* (1981), is a special kind of documentary, and raises questions about literature in the New World. Kroetsch published separate volumes from *Field Notes* in the next few years: *Seed Catalogue* (1977), *The Sad Phoenician* (1979) and *Sketches of a Lemon* (1981). He also published *What the Crow Said* (1978), a magic-realist fiction.

Kroetsch is a synthesizer of new literary theory. Through interviews and essays, he has encouraged critical thinking about contemporary writing. Perhaps the most significant example is *Labyrinths of Voice: Conversations with Robert Kroetsch* (1982) by Shirley Neuman and Robert Wilson. *Open Letter* published his collected criticism (1983). Through his teaching, at universities of Calgary and Manitoba in the late 1970s and Saskatchewan Summer School of the Arts, as well as through his writing, Kroetsch has powerfully influenced recent writing on the Canadian Prairies and elsewhere.

DOUGLAS BARBOUR

Krol, Joseph, "Joe King," football player (b at Hamilton, Ont 20 Feb 1919). He played collegiate football in Windsor and at Western helped the Mustangs win the 1939 intercollegiate title. After playing with the Hamilton Wildcats, Grey Cup winners 1943 and finalists 1944, he joined the TORONTO ARGONAUTS, leading them to 3 consecutive Grey Cups (1945-47). Krol and receiver Royal Copeland — "the gold dust twins" — were a potent passing combination, and Krol was an effective runner and kicker. His passing and kicking accounted for all the Argos' points in their 1947 Cup win over Winnipeg. He retired after 1952 but returned in 1955 to punt for the Argos. FRANK COSENTINO

Ksan is a reconstructed Gitksan (TSIMSHIAN) Indian village located at the junction of the Skeena and Bulkley rivers in Hazelton, BC, where Indian villages have stood for thousands of years. Ksan, the Gitksan name for the SKEENA R ("River of Mists"), is the result of a joint project by Indians and non-Indians to help solve the area's social and economic problems by promoting a better understanding of local Indian culture and reviving its artistic traditions. In 1958 the Hazelton Library Assn raised $10 000 and constructed the Skeena Treasure House for exhibition of ceremonial regalia on loan from many Gitksan chiefs in the area. Following the decision of the volunteer planning committee to build a replica of an Indian village of the early 1800s, construction began in 1968, with combined financial help of the Ksan Assn and the provincial and federal governments. Ksan was officially opened 12 Aug 1970. Buildings, modeled on communal houses with painted fronts, include a carving school and workshop, a shop for sales of carvings and Gitksan and CARRIER native crafts, and a museum where the regalia of chiefs



Ksan, a reconstruction of an early 1800s Gitksan village in Hazelton, BC, where Indian villages have stood for thousands of years (*photo by John deVisser/Masterfile*).

are housed and displayed until needed at ceremonial feasts (*see* POTLATCH). A 19th-century Wolf Crest HOUSE prepared for a feast and a prehistoric Frog Crest house with displays depict traditional activities.

Some Ksan buildings are open year round, and tours and dance performances are scheduled during the summer. In Gitksan villages near Ksan, visitors can see some of the oldest TOTEM POLES still in a native setting and learn more about the local history. *See also* NORTHWEST COAST INDIAN ART. V. JENSEN AND J.V. POWELL

Reading: Ksan, published by Ksan Assn (nd).

Ku Klux Klan [Gk *kuklos*, "circle"], an ultraconservative, secret fraternal organization dedicated to the supremacy of an Anglo-Saxon, Protestant society. Formed in Pulaski, Tenn, in Nov 1865 by 6 ex-Confederate soldiers, it was outlawed in 1871 because of violent and outrageous acts against blacks and northerners. Revived Nov 1915 in Atlanta, Ga, it drew its support from middle- and lower-class Americans who feared the loss of conservative and rural values. In 1921 the Klan was reported active in Montréal; by 1925 "klans," or locals, had been established all across Canada. Like their American counterparts, Canadian Klansmen had a fanatical hatred for all things Roman CATHOLIC and feared that the purity of the Anglo-Saxon race was being jeopardized by new immigration. Moreover, they were not averse to stepping outside the law to achieve their goals.

The Klan appealed to few Canadians and remained relatively obscure, except in Saskatchewan. After American organizers absconded with approximately $100 000 of Klan funds in 1927, the Saskatchewan organization regrouped and, at its height, just after the 1929 provincial election (in which it was instrumental in ending 24 years of Liberal rule), it boasted of having 40 000 members. Thereafter, the Saskatchewan Klan declined rapidly, as did the organization in the rest of Canada. In the late 1970s the Klan attempted once more to organize in Canada, notably in Ontario, Alberta and BC. The organization's avowed white-supremacist stance and further outrages committed by the American Klan during this period have done little either to increase membership or to establish the Klan's credibility in the eyes of the Canadian public.

PAUL BANFIELD

Reading: J. Sher, *White Hoods* (1983).

Kuerti, Anton Emil, pianist, teacher, composer (b at Vienna, Austria 21 July 1938). Kuerti began performing at age 9 as soloist with the Boston Pops Orchestra. He continued studies at the Peabody, Cleveland and Curtis institutes, and before moving to Canada in 1965 had performed with every major N American orchestra and given solo recitals in most large N American and European cities. An interpreter and performer particularly of Beethoven, Schumann, Mozart, Brahms, Schubert, Scriabin and Bach, Kuerti is one of Canada's leading pianists. Very much an individualist, Kuerti eschews high concert fees and performs in many smaller centres, always with his own piano. His recording of the 32 Beethoven sonatas won a Juno Award



Ku Klux Klan members at Kingston, Ont, 31 July 1927. Like their American counterparts, Canadian Klansmen displayed fanatical racial and religious hatred (*courtesy Public Archives of Canada/PA-87848*).

in 1976. As a teacher at the Faculty of Music, U of T, Kuerti has encouraged several notable young pianists, and as an international performer has premiered the works of numerous Canadian composers. He has also initiated individual concerts and festivals, including the Festival of the Sound, established at Parry Sound, Ont, in 1980. MABEL H. LAINE

Kurelek, William (Wasyl), painter and writer, evangelist (b near Whitford, Alta 3 Mar 1927; d at Toronto 3 Nov 1977). Influenced by Bosch and Brueghel and by prairie roots, his UKRAINIAN heritage and Roman Catholicism, Kurelek's realistic and symbolic paintings record his historic culture and religious vision. The oldest of 7 children, he was expected to help run the farm. His lack of mechanical aptitude attracted harsh criticism from his father, as did his wish to be an artist. He studied at Winnipeg, Toronto and San Miguel, Mexico. In England (1952-59), he sought psychiatric help and was hospitalized for severe emotional problems, depression and eye pain. He converted to Roman Catholicism (1957), credited God with his healing, and began to paint the Passion of Christ according to St Matthew. This series of 160 paintings is housed in the Niagara Falls Art Gallery and Museum.



William Kurelek, showing himself at work in *The Painter* (1974), mixed media (*courtesy the Isaacs Gallery. Toronto*).

Returning to Toronto, he was established by the early 1960s as an important painter, alternating realistic works depicting his prairie roots with didactic series. In the 1970s he began to publish his paintings with simple texts. His books for children (*A Prairie Boy's Winter*, 1973; *Lumberjack*, 1974; *A Prairie Boy's Summer*, 1975; and *A Northern Nativity*, 1976) have become modern classics. His autobiography, *Someone With Me* (1973, rev ed 1980), ends with his marriage to Jean Andrews (1962). Kurelek was an outstanding artist with a unique idealistic and pragmatic vision. A modern Jeremiah, he painted a coming apocalypse — divine justice on a materialistic, secular society. PATRICIA MORLEY

Kutchin, the northernmost of all N American Indians, occupied a broad sweep of territory located primarily N of the Arctic Circle and extending across the Mackenzie drainage and northern tributaries of the Yukon R into NW Alaska. Their northern boundary abuts INUIT land. They speak an Athapaskan language, unintelligible to all other Athapaskans except possibly the HAN.

Depending on an upland or lowland habitat, the 9 or 10 regional bands concentrated on moose hunting or salmon fishing, though caribou, captured in impressive corrals, were available to all bands. Even though big game supplied the greater part of their food and hides for clothing and shelter, the Kutchin also caught whitefish, hare and other small game. Kutchin knowledge of their environment was extensive, one anthropologist recorded 400 Kutchin names for plants and animals. Kutchin technology was similar to that of other subarctic Athapaskans, with distinctive western elements including large metal knives with double recurved handles, sleds, chair-style birch bark baby carriers, partially decked-over kayak-canoes, and portable domed caribou-skin tents. Adults and children alike wore V-tailed summer cloaks decorated with red ochre, dentalium and dyed porcupine quills. Women tattooed their chins and, on ceremonial occasions, men coiffed their hair with red ochre mixed with grease and sprinkled with down.

A pair of same sex siblings with their nuclear families customarily formed a household. Several households related to one senior person or "chief" made up a local band, which worked together to build caribou surrounds and large fish traps, but sometimes larger groups met to hunt. Several local bands formed a regional band, maintained through intermarriage and other interactions between constituent families within a single geographic area. Regional bands assembled for annual festivities and ceremonies. Kutchin identity was achieved through language. Crosscutting the band structure were 3 matrilineal clans which regulated marriage.

The Kutchin world view included beliefs in animal spirits, spirit beings, bushmen (wild Indians with supernatural attributes), and the culture hero-trickster Raven (crow), recorded in culture hero myth cycles and raven myths.

In 1789 the Kutchin were contacted by Alexander MACKENZIE, S of the Mackenzie Delta. Within 2 decades they were trading extraterritorially at posts on the Mackenzie R and, in 1840, Ft McPherson was built on the Peel R. The HUDSON'S BAY COMPANY established Ft Yukon, Alaska, in 1847. The Kutchin became middlemen in trade between the coastal Eskimo and interior tribes and between the Mackenzie and Yukon and resented establishment of European trading posts in their territory. In the 1980s Kutchin population was approximately 2500 persons, with slightly more than half living at Old Crow, Ft McPherson and Arctic Red River or in the mixed Inuit/Indian/white communities of Aklavik and Inuvik. The remainder live in Alaska. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE.

A. MCFADYEN CLARK

Reading: J. Helm, ed, *Handbook of North American Indians*, vol 6; *Subarctic* (1981).

Kwakiutl The "kwakwakawock" (often referred to as Kwakiutl, which is the name of the Ft Rupert band) occupy coastal areas of BC extending from Smith Inlet in the N to Cape Mudge in the S, W to Quatsino and E to Knight Inlet. Originally, there were 28 tribes, all speaking dialects of Kwakwala, from which comes the people's name for themselves, *Kwakwaka'wakw*. The first census in 1835 recorded the total population as 8575. A member of the Wakashan language family, Kwakwala is related to other languages such as Westcoast (NOOTKA), Heiltsuk (BELLA BELLA), Oowekyala (Rivers Inlet people) and Haisla (KITAMAAT). The culture of the Kwakiutl is similar to that of their northern neighbours, the Bella Bella and Rivers Inlet peoples. Trails across Vancouver I made trade possible with Nootka villages on the West Coast. Archaeological evidence shows habitation in the Kwakwala-speaking area for at least 8000 years. In precontact times Kwakiutl fished, hunted and gathered, according to the seasons, securing



Kwakiutl house and heraldic pole at the BC Provincial Museum (*courtesy British Columbia Provincial Museum*).

an abundance of preservable food. This allowed them to return to their winter villages for several months of intensive ceremonial and artistic activity.

In 1792 Spanish explorer Galiano-Valdes and Capt George VANCOUVER encountered most of the south Kwakiutl groups, and Vancouver wrote detailed descriptions of them. Farther N, in 1849 the HUDSON'S BAY CO established Ft Rupert, which operated until 1877, when it was sold to Robert Hunt, the last factor. George HUNT, Robert's son, became anthropologist Franz BOAS's assistant, and together they wrote a large body of material on the language and culture of the Kwakiutl.

A federal law of 1884 prohibiting the POTLATCH threatened to destroy the heart of the culture. In 1921 a large potlatch at Village I resulted in the arrest of 45 people, of whom 22 were imprisoned, their ceremonial goods confiscated. Knowing that these masks and other ritual objects had been wrongfully taken, the *Kwakwaka'wakw*, in 1967, initiated efforts to secure their return. The NATIONAL MUSEUMS OF CANADA agreed to return that part of the collection held by the NATIONAL MUSEUM OF MAN, on the condition that 2 museums be built, the Kwakiutl Museum in Cape Mudge and the U'mista Cultural Centre in Alert Bay (*see* NORTHWEST COAST INDIAN ART).

Today, most Kwakiutl children speak English as their first language, and many schools in the area sponsor programs in Kwakwala and traditional dance and art. Traditionally fishermen, the *Kwakwaka'wakw* continue to fish commercially in a highly competitive industry. Hereditary chiefs still pass on rights and privileges at potlatches, but band government is conducted by elected councilors. A number of original villages have been abandoned as inhabitants moved to communities such as Alert Bay, Campbell River and Port Hardy, to be close to schools and hospitals. Only 10 villages are now inhabited, with a total population of about 3400 for the area. *See* NATIVE PEOPLES, NORTHWEST COAST and general articles under NATIVE PEOPLE.

GLORIA CRANMER WEBSTER

Reading: F. Boas, "The Social Organization and the Secret Societies of the Kwakiutl Indians," *Smithsonian Institute Annual Report for 1895* (1897), and *Kwakiutl Ethnography* (ed H. Codere, 1966); R. and E. Rohner, *The Kwakiutl* (1970).

Kwong, Normie, "The China Clipper," football player (b Lim Kwong Yew at Calgary, 24 Oct 1929). As a running back over 14 seasons in Calgary and Edmonton, he was a Canadian Football League all-star 5 times, twice won the Schenley Award as outstanding Canadian player (1955-56) and was Canada's athlete of the year (1956). Together with teammate Johnny Bright, Kwong gave Edmonton Eskimos a potent running attack. From 1950 to 1961 he gained 9022 yards, averaging 5.2 yards per carry, and scored 74 touchdowns. GERALD REDMOND

La Baie, Qué, City, pop 20 935 (1981c), inc 1976, is located at the end of Baie des Ha! Ha! on the SAGUENAY R, 10 km E of CHICOUTIMI and 200 km N of Québec City. Seaport and cradle of the Saguenay-Lac Saint-Jean region, La Baie is the amalgamation of 4 former municipalities: Bagotville, Port-Alfred, the parish of Grande-Baie and the parish of Bagotville. La Baie was founded in 1838 by employees of the Société des vingt-et-un, a Charlevoix forestry company bought by William PRICE in 1842. Price's sawmills were soon joined by port facilities, making La Baie, a natural harbour, a major port on the Atlantic coast. A paper mill was built there in 1917 (Consolidated Bathurst) and an aluminum plant in 1979 (Alcan). The Musée du fjord shows the maritime character of La Baie. The Monument des vingt-et-un and the Fêtes du Saguenay, held each June, are reminders that this city is the oldest municipality of the Saguenay-Lac Saint-Jean region. MARC ST-HILAIRE

La Barre, Joseph-Antoine Le Febvre de, governor of New France 1682-85 (b in France 1622; d at Paris, France 1688). La Barre's administration in New France was disastrous, particularly from a military point of view. Like many governors, he enriched himself in the FUR TRADE. Joining forces with several Canadian merchants, he attempted to secure the trade with the Illinois by confiscating the posts of Cavelier de LA SALLE, protégé of the previous governor, FRONTENAC. Some said it was to secure this business that La Barre launched his ill-planned expedition against the Iroquois in 1682. His troops were so weakened by disease that he was forced to sign a humiliating peace at FT FRONTENAC. This failure, and La Salle's complaints, led to his dismissal. *See* IROQUOIS WARS. ALLAN GREER

La Brosse, Jean-Baptiste de (1712-82), Jesuit missionary in the Saguenay-St Lawrence Gulf region remembered for having predicted his own death on 11 April 1782. Upon his death, darkness is said to have covered the SAGUENAY R, and in all the parishes where he had preached the bells began ringing without anyone coming near them. NANCY SCHMITZ

La Capricieuse The first French naval vessel to visit Canada after the CONQUEST, *La Capricieuse* received a tumultuous welcome at Québec on 14 July 1855. Commander Paul-Henry de Belvèze proceeded by steamer to Montréal, Toronto and Ottawa before leaving Québec for France on Aug 25. His mission was to report on the prospects of trade with Canada, made possible by Britain's proclamation of free trade and by the Anglo-French alliance of 1854. The result was the opening of a French consulate at Québec in 1859, followed by mutual, short-lived tariff concessions and the development of a modest trade. However, the visit is remembered chiefly as the official endorsement of the Franco-Canadian cultural rapprochement that had been gathering impetus since the 1830s.

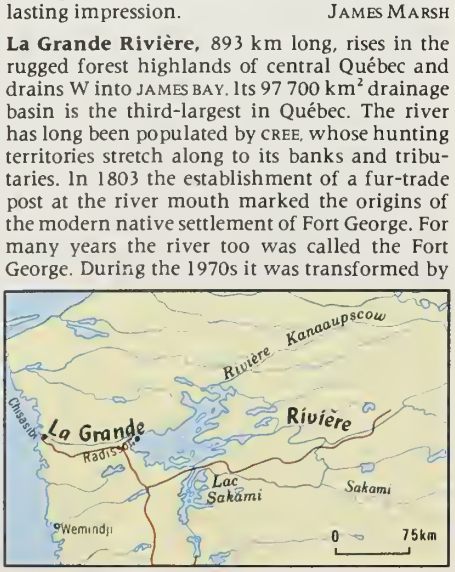
DALE MIQUELON

La Corriveau, popular designation of Marie-Josephte CORRIVEAU. In Apr 1763 a controversial court martial, based largely on rumour and hearsay, convicted Joseph Corriveau of the murder of his son-in-law, Louis Dodier. His daughter, Marie-Josephte, was convicted as an accessory and a servant, Isabelle Sylvain, was convicted for perjury. After being sentenced to hang, Corriveau confessed that he was merely an accessory to his daughter's crime. In a second trial she confessed and was sentenced to be hanged and then gibbeted in an iron cage at Pointe-Lévy — an unusual punishment unknown during the French regime and reserved in England for persons found guilty of particularly heinous crimes. This treatment fired the popular imagination and gave rise to many legends and myths. Following the discovery about 1850 of an iron cage near the Lauzon cemetery, the oral traditions concerning the incident were transferred into literature by Philippe AUBERT DE GASPÉ in *Les* ANCIENS CANADIENS (1863). Several other authors, notably Louis FRÉCHETTE, Sir James MacPherson LeMoine and William KIRBY, elaborated on the legend by adding imaginary crimes and gruesome details. Other embellishments include the number of husbands killed (2 to 7), her dissolute life and her haunting various places. In 1981 Andrée Lebel published the historical novel *La Corriveau.*

JOHN A. DICKINSON

La Galissonière, Roland-Michel Barrin de La Galissonière, Marquis de, naval officer, commandant general of New France (b at Rochefort, France 10 Nov 1693; d at Montereau, France 26 Oct 1756). He was born into a powerful family and rose to lieutenant general of the French naval forces. He was in NEW FRANCE from 19 Sept 1747 to 21 Oct 1749, during which time he strongly advocated building a line of garrisoned posts down the Ohio Valley to hold the English colonies along the coast. He enthusiastically promoted the colony's interests, seeing it as a viable economic asset in classic mercantilist terms, as well as a military distraction to the English. La Galissonière had broad humanistic and scientific interests and had his officers collect botanical specimens from across the colony. His report on France's colonies, found in *Mémoires des commissaires du roi* (1755-57), contained a lucid account of colonial policies and of the potential riches of Canada. Despite his brief stay in Canada, La Galissonière's engaging personality, intelligence and fervent activity on the colony's behalf made him popular and left a lasting impression. JAMES MARSH

La Grande Rivière, 893 km long, rises in the rugged forest highlands of central Québec and drains W into JAMES BAY. Its 97 700 km^2 drainage basin is the third-largest in Québec. The river has long been populated by CREE, whose hunting territories stretch along to its banks and tributaries. In 1803 the establishment of a fur-trade post at the river mouth marked the origins of the modern native settlement of Fort George. For many years the river too was called the Fort George. During the 1970s it was transformed by the JAMES BAY PROJECT, a scheme to divert major rivers flowing into eastern James Bay for hydroelectric development. Phase one of the project involved erecting huge dams on the La Grande and flooding low-lying areas to create reservoirs. After a prolonged legal dispute, an agreement was signed with the native people who feared the destruction of their wildlife resources, and construction on the river was completed. DANIEL FRANCIS



La Liberté, Alfred, composer, pianist, teacher, lecturer (b at St-Jean, Qué 10 Feb 1882; d at Montréal 7 May 1952). He was the pupil, friend and fervent disciple of the Russian composer Scriabin (who entrusted him with manuscripts of some of his works) and helped make his music better known. La Liberté opened studios in Montréal (1911) and New York (1913), and taught at the motherhouse of the Sisters of the Holy Names of Jesus and Mary in Montréal. Wilfrid PELLETIER was one of his pupils. Nicolas Medtner and Marcel Dupré dedicated works to him. Some of La Liberté's numerous harmonizations of folk songs were published in the *Recueil de chants populaires du Canada* (1925) and in the Montréal periodical *Le Passe-Temps.*

HÉLÈNE PLOUFFE

La Jonquière, Jacques-Pierre de Taffanel de La Jonquière, Marquis de, naval officer, governor general of New France, appointed 1746, served 1749-52 (b near Albi, France 18 Apr 1685; d at Québec 17 Mar 1752). In 1746 La Jonquière was a veteran of 49 years in the French Navy. War raged with England at the time; he served in the expedition of the Duc d'Anville in 1746 and was taken prisoner of war in 1747. He finally reached Québec in 1749. France and England were theoretically at peace during his administration, but La Jonquière's main concern was to prepare for the next armed struggle, reinforcing his troops and fortifying posts on the Great Lakes and along the frontier of Acadia. He was implicated in some of the speculations of INTENDANT François BIGOT. ALLAN GREER

La Malbaie, Qué, Town, pop 4030 (1981c), inc 1958, is situated on the lower N shore of the ST LAWRENCE R at the head of Murray Bay, 150 km E of Québec City. Named *malle baye* by CHAMPLAIN in 1608 for its difficult anchorage, La Malbaie is the seat and centre of Charlevoix East County. Some of New France's first rural settlements were located in the area. Two Scottish soliders, John Nairne and Malcolm Fraser, the first resident seigneurs, called it Murray Bay. They occupied grants on either side of Malbaie R until about 1815 and introduced many visitors to the area. The county's renowned resorts are among the oldest on the continent and include Manoir Richelieu in Pointe-au-Pic and hotels situated in Cap-à-l'Aigel. Tourist accommodation, outdoor recreation and market gardening are the main activities of the La Malbaie economy. A poultry abattoir and an aluminum-products plant are its largest industries. PAULA KESTELMAN

Reading: G.M. Wrong, *A Canadian Manor and Its Seigneurs* (1926).

La Mauricie National Park (est 1970, 544 km^2) is situated about 220 km NE of Montréal. The gently rolling Laurentian Hills form a backdrop for the PARK's billion-year-old Precambrian granite and gneiss landscape, sculpted by the action of GLACIERS during the last Ice Age. The same glaciers scraped out the numerous lakes dotting the park. La Mauricie has a mixed forest vegetation. Coniferous species typical of the boreal forest share the hillsides with deciduous species found more abundantly in the St Lawrence Lowlands. Wildlife includes moose, black bear, lynx, red fox and wolf. Some 116 bird species nest in the park. The lakes and bogs support 17 species of amphibians and reptiles. The remains of red-ochre rock paintings testify that

nomadic tribes hunted and fished here over 2000 years ago. Explorers and missionaries inhabited the area from the mid-1600s, but the lumber industry did not become established until 1825. The abandoned camps are a reminder of the colourful history of the lumberjacks and log drivers. The ST MAURICE R still carries millions of logs to mills in nearby towns.
LILLIAN STEWART

La Palme, Béatrice, soprano, violinist, teacher (b at Beloeil, near Montréal 27 July 1878; d at Montréal 8 Jan 1921). She was the second Québec vocalist, after Emma ALBANI, to appear on the great lyrical stages. She studied violin with Frantz JEHIN-PRUME and Fernandez Arbos, and sang with Gustave Garcia and Nelly Rowe. At the suggestion of Albani, she decided to devote herself exclusively to song. She appeared before Massenet, and sang various times 1905-09 at the Opéra-Comique de Paris. She then toured with the Montréal Opera Company. After 1914 she taught in the studio run by her husband, French tenor Salvator Issaurel. HÉLÈNE PLOUFFE

La Peltrie, Marie-Madeleine de Gruel de, née Chauvigny, patron of Ursuline nuns in New France (b at Alençon, France 1603; d at Québec City 18 Nov 1671). Born into the aristocracy, widowed at 22, Mme de La Peltrie was influenced by *Relations des Jésuites* to devote her life and fortune to Amerindian missions. Introduced to MARIE DE L'INCARNATION, she sailed with her and 3 Ursulines to Québec to found a monastery in 1639. Except for an 18-month absence to help found the utopian colony of VILLE-MARIE (Montréal) in 1642, she lived cloistered with the nuns she supported. When she died her body was buried in the Ursuline chapel and her heart was sent to the Jesuits.
CORNELIUS J. JAENEN

La Prairie, Qué, Town, pop 10 627 (1981c), inc 1909, a suburb of Montréal, is located on the S shore of the St Lawrence R. It took its name from the land called "La-Prairie-de-la-Magdeleine," occupied by the Jesuits as of 1647 and granted by the Abbé de La Ferté, de la Madeleine, a member of the Compagnie des Cent-Associés. After the CONQUEST, British merchants emigrated to La Prairie and soon controlled its economy, which was linked to river transportation. In 1836 the first Canadian railway, linking La Prairie with St-Jean, was inaugurated. After construction of the Victoria Bridge, goods trains coming from the east were diverted from the town. Around 1890 the establishment of brickyards gave the town new vigour; one of these yards is still among the largest in Canada. In the 20th century, La Prairie's economy has undergone little growth. Other industries (electrical equipment, electronics, printing and food processing) have been established, but in the service sector, La Prairie is largely dependent upon Montréal. SYLVIE TASCHEREAU

La Rocque, Marguerite de, coseigneuress of Pontpoint (place and date of b and d unknown). She was a close relative of the Sieur de ROBERVAL and accompanied him on his 1542 voyage to Canada. Shocked by Marguerite's conduct in taking a lover, Roberval set her ashore on Île des Démons, in the St Lawrence R, with her lover and a servant girl. (A more romantic version of the story has the young man put ashore and Marguerite joining him.) The young man, the servant and a child Marguerite bore all died. Marguerite managed to survive and was rescued some years later by fishermen. JAMES MARSH

La Salle, René-Robert Cavelier de, would-be Jesuit, fur trader, explorer, intriguer, discoverer of the Mississippi delta (b at Rouen, France 21 Nov 1643; assassinated 19 Mar 1687 in Texas). In 1658 La Salle began his noviciate in the Society of Jesus. Mental instability caused his release from his vows in 1667. He crossed to NEW FRANCE and 2 years later, falsely claiming to speak fluent Iroquois, he joined a Sulpician exploration expedition. Upon their encountering some Seneca he had to admit his total ignorance of their language and went off on his own. In 1673 he joined the coterie of Gov Gen FRONTENAC, with whose support he obtained letters of nobility. At the French Court, meanwhile, 2 clerics, Abbés Eusèbe Renaudot and Claude Bernou, to advance their own careers on La Salle's coattails, obtained a commission for him to explore the mid-west. In 1678 he began establishing a chain of trading posts, and then in 1682, with a small party of French and Indian guides, he descended the Mississippi to its mouth. On Apr 9 he claimed the entire region for Louis XIV.

Returning to France he fell in with a scheme of Bernou's to establish a base at the mouth of the Rio Grande for the conquest of Mexico. To make it seem more feasible to the king he falsified geography, situating the Mississippi over 600 miles W of its true course. Given command of the expedition, he displayed incompetence and paranoia. That, and his earlier duplicity, caused him to land in Feb 1685 at Matagorda B [Texas] which he claimed to be an outlet of the Mississippi. Most of the expedition's supplies having been lost and the Indians alienated, starvation loomed. In Apr 1686 La Salle set off with 20 men to seek help at Ft St-Louis-des-Illinois. Dissension in his party and at the base resulted in desertion and murder, and finally in the assassination of La Salle. The wonder is that his men had not killed him long before.

A romantic hero to 19th-century historians, La Salle was in fact a victim of his own incapacities. His one claim to fame is his descent of the Mississippi, upon which French claims to Louisiana were to be based. W.J. ECCLES

La Sarre, Québec, Town, pop 8861 (1981c), inc 1949, is located in the western part of the Abitibi region, near Lac ABITIBI and the Ontario border. Founded in 1917, it was one of the first agricultural centres to be settled when the transcontinental railroad opened up the Abitibi region around 1910. The place was originally called *Wabakin,* an Algonquin expression meaning "white fish river," referring to the Rivière La Sarre which flows through the town and into Lac Abitibi. It was later named after the La Sarre regiment, which had been sent to New France in 1755 and gained fame at the Battle of the Plains of Abraham. La Sarre's agricultural and forest industries have made it one of the principal urban centres in Abitibi-Témiscaming. The town is located in the heart of rich, agricultural lands around Lac Abitibi. Its economy is largely dependent upon its sawmills and wood-processing plants. The Normik-Perron plant, one of the largest timber companies in eastern Canada, is also located here. BENOÎT-BEAUDRY GOURD

La Tour, Charles de Saint-Étienne de, colonizer, trader, governor of Acadia (b at Champagne, France 1593; d at Cap de Sable, Acadia 1663). La Tour possibly reached Acadia as early as 1606, living there permanently from 1610. When Charles de BIENCOURT died in 1623, La Tour assumed leadership of the colony and 8 years later received a royal commission as lieutenant-general. Shortly afterwards he became embroiled in a dispute with governor Charles de MENOU D'AULNAY, which ended with La Tour's military defeat and exile in 1645. He returned to Acadia following d'Aulnay's death in 1650, but was captured by an English invading force in 1654. Eventually, he came to terms with his captors and returned to an Acadia under English occupation. During the short-lived Scottish occupation of NS in 1629-32, he had been given the title of knight-baronet of Scotland, and in the 1650s he allowed this title to be used to give legitimacy to the English conquest. This arrangement has frequently been termed treachery and opportunism by La Tour's critics but La Tour had tenaciously defended his settlements when necessary and his commitment to Acadia can be measured by his lifelong residence there.
JOHN G. REID

La Tour, Françoise-Marie de Saint-Étienne de, née Jacquelin, Acadian heroine (b in France 1602; d at Ft La Tour [NB] 1645). Civil war raged in Acadia in 1640 when she married Charles de Saint-Étienne de LA TOUR, one of 2 claimants to the colony's governorship. She proved to be his most courageous and resourceful supporter, travelling to France, England and Boston to secure supplies and men to fight his rival, Charles de MENOU D'AULNAY. During her husband's absence in 1645, she was in command of Ft La Tour at the mouth of the St John R when d'Aulnay attacked. Despite her stout defence, her outnumbered forces were defeated and her men were hanged by the victors. ALLAN GREER

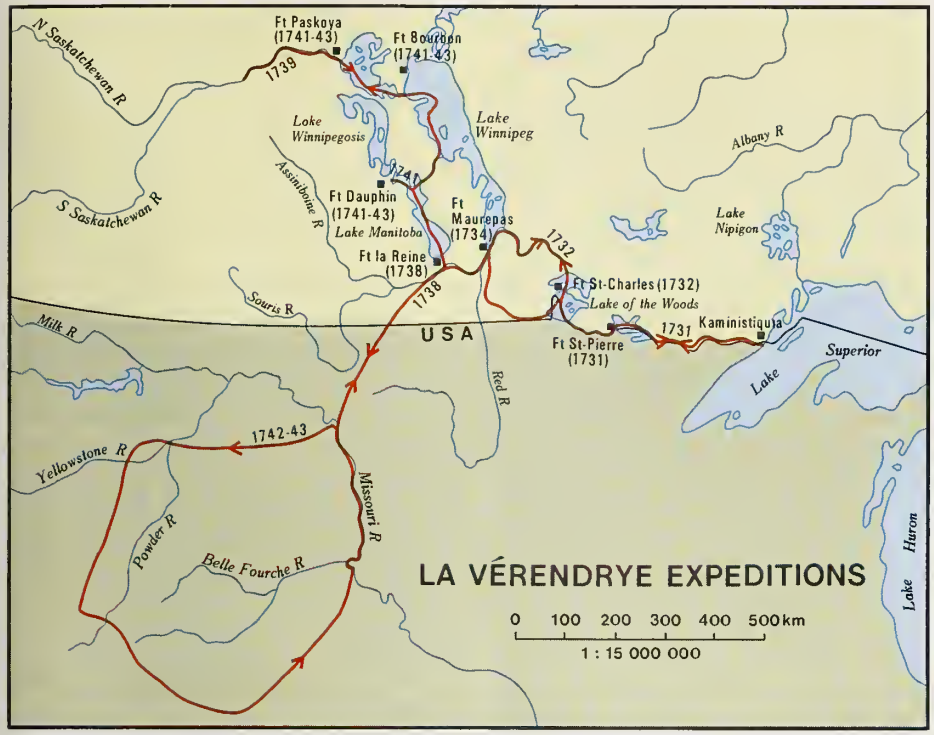
La Tuque, Qué, Town, pop 11 556 (1981c), inc 1911, is located on the Rivière ST-MAURICE, 165 km N of Trois-Rivières. Isolated in a huge forest zone in the heart of the Maurice region, the town was built at the start of the 20th century on the site of a former trading post. It owes its name to a mountain shaped like a triangular woolen hat, popularly known as a "tuque." In 1904 the Brown Corp, an American paper company, bought the falls and neighbouring lands and in 1907 built a pulp mill powered by electricity from a dam. The town born of this industry grew and became the gathering point for forest workers. The hydroelectric station, whose power was increased in 1943, is used by HYDRO-QUÉBEC. In 1954 the Canadian International Paper Co (CIP) bought the pulp mill, which it operates today. La Tuque lives primarily from FORESTRY and its derivatives: mills and construction wood. CIP makes industrial wrapping paper, cartons and bleached kraft paper.
CLAUDINE PIERRE-DESCHÊNES

La Vérendrye, Louis-Joseph Gaultier de, "Chevalier," explorer, fur trader, military officer (b at Île aux Vaches, New France 9 Nov 1717; d at sea 15 Nov 1761). Youngest son of Pierre Gaultier de Varennes et de LA VÉRENDRYE, Louis-Joseph is best known for having led the first European exploration across the Missouri R into the Great Plains. He joined his father's westward explorations in 1735 and helped him establish Ft Maurepas and Ft La Reine. In 1738 he accompanied his father to the Mandan country (near Bismarck, N Dakota) and in 1739 was sent N to explore Lk Winnipeg. It is likely that he reached THE PAS on the lower Saskatchewan R. In 1742 Louis-Joseph, his brother François Gaultier Du Tremblay and 2 other Frenchmen, undertook their epic 15-month journey SW of the Mandan in search of the fabled "western sea." Having reached what were probably the Big Horn Mtns (Wyoming) they returned along the Cheyenne and Bad rivers, and buried a lead plaque at Pierre (S Dakota), unearthed in 1913. After 1743 Louis-Joseph served as post commander at Chequamegon, Kaministiquia and Michipicoton.

In the east, he participated in the Mohawk campaign (1748) and on Lk Champlain (1759) during the SEVEN YEARS' WAR. The most active and gifted of the 4 La Vérendrye sons, Louis-Joseph died in a shipwreck off Cape Breton.
C.E. HEIDENREICH

La Vérendrye, Pierre Gaultier de Varennes et de, military officer, farmer, fur trader, explorer (b at Trois-Rivières 17 Nov 1685; d at Montréal 5 Dec 1749). The expeditions organized by La Vérendrye and spearheaded by his sons were the first to open the country from Lk Superior to the lower Saskatchewan R and the Missouri R to the French fur trade.

Early in life La Vérendrye had chosen a military career. He saw action during the American



phase of the WAR OF THE SPANISH SUCCESSION and, in 1708, was wounded and taken prisoner in France. Released in 1710 he returned to Canada in 1712, married and became a farmer on his wife's land on Île aux Vaches and Île Dupas in Lac St-Pierre. Tiring of this life, he decided to join his brother Jacques-René when he became commandant of the posts along the N shore of Lk Superior in 1726. After succeeding his brother as commandant in 1728, La Vérendrye began to revive the old dream of discovering a route to the hypothetical "western sea" believed by some geographers to be a large gulf in the western interior that opened to the Pacific. With permission from the minister of the marine, Maurepas, but no financial backing, La Vérendrye sought and received a 3-year monopoly on the fur trade of the area in 1731. He formed a partnership with a number of merchants and between 1731 and 1737 he was active building posts from Lk Superior to Lk Winnipeg promoting the fur trade, and gathering native information. These accounts mentioned 2 rivers leading west. La Vérendrye named them *Rivière Blanche* (Saskatchewan) and *Rivière de l'Ouest* (Missouri). Dissatisfied with La Vérendrye's progress in exploration (6 years to get to Lk Winnipeg), Maurepas demanded action. Accordingly, La Vérendrye struck SW in 1738 to the Mandan country on the Missouri R. It was the only journey of exploration in which he had not been preceded by one of his sons or his nephew Christophe Dufrost de La Jemerais. Unsure of what he had found, exhausted physically and financially, La Vérendrye returned to Ft La Reine [PORTAGE-LA-PRAIRIE] and left further exploration to his sons. In 1742-43 his sons Louis-Joseph and François Gaultier Du Tremblay journeyed SW beyond the Mandan proving that the sea did not lie in that direction. In the meantime La Vérendrye continued the development of the fur trade in the Manitoba Lks area. Expectations for a major discovery were so high that Maurepas lost patience, blaming La Vérendrye for diverting energies from exploration to trading and suggested to Governor BEAUHARNOIS that he be replaced. In 1743 La Vérendrye resigned but was reappointed in 1746. He planned the exploration of the Saskatchewan R but died before he could undertake it. C.E. HEIDENREICH

Labatt, John, brewer, entrepreneur (b in Westminster Twp, Middlesex County, Upper Canada 11 Dec 1838; d at London, Ont 27 Apr 1915). Third son of John Kinder LABATT, he was educated at Caradoc Academy and secondary school in London. He studied under an English brewer in Wheeling, West Virginia, 1859-64. Two years later, on his father's death, he entered into partnership with his mother to manage and then own the London Brewery, changing its name to John Labatt. Specializing in an English-type India pale ale, he marketed beyond the local region by the use of railways and bottling agencies, advertising by using prizes won at international expositions. Though he invested in other ventures, even founding an implement company to compete with Massey-Harris, none succeeded. Finally he confined himself to brewing, resisting merger first with Carling and then with O'Keefe. In 1911 he finally incorporated the firm as JOHN LABATT CORP, with a capital of $250 000 and a capacity of some 30 000 barrels annually. ALBERT TUCKER

Labatt, John Kinder, farmer, brewer (b at Mountmellick, Ire 1803; d at London, Canada W 26 Oct 1866). Descended from French Huguenot exiles who had become Anglican, he emigrated from Ireland to England and thence to Upper Canada in 1833 with his wife. They settled on land of the Canada Co in Westminster Twp, Middlesex County. After 13 years Labatt sold his farm and invested as a partner in a small London brewery near the forks of the Thames R. In 1855 he became sole owner, and went on to build the business into a successful enterprise which combined the making of malt with the brewing of English types of ale. ALBERT TUCKER

Labatt, John Sackville, brewer (b at London, Ont 10 Mar 1880; d at Port Stanley, Ont 8 July 1952). The eldest son of John LABATT, he was educated at Trinity College School and McGill. Succeeding his father, he was president of John Labatt Ltd 1915-50. Not a dynamic man, he combined ingenuous charm with the sense to maintain family control through the years of prohibition in Ontario (1916-27) and in the US (1920-33). During these years the company made large profits from the sale of beer and whiskey across Lk Erie and the Detroit R. These profits made him the target for kidnapping in Aug 1934, when he became the first important Canadian business figure to be kidnapped for a high ransom. The ransom was never paid, and he was released unharmed. In the subsequent trial he mistakenly identified the wrong man, who was imprisoned. The experience made Labatt apprehensive and defensive. Though maintaining his visibility as president and his cordial relations with employees, he depended on others for direction through the period of expansion in the 1930s and 1940s. ALBERT TUCKER

Labelle, François-Xavier-Antoine, Roman Catholic priest (b at Ste-Rose, Qué 24 Nov 1833; d at Québec C 4 Jan 1891). One of the best-known and most popular figures in Québec at the time, Curé Labelle was instrumental in promoting colonization of the Ottawa Valley. Appointed parish priest of St-Jérôme de Terrebonne in 1868, he dreamed of a francophone and Catholic reconquest of northern Canada, from Montréal to Winnipeg, through the establishment of a chain of colonies. A remarkable orator and assiduous lobbyist in Québec C and Ottawa, the huge priest devoted most of his energy to the first stage of this project: the settlement and agricultural, commercial, mining and manufacturing development of the area northwest of Montréal. An ardent supporter of building the CPR in 1872, he was sent as an envoy to Europe by the Canadian government in 1885 and the Québec government in 1890. In 1888 the Prem Honoré MERCIER, appointed him deputy minister of agriculture and colonization. Although Labelle encountered innumerable obstacles over the years and saw his most grandiose dreams crumble, he contributed directly to the establishment of some 20 parishes.
GABRIEL DUSSAULT

Labelle, Huguette, née Rochon, nursing teacher and administrator (b at Rockland, Ont 15 Apr 1939). One of a few women to achieve senior administrative positions with the federal government, she began her career as a general staff nurse at the Ottawa General Hospital. After changing to teaching, she became founding director of the Vanier School of Nursing in Ottawa. In 1973 she was appointed principal nursing officer with Health and Welfare Canada, nursing's highest administrative post. A past president of the Canadian Nurses' Assn, she became under secretary of state in 1980 and in 1985 deputy clerk of the Privy Council and associate secretary to the Cabinet. DANIEL FRANCIS

Laberge, Albert, journalist, author (b at Beauharnois, Qué 18 Feb 1871; d at Montréal 4 Apr 1960). He produced several collections of tales, short stories and critical essays and is known especially for *La Scouine*. Laberge began school at the Académie Saint-Clément in Beauharnois and later attended Collège Sainte-Marie in Montréal, which he left in 1892. In 1894 he studied law at the École de Leblond de Brumath. His first poetic tales appeared in *Le Samedi* (1895). From 1896 to 1932 he worked at *La Presse*. He helped found the École littéraire de Montréal but did not participate in it until 1909. *La Scouine* (1918), a novel of rural customs, established Laberge as a naturalist writer. Besides *La Scouine*, Laberge published 10 collections of stories, 3 essays and some literary criticism — all at his own expense. His autobiographical novel, "Lamento," was unfinished. Laberge tried to describe life as he saw it and placed particular emphasis on the dark side of life. Some of his stories have become classics: "La Femme au chapeau rouge" (1947), "Les Noces d'or" (1950), "La Rouille" (1950), "Le Dernier Souper" (1952) and "Madame Pouliche" (1963). PAUL WYCZYNSKI

Laberge, Louis, aircraft mechanic, labour leader (b at Ste-Martine, Qué 18 Feb 1924). At age 22, after working 2 years for Canadair, Laberge be-



Under the leadership of Louis Laberge, the Fédération des travailleurs du Québec incorporated nationalist and independentist objectives (*courtesy Canapress*).

came shop steward of his union. Three years later (1948), he became the union's business officer and was president 1956-63 of the Conseil des métiers et du travail de Montréal. His election as president of the Fédération des travailleurs du Québec in 1964 came when it was losing ground to the Confédération des syndicats nationaux. Under his leadership, the FTQ, while defending the advantages of international ties and allegiance to Canada, also incorporated Québec neonationalist objectives. During the 1960s and 1970s, the FTQ sought greater independence from the Canadian Labour Congress, supporting the PARTI QUÉBÉCOIS and moving ideologically to the left. Laberge has been re-elected easily at every congress since 1964. JACQUES ROUILLARD

LaBine, Gilbert, prospector, mining promoter (b at Westmeath, Ont 10 Feb 1890; d at Toronto 8 June 1977). He and his brother Charlie formed Eldorado Gold Mines (1926) in Manitoba. When the mine petered out, he used the company's remaining funds to finance prospecting trips around Great Bear Lk, where in 1930 he discovered a valuable deposit of silver mixed with pitchblende (radium). After establishing a refinery at Port Hope, Ont, LaBine entered the world radium market in 1933. His mine was forced to close in 1940, but American demand for uranium reopened it in 1942. That year the government secretly bought control of Eldorado, and in 1944 the company was nationalized. LaBine remained president until 1947. A brilliant prospector and creative promoter, LaBine was less at home with routine administration. His other interests included Gunnar Mines and Nesbitt-LaBine Mines.

ROBERT BOTHWELL

Labour Canada, est 1900 as the Department of Labour under the Conciliation Act (now Department of Labour Act) to "aid in the prevention and settlement of trade disputes." The department's objectives are to promote and protect the rights of parties involved in work and to ensure equitable access to employment opportunities. Its functions are implemented through the Federal Mediation and Conciliation Program, which appoints conciliation officers in labour disputes; Program Developments and Central Operations Program, which produces labour-related data; the Policy Co-ordination and Liaison Program, which co-ordinates Canada's participation in the International Labour Organization; and the Administrative Policy and Services Program, responsible for the department's personnel relations. The Canada Relations Board and CANADA POST CORPORATION report to the minister. The department's 1984-85 budget was $95 million.

Labour Day, honouring organized labour, is a legal holiday observed throughout Canada on the first Monday in Sept. The contribution of organized labour to Canadian society has been recognized since 1872, when parades and rallies were held in Ottawa and Toronto. The earliest American labour parades were not held until 1882 and in Europe Labour Day has been celebrated since 1889 on May 1, thereby merging traditional May Day festivities with labour celebrations. This spring date was briefly observed in Canada, but the N American need for a long weekend at the end of summer brought about the fall observation, recognized by Parliament in 1894. JOHN ROBERT COLOMBO

Labour Force, total of the adult population available to the LABOUR MARKET at a specific time; defined by Statistics Canada as "that portion of the civilian noninstitutional population 15 years of age and over who, during the reference week [in which the employment survey was taken], were employed or unemployed." Employed persons include all those who worked, part or full time, and those who would have been at work were it not for illness, disability, family responsibilities, bad weather, labour disputes or vacations. The unemployed include those without work but seeking work, those laid off for less than 6 months but available for work or those who have not sought work in the previous 4 weeks but have a job to go to within 4 weeks. This definition is a technical one for gathering statistical data and has been refined and modified over the years both for operational reasons and to reflect social and economic changes. For instance, earlier in this century the labour force was considered those 10 years of age and over. This changed to 14 years in 1931 and 15 years in 1951, reflecting the decline of an agriculturally based economy.

The size of the labour force is determined by the size of the adult population (potential labour force) and the proportion of that population willing and able to work (actual labour force); it is calculated from a monthly survey of 55 000 households across Canada, from which unemployment rates, employment rates, reasons for leaving the labour force, etc, are also calculated. The proportion of the adult population in the labour force is referred to as the participation rate, which varies by region and by demographic factors such as age or sex. PAUL PHILLIPS

The Canadian Labour Force: 1911-1981
(Source: Census of Canada, 1971; The Labour Force, June 1981)

	Labour Force (000s)		
Year	*Total*	*Male*	*Female*
1911	2 698	2 341	357
1921	3 143	2 658	485
1931	3 908	3 245	663
1941	4 183	3 352	831
1951	5 277	4 114	1 162
1961	6 458	4 694	1 764
1971	8 608	5 648	2 960
1981	12 178	7 235	4 688

Note: Excludes the Yukon, the NWT and, prior to 1951, Newfoundland. Excludes the unemployed who have never been employed and those on active service in 1941. Prior to 1951 the concept used was the "gainfully occupied" rather than the "labour force." Data prior to 1961 has been adjusted to eliminate all those under the age of 15

Labour History, *see* WORKING-CLASS HISTORY.

Labour Law governs COLLECTIVE BARGAINING and other collective relations among employers, their unionized employees and trade unions. In Canada a distinction is commonly made between labour law narrowly defined in this way and EMPLOYMENT LAW, the law of individual employment relationships. In England, labour law describes both, and of course a close relationship exists between them. In most provinces these matters are covered in separate statutes, but the Canada Labour Code, Parliament's major labour-law enactment for industries within federal jurisdiction, also regulates labour standards and occupational health and safety.

As soon as there were unions in Canada there were labour laws (*see* WORKING-CLASS HISTORY), but it was not until 1944 that a full system of collective labour-relations law was established by regulation PC 1003, under federal government emergency powers. After the war it was replaced by federal and provincial legislation (*see* LABOUR RELATIONS), eg, Industrial Disputes Investigation Act 1947. These statutes, variously called labour codes, labour or industrial-relations Acts or trade-union Acts, are all based on

Beginning in 1872, Labour Day has continued to be celebrated with parades, such as this one in what is now Thunder Bay, Ont (*courtesy Thunder Bay Historical Museum Society*).



the idea, expressed in the preamble to Part V of the Canada Labour Code, that "the common well-being" is promoted "through the encouragement of free collective bargaining and the constructive settlement of disputes." At the heart of labour law lies the volatile ideological issue of how completely the state should regulate the use of economic power by labour and management in bargaining over wages and other terms or conditions of employment.

The Canada Labour Code and each equivalent provincial statute protects the right of employees to join the union of their choice by making it an unfair labour practice for an employer to discriminate against employees for joining a trade union or participating in any of its lawful activities. Moreover, the employer is required by law to bargain in good faith with the union chosen as bargaining agent by a majority of his employees. To protect these rights each statute provides for the appointment of a labour relations board, to which complaints of unfair labour practices may be taken and which, upon application for certification, decides whether a majority of the employees in question wish to be represented by that union. In deciding whether to certify a union the board must determine the "appropriate bargaining unit," ie, the group of employees by whom and for whom the selection of the bargaining agent is to be made. Once the appropriate bargaining unit is determined the labour relations board must ascertain the wishes of the majority by examining dues receipts and other evidence of membership in the union or by administering a secret-ballot vote, or both. In addition to the legislation there are regulations, practices, countless decisions by labour boards and many court judgements that make up the labour law governing unfair labour practices, union certification and the duty to bargain in good faith.

Once a union has been certified it is entitled to require the employer to meet with its representatives and bargain over the terms and conditions of employment that will form the collective agreement for the employees in the bargaining unit. Either the union or the employer may apply to the minister of labour for the province (or for Canada if the industry is under federal jurisdiction) for conciliation. If no collective agreement is reached by that process, and in some provinces after a STRIKE vote, the employees can lawfully strike. Legally, a strike is a concerted withdrawal of labour; at that same point in the process the employer can legally lock the employees out. Usually in a strike or lockout everybody loses something: the employer his profits and continuing costs, the employees their wages and the union its strike funds. It is generally believed that the fear of this mutual loss is the driving force behind collective bargaining. In most cases the union and the employer sign a collective agreement without a strike. The agreements are usually for one or 2 years and during that time any strike is illegal. When the agreement expires the process of collective bargaining, conciliation and strike or lockout starts over again.

The ordinary CRIMINAL LAW and the law of TORTS and DELICTS determine the legal limits on picketing and other union activity in support of a strike, although in some provinces special laws limiting such activities are administered by labour-relations boards. Strikes are usually lawful and peaceful and are concluded by the signing of a collective agreement, but not necessarily. If the employer wins the strike or lockout so completely that no collective agreement is reached, the employees' jobs are protected only by the unfair-labour-practice laws and individual employment law. Aside from the legal aspects of strikes, their economic, political, social and personal implications may be very important.

In public sector collective-bargaining relationships, federal or provincial law may substitute interest ARBITRATION (which is otherwise noncompulsory) for the right to strike, particularly when essential services are involved. The interest arbitrator's function is to establish the terms of the collective agreement upon which the parties have been unable to agree, usually the amount of the wage increase, but certain nonmonetary conditions of employment can be equally or more contentious.

When a collective agreement is in force, it becomes, in effect, the private law of the employer, the employees and the union. Disputes over the application, interpretation or breach of the collective agreement are settled through a grievance procedure which leads finally to grievance arbitration, but arbitration is not always the final step because application may be made to the courts if arbitrators do not perform their functions properly. The enormous number of arbitration awards and court judgements relating to arbitration comprise the most practically important, if not the most newsworthy, component of labour law. For every strike there are tens of thousands of grievances that are settled by the people involved and hundreds of grievance arbitrations.

Labour law is also concerned with the relationships between unions and their members. Since collective agreements can legally make union membership mandatory, employees may need protection against their own unions. Generally employees are hired and then required by "union shop" provisions to join the certified union. In some industries, eg, longshoring and construction, because of closed-shop provisions union membership is a prerequisite to being hired. The common, or judge-made, law, the Canada Labour Code and the labour statutes of some provinces protect employees against unfair union disciplinary procedures and, in the case of the statutes, limit the reasons for which an employee can be expelled from a union or fired as a consequence.

The central issues of labour law are the central issues of our society. How much state regulation should exist? Can economic justice be defined and administered, or must the free market be given more play? Is there a breakdown in order as competing interests vie for public sympathy and support? Paradoxically, the trend in the 1980s appears to be toward greater state regulation of all aspects of the employment relationship, including the wage bargain. Labour relations is increasingly a matter of labour law.

INNIS CHRISTIE

Labour Market is a generalized concept denoting the interaction between the supply (number of persons available for work) and the demand (number of jobs available) and the wage rate. Labour-market analysis is complicated by the need to consider not only the short-term supply and demand for labour, but their allocation among regions, occupations and industries. In addition many institutions influence and regulate the distribution of workers.

The many labour markets in Canada are indistinctly divided and sometimes overlap. The most obvious types are geographical and occupational. The market for unskilled labour would normally be the local area, while that for highly trained professionals would be international. However, there are exceptions. Canada imports agricultural workers from Caribbean countries rather than paying wages and providing working conditions adequate to induce Canadian workers to accept jobs in this seasonal industry. By contrast, because of the surplus of trained teachers in most major urban centres, school boards rarely need recruit beyond the local area. In this sense the size of the labour market is determined by worker mobility — the ability and willingness of workers to move from one labour market to another occupationally as well as geographically. To complicate matters further, a significant number of firms, particularly large ones, do not hire on the open market except to fill low-level positions or "entry ports." Otherwise their jobs are filled from internal labour markets through promotion. Legislation may also affect how people choose or are chosen for jobs; eg, lawyers and doctors are restricted from practising within a province unless they are certified by that province. Under current immigration laws, employers may not seek workers outside Canada unless they can demonstrate that there are no qualified personnel available in Canada. Some union agreements stipulate that employers may not hire from outside the local union. Various professions and technical jobs require certificates attesting to an individual's training, eg, a university diploma or a journeyman's certificate attained through an apprenticeship.

The total supply of labour is determined by the size of the adult population, defined statistically as all those 15 years of age and over. Only a portion of the potential LABOUR FORCE actually participates in the labour market, the main determinants of participation being age and sex, economic conditions, social institutions and attitudes. Many young people, until their mid-twenties, attend school or training institutions, and participation declines rapidly as people approach and pass the age of 60. The participation

Labour Force Distribution by Region and by Rural-Urban: 1961-1984
(Source: Census of Canada, 1971; *The Labour Force*, June 1984)

Region	*% of Labour Force*		
	1961	*1971*	*1984*
Atlantic provinces	8.7	8.1	7.9
Québec	27.4	25.2	25.4
Ontario	37.1	39.0	37.4
Prairies	17.9	17.1	18.0
British Columbia	8.9	10.5	11.3
Rural-Urban			
Rural	30.4	20.8	N/A
Urban	69.6	79.2	N/A

Occupational Distribution
Experienced Labour Force: 1971-1984
(Source: Census of Canada, 1971; *The Labour Force*, June 1984)

Occupation	*% of Labour Force*					
	1971			*1984*		
	Total	*M*	*F*	*Total*	*M*	*F*
Managerial	4.3	5.5	2.0	9.8	11.3	7.5
Professional	12.7	10.0	17.8	15.4	12.5	19.4
Clerical	15.9	7.6	31.7	16.7	5.8	31.9
Sales	9.5	10.0	8.4	9.3	9.2	9.5
Service	11.3	9.2	15.1	14.1	10.9	12.7
Agriculture	5.9	7.1	3.6	4.7	6.2	2.7
Fishing, Hunting and Trapping	0.3	0.5	a	0.4	0.6	a
Forest and Logging	0.8	1.2	a	0.8	1.2	0.1
Mining and Quarrying	0.7	1.0	a	0.6	1.0	a
Processing	3.9	4.9	2.0	3.7	4.9	2.0
Machining	2.8	4.0	0.5	2.1	3.3	0.4
Product Fabrication	7.3	8.5	5.1	8.7	11.5	4.8
Construction Trades	6.6	9.9	0.2	6.2	10.5	0.3
Transportation Equipment Operators	3.9	5.8	0.3	3.8	5.9	0.7
Materials Handling	2.4	2.9	1.4	2.5	3.5	1.2
Other Crafts	1.3	1.7	0.5	1.2	1.7	0.6
Not Classified or not stated	10.5	10.0	11.5	–	–	–
All occupations	100.0	100.0	100.0	100.0	100.0	99.8

a = less than .05%

Note: 1984 columns exclude unemployed persons who have never worked before and those persons who last worked more than 5 years ago. 1971 columns exclude persons looking for work who worked prior to 1 Jan 1970 or who have never worked

rate of women, particularly those between the ages of 25 and 64, has traditionally been much lower than that of men, although this is changing as more married women enter the labour force. Increasing participation of WOMEN IN THE LABOUR FORCE has been attributed to changing social attitudes, declining birthrates and family size (which may be a consequence rather than a cause), higher education levels, growing availability of jobs, the need to maintain a family and economic pressures.

The total labour supply is not evenly distributed among regions or even subregions nor between rural and urban labour markets. Its size in any local labour market is affected not only by the size and participation rates of the local population and the rate of natural increase, but also by migration into or out of markets. The rate of migration into or out of a labour market varies directly with economic opportunities. The relative growth of the labour force in different regions has reflected Canada's economic development. In the early 20th century, the advent of the wheat economy brought explosive growth to the Prairies. Later, expansion was concentrated in central Canada but has recently shifted again to the West.

For practical and administrative purposes and because of geographical limits, Canada has been divided into 99 labour-market areas in the labour-force survey, but the 350-400 Canada Employment Service areas, within each of which is a Canada Employment Centre, are a better measure of the number of local labour markets, except that major urban areas have a number of centres, which may result in an overestimation of the number of markets. Occupationally, it is possible to estimate roughly the flow of new workers with certain occupational skills into the labour market by monitoring the output of education and training institutions; formal on-the-job industrial and apprenticeship programs and the occupational skills of immigrants. Such an estimation would be imprecise, however, because it does not include informally acquired skills and workplace training, which are not normally recorded, and does not record the number of workers employed at jobs that do not utilize their actual skills. According to a study for Employment and Immigration Canada, in 1976, 37.7% of university graduates and 25.3% of community-college graduates 2 years after graduation were employed in jobs that did not utilize their qualifications. There is also no accurate record of the skills lost to the country by EMIGRATION. The actual occupational distribution of the labour force is therefore more accurately determined by measuring the demand for, rather than the supply of, skills. The prolonged reliance upon immigrants for certain skills and repeated complaints of employers in periods of low unemployment of a shortage of available tradesman are evidence that the domestic supply of certain skills has fallen behind the demand.

Market Demand for Labour The demand for labour is indirectly determined by the demand for the goods and services that labour produces. Demand for labour has geographical and occupational dimensions, but is also affected considerably by the industrial distribution of demand and the organization of industries. Geographically, the demand for labour will not normally equal the geographical distribution of supply. Consequently, differences in both unemployment rates and in average wage levels for essentially similar jobs will often exist.

According to the industrial distribution of the employed labour force, the difference between male and female distribution is again quite pronounced, primarily because of differences in the occupational composition of the demand for labour in the various industries. The figures reveal more rapid growth in recent years of employment in the service-producing industries, similar to the occupational distribution trend towards increasing numbers of white-collar workers.

Regional Differences in Average Wage Rates and Unemployment: 1984
(Source: *Canadian Statistical Review*, Sept 1984)

Region	*Average Weekly Earnings (Industrial Aggregate, June 1983)*	*Unemployment Rate (%) (Annual Average, 1983)*
Atlantic provinces	$347.24	15.0
Québec	$384.72	13.9
Ontario	$386.13	10.4
Prairies	$402.66	9.7
British Columbia	$428.98	13.8
Canada	$390.46	11.9

Wages and Unemployment In an economist's ideal model of the labour market, wages would adjust to eliminate all unemployment and, over time, labour would move between regions, occupations and industries until real wage rates were equalized when adjusted for differences in skill, education and training, and nonmonetary costs and benefits of individual working environments. In fact, such ideal conditions do not exist and disparities in the supply and demand for labour persist, particularly between regions and between jobs with similar skills, in training requirements and working conditions and in wide differences in unemployment rates between occupations and regions. Analysis of these disparities is extremely complex, but regional disparities reflect how far the Canadian situation falls short of the equilibrium of supply and demand posited by the economic theory of labour markets.

The concept of a labour market must be considered a complex and imperfect tool for analysing the system by which the total supply of Canadian labour, including employers, managers and the self-employed, is allocated among the total of employment opportunities in the economy.

Participation Rates, the proporation of people within any given age/sex group that participate in the labour market, have been undergoing quite marked changes in recent years as a larger percentage of women enter the market. In 1961 less than 30% of Canadian women were in the labour market; by 1984 this had risen dramatically to 54%, mainly as a result of fewer women leaving the labour force for marriage or for raising families. Male participation, on the other hand, has remained relatively constant despite a steady decline in participation by males 65 years of age or older as a result of improved retirement provisions. The participation rate of males 15 years of age or older has remained considerably higher than the female rate despite this trend, standing at 78.8% in June 1984 compared to the female rate of 54.3%.

PAUL PHILLIPS

Labour Mediation is the process of trying to effect a collective agreement between a union and management (*see* LABOUR LAW and COLLECTIVE BARGAINING). Since 1907 Canadian labour legislation has required unions to try "conciliation" before they can legally strike (*see* STRIKES AND LOCKOUTS). The responsibility for labour conciliation is generally that of conciliation officers who are civil servants expert in the field, but in some provinces 3-person conciliation boards are used in difficult or major labour disputes. The term "labour mediation" is often used interchangeably with "labour conciliation," but strictly speaking, under most Canadian labour legislation, mediation is a special attempt to achieve agreement, usually after the regular conciliation process has failed, by an independent expert.

INNIS CHRISTIE

Labour Organizations may include all types of workers' associations, whatever their objectives, but generally the term is used synonymously with trade unions.

Until Confederation, 1867, labour associations were limited to local groups, almost always of tradesmen. Regrouping of local units began in the 1870s; in 1883 the TRADES AND LABOR CONGRESS (TLC), the first Canadian central labour body, was founded in Toronto. From 1880 to 1910, union locals were organized in great numbers, but total membership did not represent more than 10% of all paid nonagricultural workers. The membership rose to 15% around 1920 and remained at that level or below until the 1930s.

Industrial-type unions have existed in Canada under different names since the first assemblies of the KNIGHTS OF LABOR in 1881, but they really came to life in the late 1930s and early 1940s with the rise of Canadian locals of the newly formed Congress of Industrial Organizations (CIO) in the US. The major growth of labour organizations in Canada resulted from the industrial development that was spurred by the war industries and postwar boom, but also from new legislation (1944) permitting union certification and forcing employers to accept COLLECTIVE BARGAINING with employee representatives. Thus, during the 1940s, membership in labour organizations more than doubled from less than 400 000 to 1 000 000, and the level of unionization rose from 20% to 30%. The degree of unionization reached 34% in 1954, but returned to 30% in the late 1950s and beginning of the 1960s. Even in absolute numbers, union membership declined between 1959 and 1963. In the 1960s efforts were made to tap new sources of members, ie, office workers and some professional employees. In the late 1960s all Canadian jurisdictions (except Saskatchewan, which had done so in 1944) granted public-sector employees the right to organize and bargain collectively. The level of unionization consequently rose to 40% of Canadian nonagricultural paid workers by the 1980s. The percentages in Québec and BC were above the national average. Total membership was 3.5 million.

There have been 3 major periods in the history of labour organizations in Canada: the development and dominance of the trade unions from the 19th century to the early 1930s; the major upsurge of industrial unions and general labour organizations during and following WWII; and in the late 1960s and early 1970s the unionization of public-sector employees. Until the 1930s, workers had to be persuaded individually to sign up to join the union; after WWII many continued to sign up voluntarily, but others were forced to join directly because of a union shop or indirectly because of a RAND FORMULA clause in the collective agreement. The public-sector employees were brought into the labour movement by government legislation. There has been little "autonomous" growth of labour organizations since the 1960s.

Despite the common stance on solidarity, the labour movement has always been divided internally. With the reunification of the TLC and Canadian Congress of Labour in 1956, the Canadian Labour Congress became the mouthpiece of close to 80% of all union members. New divisions developed in the 1970s. Unaffiliated or independent unions grew in number and importance; in the early 1980s they accounted for 20% of all union members in Canada. A major split among CLC-affiliated unions occurred in 1982 when the building trades seceded to form the Canadian Federation of Labour (CFL), resurrecting the name of an old federation that had existed from 1902 to 1927. The split came because for many years the CLC sided with the industrial unions against the building trades on different questions, eg, regarding whether certain types of work should belong to the shop

employees or to the construction workers. Because of the fragmentation, the CLC represented, in the early 1980s, less than 60% of all union members in Canada.

Labour organizations have always struggled for at least 2 different sets of objectives. One is directly concerned with the economic interests of the members themselves, the other with social reform in general. The former, pursued through collective bargaining, has been labelled "business unionism." The latter objectives, pursued through activities such as the NINE-HOUR MOVEMENT are concerned with a variety of social reforms, from UNEMPLOYMENT INSURANCE to medicare.

Labour organizations have also engaged in political action, from ad hoc nonpartisan positions on specific issues to direct affiliation with a political party (*see* CLASS AND POLITICS). Representations on specific issues were made most frequently to object to, or sometimes to support, certain pieces of legislation directly concerning labour. More direct involvement has been less constant. During the first 50 years of its existence, the TLC had to follow the neutral policy decided upon by the American Federation of Labor. The Canadian Congress of Labour enjoyed more freedom, and in 1942 endorsed the Co-operative Commonwealth Federation (CCF) as "the political arm of labour." Although the formation of a labour party, either at the federal or provincial level, was occasionally discussed, it never materialized. A socialist party was formed in Québec by leftist intellectuals and some labour leaders, but it never had any real influence.

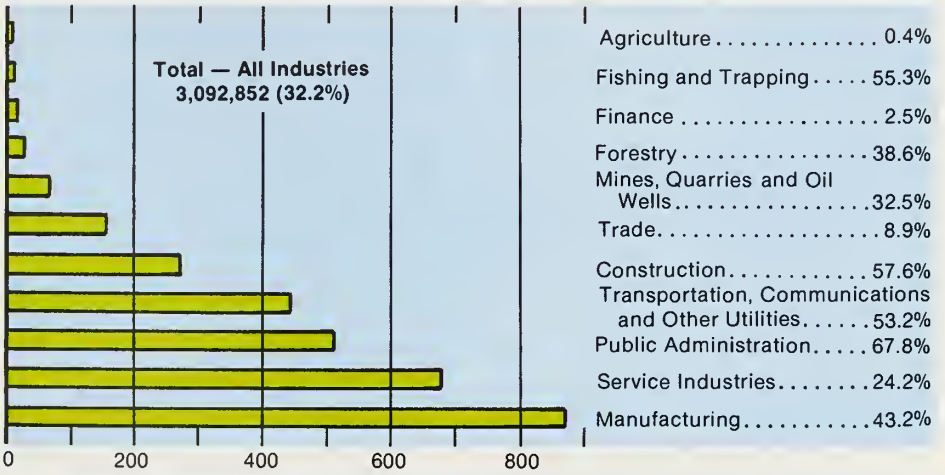
Ideological biases have marked certain labour organizations. Probably the most controversial case was the infiltration of communism into some organizations in the 1930s and the early 1940s. At the other extreme, the Roman Catholic Church, since the 1900s, was involved in the development of the Québec-based syndicates, which remained faithful to the program of Catholic social reform until 1960, when the formal links with the church were severed and the name of Canadian Catholic Confederation of Labour was changed to Confederation of National Trade Unions (CNTU). The group has remained highly militant.

Labour organizations have traditionally been suspicious of legal action. Before 1872 their very existence was illegal, and despite their recognition in 1872 labour organizations have had no efficient recourse in law, at least not until 1944 when union certification was introduced. Even then their legal status remained doubtful, as was the legal value of the collective agreements they signed. But things have changed gradually, and labour organizations are now claimants in legal suits or actions as frequently as they are defendants.

In the early 1980s labour organizations in Canada faced a number of challenges from both inside and outside their ranks. Ideological divisions still existed. Unions preoccupied with social reform had a tendency to become radical, more in the public than the private sector. Many members from private-sector unions have viewed public-sector salary increases as coming directly from the taxes they themselves have to pay. Although no split has actually occurred, serious tensions have been felt between the 2 groups, especially within the ranks of smaller central labour bodies, such as the CNTU. Another source of controversy has been the divergent views of various labour organizations regarding co-operation with management and governments. So-called "tripartism" has been a source of contention among unions. Some consider such mechanisms the only feasible and practical avenue of the future; others regard them as a downright betrayal of their members and of workers in general.

Degree of Union Organization by Industry, 1980

(Number of Paid Workers Unionized, in Thousands)



Source: Statistics Canada Catalogue 71-202.

As serious as these internal divisions may be, other problems, eg, unsupportive government interventions, decreasing support of public opinion, tougher management and the problems raised by new technology, may be more menacing.

In the 1970s most governments introduced extended and more sophisticated employment standards, together with more constraining health and safety measures. Some have called these new standards the "collective agreement of the unorganized." These measures may either curtail or enhance the unionization of the 60% of workers still not covered by any collective agreement.

A more drastic type of government intervention has to do with the substance of collective bargaining, eg, wage controls (*see* WAGE AND PRICE CONTROLS) of the mid-1970s and the curtailing of bargaining rights of public-sector employees in the early 1980s. These interventions have considerably reduced the influence of labour organizations on the Canadian economy. Their bargaining power has also been curtailed by the many instances of back-to-work legislation adopted at various times — federally and in all large Canadian provinces. These laws, according to some observers and practitioners, amount to a denial of the right to strike. The support of such government intervention by many Canadians reflects the diminishing support of labour organizations among the public. Public-opinion polls in the late 1970s revealed that the Canadian people trusted management and business representatives more than labour-union spokesmen. On the other hand, employees realize that as a group, perhaps the only opportunity available to them to secure better working conditions still lies in unionization and collective bargaining.

Another factor influencing the future of labour organizations in Canada is the uncompromising position management has taken at the bargaining table since the recession: in the early 1980s it has become commonplace for employers to try and rescind advantages already conceded. Also, the nonunion sector of private industries has been growing steadily. World competition has made employers aggressive. Labour organizations have grown at different rates around the world, and industry and consumers have taken advantage of the lower working conditions in other countries. HIGH TECHNOLOGY will also cause drastic changes in the labour movement and its organizing tactics, as well as affecting various methods of production; and diversified economic structures may further the balkanization of the labour movement rather than increasing its bonds of solidarity.

GÉRARD HÉBERT

Reading: Labour Canada, *Labour Organizations* (publ annually); D. Morton, *Working People, An Illustrated History of the Canadian Labour Movement* (1984).

Membership in Labour Organizations (000s)
(Source: Labour Canada, *Labour Organizations in Canada*)

	TLC	CLC	CCL	Total	% of paid nonagri workers
1901	8				
1911	57			133	
1921	174			313	16.0
1931	141			311	15.3
1941	145		125	462	18.0
1951	497		360	1 029	28.4
1961		1 071		1 447	31.6
1971		1 654		2 231	33.6
1981		2 369		3 487	37.4

TLC: Trades and Labor Congress, established in 1883
CCL: Canadian Congress of Labour, established in 1940
CLC: Canadian Labour Congress, established in 1956, integrating the TLC and the CCL

Labour Party That workers should have political representatives of their own class has been a recurrent theme in Canadian labour history. No one organization has provided a permanent home for this idea. Labour candidates and workers' parties emerged during the 1870s and 1880s, often backed by local unions. In 1874 Daniel J. O'DONOGHUE, an Ottawa printer, was elected to the Ontario legislature, and in 1888 A.T. Lépine, a Montréal leader of the KNIGHTS OF LABOR, was elected to Parliament. Many union leaders have preferred to advance their cause through established political parties. Also, acceptance of trade unionists and hybrid candidates by the major parties inhibited the formation of independent labour parties. Nevertheless, the TRADES AND LABOR CONGRESS showed a growing interest in political action, and in 1900 A.W. PUTTEE, a Winnipeg Labour Party founder, and Ralph SMITH, TLC president, were both elected to Parliament. While rejecting the more radical Socialist Party of Canada, the TLC in 1906 endorsed the creation of provincial labour parties based on the TLC's platform. Although there were labour candidates from all 9 provinces in the 1921 federal election, only J.S. WOODSWORTH, Winnipeg, and William IRVINE, Calgary, were elected. Labour candidates had greater success at the provincial level, winning seats in NS, Manitoba and BC in 1920, and participating in the Farmer-Labour government in Ontario (1919-23). In 1920 also, more than 100 mayors and municipal councilors were elected as labour

candidates. Nevertheless, attempts to create a cohesive Canadian Labour Party failed. Since then working-class representation has found a place in the COMMUNIST PARTY, the CO-OPERATIVE COMMONWEALTH FEDERATION and the NEW DEMOCRATIC PARTY, though labour parties have continued to appear occasionally, especially at the local level. DAVID FRANK

Labour Policy includes policies concerned with relations between employers and employees and those concerned with manpower or the LABOUR MARKET. INDUSTRIAL RELATIONS in Canada were governed through the common law of conspiracy in restraint of trade until 1872 when, as a result of the jailing of striking Toronto printers in a dispute with George BROWN, PM John A. MACDONALD introduced the Trade Unions Act legalizing unions. While professing neutrality in labour matters, government has often intervened without legal basis on behalf of employers. The first direct legislative intervention in labour-management relations came with the Industrial Disputes Investigation Act (1907) prohibiting STRIKES AND LOCKOUTS in public utilities and mines until a dispute had been investigated. The Act had been prepared by Mackenzie KING who, in 1909, became the first full-time labour minister.

Jurisdiction over labour relations was transferred to the provinces in the interwar period until wartime emergency and rising labour discontent led to the passage of wartime order-in-council PC 1003 (1944), which provided for the right to organization and to engage in COLLECTIVE BARGAINING. After the war, jurisdiction over most labour relations returned to the provinces, though governments at both levels have generally adopted the principles of the wartime measures. Since that time conflicts and disagreements over industrial relations are normally referred to provincial or federal tribunals or boards for adjudication.

Labour policy has been aimed at maintaining, allocating and ensuring a plentiful supply of labour; implementing strategies to increase the mobility of labour, including relocation and retraining; job creation and enhancement; managing the unemployed; and implementing appropriate social policies. It has always reflected economic policy which has traditionally involved hinterland resource exploitation, eg, the squared-timber industry in the Maritimes and northern Québec and Ontario. A comprehensive manpower policy was introduced (excluding wartime) only in the 1960s. Most provinces have their own policies, not all of which are in harmony with those of the federal government.

The earliest Canadian labour-market policy was the attempt during the time of Jean TALON, in the late 17th century, to consolidate French control of the St Lawrence region through settlement. Although opposed by the fur-trading monopolies, efforts were made to increase population through encouragement of immigration, the shipment of young women from France, the settlement of demobilized soldiers and the promotion of natural increase through state subsidies for early marriage and large families. In the FUR TRADE, the native people provided much of the labour as suppliers and transporters, and French Canadian traders, COUREURS DE BOIS and VOYAGEURS located new resources and brought the furs to port. The HUDSON'S BAY CO developed another de facto policy. The native peoples acted as suppliers and brought the furs to the Bay until Orkney labourers began to handle transport to the interior. Métis communities developed as suppliers of PEMMICAN, guides and labourers; the English were merchants, traders and managers. The encouragement of immigration and settlement continued after the Conquest (1760), reaching its peak in the late 19th century and the first decade of the 20th. Massive numbers of immigrant workers were imported to build the transcontinental railway. A Royal Commission (1905) revealed that 2 CPR subcontractors alone had imported some 6000 oriental labourers. The federal government and the CPR also co-operated in an ambitious recruiting campaign to populate the Prairies, first in England, Scandinavia and W Europe and then, by necessity, in Eastern and Southern Europe. Many of these immigrants supplied a labour reserve for mines, highways and factories as well as breaking land on the Prairies. The policy of importing workers was vigorously opposed by labour, which was able to persuade government to intervene, eg, in passing the Alien Labour Law (1897).

Government support of manpower development was not restricted to encouraging immigration. Soon after the Conquest, agricultural societies and exhibitions were promoted as a means of providing agricultural education. Beginning in Ontario, public education spread across much of Canada in the second half of the 19th century, one of its explicit aims being the preparation of young men for the labour market. Prior to WWII there were a number of sporadic and ad hoc incursions into labour-market policy by all levels of government, usually in response to high unemployment. Several municipal governments in the larger centres established employment exchanges or became involved in public relief work, as did provincial governments.

By 1914 "relief work" was a common response to the growing numbers of unemployed men who were given bed and meals in exchange for performing menial or odd jobs, eg, cutting firewood and sewer work. During the GREAT DEPRESSION the federal government resorted to deportation and work camps. In 1930, at the urging of provincial and municipal governments, 4000 people were deported, some 45% of whom had been receiving public assistance, several hundred of whom were ill. Relief work was reinstituted and in 1932 work camps administered by the Department of National Defence were established. Around 17 000 men were detained in 10 camps in remote areas of Alberta alone. The Conservative government under Prime Minister R.B. BENNETT did attempt unsuccessfully to introduce an unemployment insurance program in 1935, but it was not until a constitutional amendment to the BNA Act in 1940 that the federal government became directly involved in employment exchanges.

The establishment of the Unemployment Insurance Commission (UIC) and its affiliated National Employment Service (NES), which derived from the wartime registration program (1940), marks the first systematic labour-market policy. The NES was to match unemployed workers with unfilled job vacancies, using the employment centres as clearing houses. Almost immediately it began allocating labour to priority wartime work and administering the selective-service system, but in the generally buoyant economic conditions after the war it returned to its earlier placement work.

In the late 1950s, unemployment and concern with structural unemployment (unemployment created by regular cyclical crises and that created by technological change, corporate conglomeration and shifting world markets) began to rise, resulting in the Technical and Vocational Training Assistance Act (1960), a shared-cost program with the provinces for the provision of occupational training and training facilities. The central importance of the labour-exchange function of labour-market policy was consequently downgraded. In 1966 the government established the Department of Manpower and Immigration (DMI), responsible for all manpower policy except UNEMPLOYMENT INSURANCE. The Adult Occupational Training Act (1967) under the Canada Manpower Training Plan (CMTP) emphasized training; it was federally funded but no longer included capital grants for facilities and was restricted to adults only. New provisions were also introduced promoting worker mobility. Grants were available for relocation, job seeking and travel to seasonal and temporary work.

In the 1970s the persistence of unemployment and poverty particularly among disadvantaged youth, women, natives, the handicapped and residents of areas suffering high unemployment prompted a new interest in the management of unemployment and in the containment of potential crises. Training, counselling and relocation strategies proved inadequate and governments again resorted to job creation. In the 1950s they had funded winter-works programs to combat seasonal unemployment. In the 1970s Opportunities for Youth (OFY), a summer scheme for students, Local Initiatives Program (LIP) for winter unemployment, and Local Employment Assistance Program (LEAP) to aid the hard-core unemployed were introduced under the Job Creation Branch of the DMI. In 1975 a joint scheme with the provinces was added, the Community Employment Strategy. In addition, the federal and provincial governments attempted to stimulate activity in the private sector through a variety of incentives, eg, tax considerations, loan guarantees, direct grants and subsidies and infusions of equity. The government also reunited its labour-market and immigration branch with the UIC in 1976. The new department, Employment and Immigration, supervises the Canadian Employment and Immigration Commission, which is responsible for implementing programs and the insurance scheme. Under revisions to the Unemployment Insurance Act, insurance funds also became available for job creation and for work sharing. Young Canada Works (1976) and Canada Works (1976), with other youth- and student-employment programs, replaced OFY and LIP.

In 1982-83, 4.1 million people registered for employment at the 453 Canada Employment Centres (CECs) across the country, although this figure includes those who may register several times in a year. Temporary employment offices to service student and seasonal needs also existed. Employers registered 733 000 vacancies, which included casual, temporary and seasonal labour. The CECs made 2.2 million referrals resulting in 570 000 placements, 15% of them for casual labour. There were also special placements under the Farm Labour Pool and the Outreach program for disadvantaged workers.

The labour-exchange function has been declining fairly steadily in importance since the 1950s, but training has not. In 1982-83, 86% of the 272 000 students trained were enrolled in institutional training under the National Training Program, 14% in industrial training under the General Industrial Training Program and Critical Trade Skills Training. However, most vocational training in Canada occurs in post-secondary institutions; it is heavily subsidized by government and used disproportionately by youth of relatively high-income families. Industry is not generally satisfied with the quality of vocational training, but provides little substantial training itself for those who enter the labour market instead of advancing to post-secondary education. Total federal government expenditure on training in 1982-83 was $926 million, putting Canada ahead of most industrialized nations in the proportion of its gross national product devoted to occupational training. Mobility programs have played a considerably smaller role in manpower policy because high rates of unemployment are now country-wide; 1982-83 expenditures on worker relocation, grants for job seekers and for seasonal and agricultural work totalled $8.1 million. Immigration, which for most of Canada's history was a

significant labour-market policy tool, is now less important, although immigrants still fill a disproportionate number of job openings in certain skilled trades. PAUL PHILLIPS

Labour Relations refers to the relations between employers and employees. They are affected by a number of factors, including labour organizations, COLLECTIVE BARGAINING, LABOUR MARKET, government policy, the structure of the economy, LABOUR LAW and technological change. Because labour relations are commonly associated with unions, it is significant that in Canada, until the 1970s, a substantial number of unions and union members belonged to American-based industrial and construction unions. American employers are also influential — more than 4000 branch plants and subsidiaries of American corporations exist in Canada. During this century, labour relations in Canada and the US have been remarkably similar; a 1959 survey of 15 countries over more than 15 years described labour relations in the two countries as "a single system."

The outstanding feature of N American industrial relations, according to some observers, has been the unusually high incidence of STRIKES. Studies have also disclosed that the incidence of violence and illegality arising out of labour disputes has been much higher in the US and Canada than in other comparably industrialized countries — characteristics attributed to a few political and institutional factors that Canada, until the 1960s, shared with the US. They included the relatively recent development of large-scale "mass unionization," a considerable residue of tension and mutual hostility arising from the widespread, protracted and frequently violent opposition of employers to unions; intense organizational and leadership rivalries among unions; the highly decentralized structure of labour organization and collective bargaining in most industries; and the absence of a strong or dominant labour party capable of gaining power at the national level. Despite these broad similarities, however, labour relations in Canada have differed from those in the US in some important respects, which appear to have widened in recent years. For example, until the late 1950s the incidence of strikes in Canada was well below that of the US. Canada was less industrialized, with a smaller proportion of unionized workers. Until WWII only 25% of Canada's labour force was employed in industry and 50% in agriculture, but by 1951 only 10% were employed on farms, while 33% were involved in industry — 30% of whom were unionized. In the 1960s and 1970s the trade-union movement mushroomed dramatically once again with the growth of public-sector unions. By the early 1980s, 39% of non-agricultural workers in Canada were unionized.

The relative strength of labour in Canada was also affected by cultural and ethnic divisions among workers, particularly the formidable gap between Francophones and Anglophones, which was exemplified by the formation of the separate francophone Confederation of National Trade Unions. Pronounced geographic and political divisions have also precluded effective unionization and often set the interests of the workers in one region against those in another. For example, the interests of packinghouse workers in the food-processing industry in eastern Canada have often conflicted with those of their western counterparts, particularly regarding transportation, international trade and government subsidies. Politically, the labour movement has been decentralized since the turn of the century, when the Trades and Labor Congress, backed by the American Federation of Labor, evicted the militant KNIGHTS OF LABOR. Conflicts over opposing ideologies, programs and organizational objectives have continued to rage. Temporary alliances of one decade would give way to open hostility in the next. In the 1960s several unions now affiliated with the Confederation of Canadian Unions broke away from traditional American-supported organizations in a drive for national autonomy, although earlier the nationally based Canadian Seamen's Union had been overcome by the American-based Seafarer's International Union. Government intervention is another factor increasingly influencing labour relations. Since W.L. Mackenzie KING, as federal deputy minister, introduced the Industrial Disputes Investigation Act of 1907 to curb western Canada's militant coal-mine workers, governments in Canada have acted to maintain "law and order" and to protect employers' property and latitude of action rather than to protect the rights of employees to organize and bargain collectively. This tendency is evident in a history of expeditious resort to compulsory intervention, such as back-to-work legislation and binding arbitration, to settle disputes.

As far as employers are concerned, the Canadian situation differs from the American in that employers in most major industries in Canada have been relatively larger and more concentrated in their respective labour and product markets, and in earlier decades enjoyed relatively stronger bargaining power vis-à-vis organized labour. Where they have operated as subsidiaries or "branch plants," their strength has increased because their freedom to invest selectively and to relocate physically have provided them with a definite advantage in their labour relations.

Labour relations changed dramatically during and after WWII, and Canadian and American positions were, in some respects, reversed. Union organization and membership grew more rapidly in Canada, and for the past several years union members have comprised a considerably larger percentage of the labour force. Since the 1960s the incidence of industrial conflict has also risen far more rapidly in Canada, and has remained at a considerably higher level for almost 20 years. A rapidly growing but highly erratic and irregular wave of industrial disputes developed in Canada from the mid-1960s to the mid-1980s, reaching record peaks in the numbers of strikes, workers involved and person-days lost in 1965, 1966, 1968, 1972, 1974, 1975 and 1976 (the all time high) and 1980 and 1981. During the past 2 decades Canada shared with Italy the rather dubious distinction of having the world's highest annual average time loss per 1000 workers, with the US a distant third. Illegality and violence arising from labour disputes also increased in Canada during this period, particularly in Ontario and Québec, in a pattern reminiscent of the 1930s and earlier. As a result, and in response as well to the emergence of powerful public-sector unions, governments in Canada severely restricted organized labour. Strikes were banned in essential services, and in 1975 the federal government imposed a mandatory incomes policy administered by an Anti-Inflation Board. "Six and five" legislation followed in early 1980s, and various provincial governments imposed wage-guideline policies.

Labour relations have also been affected by the structure of the Canadian economy. During the 1960s and 1970s Canada's LABOUR FORCE grew more rapidly than that of any other industrial country and was accompanied by and dependent upon an unusually high rate of capital investment, particularly by American corporations. Postwar economic expansion, however, produced an economy heavily reliant upon primary-resource extraction and export, susceptible to "boom-and-bust" cycles. Canadian governments, owing partly to the inability of a highly decentralized federal system of government and partly to tradition, have not generally introduced measures to promote long-term stability or planning in the economy. Instability, inflation and unemployment have generated corresponding instability in labour relations. The concentration of strikes in cyclically sensitive industries seems to indicate a close relationship between economic instability and industrial conflict. Over the past 2 decades, only 6 industries, employing less than 15% of the labour force, accounted for more than 50% of all person-days lost and for more than 66% of the unusually large and protracted strikes. In order of percentage of time loss from strikes, they were construction, mining and smelting (particularly nickel), and (in manufacturing) transportation equipment (mainly automobiles), primary metals (mainly iron and steel) and wood products (mainly lumber and pulp and paper).

A by-product of Canada's rapid but unstable pattern of economic growth and one particularly provocative of industrial conflict has been the problem of wage disparities. During periods of rapid expansion, greater disparities have tended to develop more within the general wage structure of Canada than within that of other industrial countries, primarily because of widely unequal rates of growth and profitability among different industries and regions and because of wide differences in bargaining power among unions. In Canada's very decentralized labour movement, collective bargaining is highly localized and competitive. Three-quarters or more of all collective agreements are negotiated with individual employers, and multi-employer bargaining is usually local or district wide. The resulting differences in wages and fringe benefits have made it difficult for unions to achieve their general goal of parity among workers and have tended to provoke widespread conflict.

The problem of unequal growth during the 1960s and early 1970s particularly affected the public sector, partly because of growing intervention of government at all levels in disputes and strike settlement procedures in other industries under the aegis of postwar labour legislation. The (implied) responsibility of governments for the gains in wages and benefits in the private sector and the wage lag in various public and publicly controlled sectors has resulted in the formation of militant unions, the enactment of new legislation providing for union certification and collective bargaining, and numerous large and protracted strikes among public-service workers. The onset of a severe recession and serious unemployment in the 1980s greatly weakened the bargaining power of unions. In the period 1983-84 strikes generally reached the lowest levels since the early 1960s. STUART M. JAMIESON

Reading: Stuart M. Jamieson, *Times of Trouble* (1968) and *Industrial Relations in Canada* (1973).

Labrador, mainland section of the province of NEWFOUNDLAND, lies almost entirely N of the Island, 20 km across the Strait of Belle Isle, and some 800 km S of Greenland. The long (1125 km) Labrador coast is indented by innumerable fjords, bays and inlets, notably HAMILTON INLET (Lk MELVILLE), which penetrates the rocky interior for over 200 km. Geologically, Labrador is part of the Canadian SHIELD, a massive granite plateau rising some 300 m from sea level to the interior watershed. Most of coastal and northern Labrador is bare rock and barren tundra, but river valleys S from Lk Melville and the deep interior contain valuable forest reserves. The TORNGAT MTS of the far N rise in splendid isolation — the highest peaks E of the Rockies. Though in the same latitude as the British Isles, Labrador's forbidding terrain and extreme climate support only sparse settlement. The Labrador Current, sweeping S from arctic waters, chills the coast and clogs harbours with ice from Dec to May.



Cape Mugford, Labrador. Labrador contains some of the most rugged and splendidly isolated scenery in N America (*photo by John deVisser*).

The primary settlements in 1983 were Cartwright (658), Rigolet (271), Makkovik (347), Postville (223), Hopedale (425) and NAIN (938) S to N along the coast; North West River (515) and HAPPY VALLEY - GOOSE BAY (7103) on Lk Melville; and Churchill Falls (936), Wabush (3155) and LABRADOR CITY (11 538) in the interior.

The Labrador coast has been occupied for a very long time. Evidence of Maritime Archaic Indian occupation, dating back 8000 years, has been found at L'ANSE AMOUR BURIAL SITE in the S. Labrador was likely the "Markland" of the Viking sagas, which described the anomalous silvery beaches near Groswater Bay. BASQUE fishermen established a great whale fishery, centered at RED BAY on the NE coast of the Str of Belle Isle, even before Jacques CARTIER explored the coast in the early 16th century. Maritime Archaic culture was displaced about 4000 years ago by southward expansion of Paleoeskimos from the Arctic, who were in turn displaced by the ancestors of the MONTAGNAIS-NASKAPI and Inuit. Portuguese explorers were active along the coast and the name "Labrador," which was first applied to the coast of Greenland, likely derives from the Portuguese explorer João FERNANDES, a *lavrador* or "landholder" in the Azores. Early European occupation was entirely focused on the coastal fishery and was fiercely opposed by the Inuit to the N and the Naskapi in the S. Control of the coast was contested by the British and French, but control by either was tenuous. In the early 19th century, thousands of New England fishermen and whalers descended on the coast annually.

Settlement was haphazard, begun by a few fishermen who stayed on each winter (called LIVEYERS), while thousands of "stationers" (those who fished from land bases in summer) and "floaters" (those who used schooners as their bases) came and went with the fishing season. George CARTWRIGHT established a business at Cape Charles in 1770 and persevered for 16 years. The Moravians set up a mission at Nain in 1771 that has been in continuous operation since. The HBC established its first post at Rigolet in 1834, another at North West River in 1836 and a third at Cartwright. HBC employee John MCLEAN explored the interior in 1839, but the fur trade remained marginal in Labrador. In the 1890s geologist A.P. LOW reported the massive iron-ore deposits of the interior and in 1937 and 1939 Finnish geographer V.A. Tanner compiled the most detailed designation of Labrador to date. The small coastal settlements of Labrador were among the most isolated, deprived and neglected in the world. With the exception of the Moravian mission at Nain, Labrador was without medical care, schools or adequate housing until the heroic efforts of Wilfred GRENFELL in the 1890s. Grenfell and his associates established hospitals, schools, orphanages and co-ops — financed by fund-raising tours around the world.

The break with the traditional dependence on the fishery alone came during WWII when the airport at Goose Bay was built as a staging point for FERRY COMMAND. It later continued as a USAF base and by the early 1950s was the second-busiest airport in the world. Happy Valley grew up nearby. Meanwhile the completion of the monumental Québec North Shore and Labrador Ry (1954) opened the vast iron reserves of the interior, and BRINCO tapped the huge power of the Churchill R at CHURCHILL FALLS — the second-largest hydroelectric development in Canada.

The LABRADOR BOUNDARY DISPUTE was one of the most celebrated legal cases in British colonial history. Though Newfoundland's claim to the watershed of all rivers flowing into the Atlantic Ocean is recognized in the Constitution Act, many Quebecers still consider Labrador part of "Nouvelle-Québec." JAMES MARSH

Labrador Boundary Dispute The territorial limit between Québec and Newfoundland in the LABRADOR peninsula, at over 3500 km long, is the longest interprovincial boundary. It has not yet been surveyed and marked on the ground. A dispute concerning the ownership of Labrador arose in 1902 when the Québec government protested NEWFOUNDLAND's issuing a timber licence on the CHURCHILL R. Two years later Québec asked Ottawa to submit the controversy to the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in London. This reference to an outside impartial body was appropriate, since Canada and Newfoundland were separate members of the British Empire and neither could have settled the issue through its own courts. Only Canada and Newfoundland were admitted as parties to the case, and Québec had no direct representation.

The dispute dragged on, and in 1922 Canada and Newfoundland agreed to ask the Privy Council to decide only "the location and definition of the boundary as between Canada and Newfoundland in the Labrador Peninsula under the statutes, orders-in-council and proclamations." The panel of 5 judges was confined to this question; it could not create a new boundary or suggest a territorial compromise. The main point in the case was the meaning of "coast," for that was how Labrador was legally described. Newfoundland traced its claim of ownership to the commission issued to Gov Thomas Graves in 1763, which extended his jurisdiction to the "Coasts of Labrador." Canada argued that a royal proclamation later that year merely placed the territory under the governor's "care and inspection" for fishing purposes. In 1774, it was pointed out, Labrador was transferred by statute to Québec, but in 1809 it was reannexed to Newfoundland; in 1825 the coast of Labrador W of a line extending due N from the bay of Blanc-Sablon to the 52nd parallel of latitude was once again restored to Lower Canada [Québec].

The judicial committee refused to accept Canada's contention that "coast" meant a strip of land one mile (1.6 km) wide along the seashore. It found that the evidence supported Newfoundland's inland claim as far as the watershed line or height of land. The court's decision in Mar 1927 settled the boundary in its present location. When Newfoundland joined Confederation in 1949, its boundary in Labrador was confirmed in the Terms of Union (now the Newfoundland Act), enshrined in the CONSTITUTION ACT, 1982. A 1971 Québec royal commission decided that Québec's case against the 1927 boundary was not worth pursuing; nevertheless, in the early 1980s the province did not consider the issue to be settled. ALEC C. MCEWEN

Reading: Alec C. McEwen, "The Labrador Boundary," *Canadian Surveyor*, vol 36, no 2 (June 1982). F.W. Rowe, *A History of Newfoundland and Labrador* (1980).

Labrador City, Nfld, Town, pop 11 583 (1981c), inc 1961, is located in western Labrador near the Québec border and the base of the Wapussakatoo Mts, adjacent to one of the richest iron-ore formations in Canada. The ore was discovered in 1892, and the mineral rights were acquired in 1936 by the Iron Ore Co of Canada (IOC). In 1958 formal mining operations began at Carol and Smallwood Mines, and by 1959 construction of a planned townsite had begun by the shore of Carol Lk. In 1960 a railway linked Carol Lk to Québec. When incorporated in 1961, Carol Lk was renamed Labrador City. By 1968 the town, with a population of nearly 8500, was the largest in Labrador. Constructed by IOC, by 1960 it had an airstrip, a hospital and numerous churches and schools. Because Labrador City's economic fortunes are tied to those of world markets for iron ore, employment has fluctuated accordingly. J.E.M. PITT AND R.D. PITT

Labrador Highlands extend 400 km S from Cape Chidley, at the northern tip of LABRADOR, almost to NAIN. The uninhabited highlands contain 3 mountain groups: the TORNGAT, Kaumajet (Inuktitut, "shining top") and Kiglapait ("sawtooth"). The highest summits are Mt Caubvick (1738 m) in the Torngat, Brave Mt (1220 m) in the Kaumajet and Man O'War Peak (1050 m), which rises just S of the main range of the Kiglapait. Formed of ancient Precambrian rocks and heavily glaciated in recent times, the mountains support more than 70 small glaciers, the southernmost in eastern N America. Bold cliffs fall sheer to the LABRADOR SEA or the narrow water of FJORDS, while the valleys support only arctic vegetation and wildlife. R.J. ROGERSON

Labrador Inuit, who sometimes refer to themselves as Labradormiut, have occupied most of the Atlantic coast of LABRADOR during the historic period. In early historic times they ranged even farther to the south, crossing occasionally to northern Newfoundland and travelling far into the Gulf of St Lawrence. However, the nature and extent of former Inuit presence in southern Labrador is uncertain. The Inuit ap-

pear to have made contact with European explorers, fishermen and whalers in the south of Labrador by the late 16th century. In spite of frequent misunderstanding and bloodshed during the first few centuries of contact, an intermittent trade was already well established when Britain acquired Labrador in 1763. The Inuit had obtained a wide variety of European goods, including wooden sailing boats, in exchange for their baleen (horny plates in the jaws of certain whales), sealskins and blubber. Until they obtained firearms in the 1780s, the Labrador Inuit tried to avoid contact with their sometimes hostile Indian neighbours, the MONTAGNAIS - NASKAPI, who had been armed earlier by French fur traders.

The traditional Labrador Inuit, who numbered about 1500 during the late 18th century, derived most of their livelihood from the sea. While coastal waters remained unfrozen (mid-June to mid-December), the men hunted walrus, beluga and seal from their KAYAKS. In late autumn they hunted the giant Greenland whale from their open skin-covered UMIAKS. During winter they hunted seals. Large winter houses, made of sod, stone, timber and whalebones, were usually shared by several families.

Most Labrador Inuit now live in NAIN, Hopedale and Makkovik, settlements which were founded by Moravian missionaries in 1771, 1784 and 1896. Since WWII some have moved to the inland communities of Happy Valley and North West River. Those who had migrated even farther to the south in earlier times were decimated by various contagious diseases, and their survivors have been largely absorbed through intermarriage with European settlers. As a result of government relocation projects in the 1950s there are no longer any permanent Inuit settlements on the coast N of Nain. Nevertheless, many people still travel north from Nain each summer to fish for arctic char, one of the main sources of earned income for the modern Labrador Inuit. *See* NATIVE PEOPLE: ARCTIC.

J. GARTH TAYLOR

Reading: Carol Brice-Bennett, ed, *Our Footprints Are Everywhere: Inuit Land Use and Occupancy in Labrador* (1977).

Labrador Sea is the body of water between Greenland and the coast of Labrador. It is 3400 m deep and 1000 km wide where it joins the N Atlantic and shallows to less than 700 m where DAVIS STR separates it from BAFFIN BAY. The NW Atlantic Mid-Ocean Channel, a 100-200 m deep channel some 1.5-2.5 km wide in the seafloor, follows the axis of the Labrador Sea, some 3800 km from the mouth of HUDSON STR, southward into the N Atlantic. The sea's circulation is anticlockwise. At the surface the West Greenland Current transports warmer, more saline water northward, while the Labrador Current transports cold, less saline water southward. At a depth of 2500-3000 m the dense outflow from the Greenland Sea flows around the basin and then southward as a bottom boundary current. A water mass, the Labrador Sea water, is formed in the western Labrador Sea by wintertime cooling and spreads into the NW Atlantic at depths of 1500-2000 m.

The northern and western Labrador Sea is ice-covered from Dec through June. This pack ice is the whelping and breeding area for harp and hooded seals in early spring. The Labrador and Greenland banks are commercially fished for cod. As well, a shrimp fishery has developed in recent years. The Labrador Sea is a feeding ground for ATLANTIC SALMON and several species of marine mammals. Icebergs, carried southward in the Labrador Current, are an impediment to the exploitation of recently discovered natural-gas fields off Labrador.

ALLYN CLARKE AND KEN DRINKWATER

Labrador Tea (*Ledum groenlandicum* and *Ledum palustre*), also called Hudson's Bay or Indian tea, shrubs of the heath family (Ericaceae). They grow up to 2 m high in wet, acidic soil throughout much of northern Canada and in peat bogs to the south. Some 4 species of genus *Ledum* exist worldwide, 3 in Canada. The third, *L. glandulosum* (trapper's tea), should not be used for tea. Labrador tea leaves are elliptical, up to 6 cm long, with revolute (backward-rolled) margins and dense, whitish to rust-coloured fuzz on the lower surfaces. The flowers are white and clustered. The aromatic young twigs, leaves and flowers have been used, fresh or dried, as tea by native peoples and settlers. "Tea" should be weak; a small handful of leaves steeped in boiling water for 5 min yields a pleasant beverage. *See* PLANTS, NATIVE USES.

NANCY J. TURNER

Labrosse, Paul-Raymond Jourdain, *dit,* joiner-sculptor, organ builder (b at Montréal 20 Sept 1697; d there 8 June 1769). He was hired in 1721 to repair an old organ and build a new 7-stop instrument for Notre-Dame in Québec. The leading Montréal joiner-sculptor from 1730 to 1760, he trained at least 3 apprentices. He sometimes worked as a joiner, but was usually employed as a wood sculptor by a dozen Montréal-area parishes, creating for them retables, tabernacles and statues as well as various liturgical accessories. Few of his works remain. One is the richly ornamented tabernacle (1741) originally in the old Longueuil, Qué, church, now in the National Gallery of Canada. There is also the vigorous *Christ* (1741) in Notre-Dame, Montréal, and some small baroque-style statues.

JOHN R. PORTER

Lac La Ronge, 1414 km², elev 364 m, is located in the rugged, sparsely populated SHIELD country of central Saskatchewan, 235 km N of Prince Albert. About 58 km long and studded with many islands, it drains NE via the Rapid R into the CHURCHILL R. When the first Europeans arrived, the area was inhabited by Cree. Peter POND built a fur-trade post in 1781; the village of La Ronge on the W shore is one of the oldest settlements in Saskatchewan. Today the area is a tourist centre catering to campers, fishermen and hunters. The name probably comes from the French verb *ronger,* "to gnaw," referring to the local beaver population.

DANIEL FRANCIS

Lac-Mégantic, Qué, Town, pop 6119 (1981c), inc 1912, is located on the NE shore of Lac MÉGANTIC, 85 km E of SHERBROOKE. On nearby Mont Mégantic (1100 m) are located the oratory of St-Joseph de la Montagne, a pilgrimage site built in 1855, and an astronomical OBSERVATORY. The observatory, with its 1.6 m diameter telescope, is shared by Université de Montréal and Laval. The Rivière CHAUDIÈRE starts in Lac-Mégantic, the name of which in Abenaki means "the place of fish." The river was a traditional Indian route. The first settlers (SCOTS), arrived in Lac-Mégantic in the mid-19th century. After 1895 a branch of the Quebec-Central rail line linked Lac-Mégantic to LÉVIS. Today the city, a commercial and industrial crossroads and tourist site, is a service centre for the surrounding rural region and features the large Baie des Sables recreational complex. The Manesokanjik museum traces local history.

CLAUDINE PIERRE-DESCHÊNES

Lac Ste Anne, Alta, UP, pop 34 (1981c), is located 75 km NW of Edmonton on the lake of the same name. The Rev Jean-Baptiste Thibault, an Oblate priest, named the lake for his patron, Ste Anne de Beaupré, and the shrine became a PILGRIMAGE destination in 1889, when rain fell following prayers. Thousands still visit the shrine on the feast day of Ste Anne (July 26), and bathe in the lake, which is believed to have curative powers.

ERIC J. HOLMGREN

Lacewing, common name for small, fragile INSECTS of the 2 most common families (Chrysopidae, green lacewings; Hemerobiidae, brown lacewings) of order Neuroptera. Most green lacewings have golden or copper eyes and are found on foliage. They are poor, erratic flyers and strongly attracted to light. Some 25 species occur in Canada, the most common (*Chrysopa carnea* and *C. oculata*) in all provinces and territories. Eggs are laid on foliage or other objects, singly or in groups of 20 or more. Larvae are voracious predators, seizing small insects or arachnids with pincerlike jaws. Thus the possibility of rearing and releasing large numbers for biological control of INSECT PESTS has been studied. When fully grown, larvae spin cocoons, usually in secluded places. Brown lacewings resemble greens but are generally smaller and less common. They frequent wooded areas. About 23 species are found in Canada; the most common, *Hemerobius humulinus,* occurs across country. Beaded lacewing (family Berothidae) and giant lacewing (Polystoechotidae) have one species each in Canada: *Lomomyia occidentalis* (southern BC), and *Polystaechotes punctatus* (BC, Alberta, Ontario and Quebec).

J.E.H. MARTIN

Lachance, Louis, priest, philosopher (b at St-Joachim de Montmorency, Qué 18 Feb 1899; d at Montréal 28 Oct 1963). His *Nationalisme et religion* (1936) provided the base for a nationalism based on reason — distinct from that advocated by Lionel GROULX which was based primarily on feeling. His pioneering *Philosophie du langage* (1943) helped give Thomism a contemporary relevance and direction. Among philosophers, he is best known for *Le Droit et les droits de l'homme* (1959) which develops the theory that human rights are meaningless if seen merely in the context of the individual and his desires. They depend upon the community and must be related to the common good and to basic social responsibilities.

Lachance studied at the Petit Séminaire de Québec and then joined the Dominican order at St-Hyacinthe, the traditional stronghold of Québec Thomism. He studied and taught in Ottawa until 1936, apart from the years 1929-31 when he studied in Rome. in 1936 he returned to Rome to teach at Angelicum U. His career there was cut short by WWII and he returned to Canada as a priest, and in 1943 moved to U de M as professor of philosophy.

LESLIE ARMOUR

Lachine, Qué, City, pop 37 521 (1981c), inc 1907, is located on the S bank of Montréal I and forms part of the MONTRÉAL urban community. In 1669 Cavelier de LA SALLE travelled inland in search of China, whence the derisive nickname Lachine applied to his land grant. In 1689 it was the site of a battle between the French and IROQUOIS in which the Indians killed 24 settlers and took more than 60 prisoners (*see* LACHINE RAID). Lachine remained the nerve centre in the Canadian FUR TRADE for several decades, and the HBC maintained a trading post there for many years. The development of the Lachine Canal in the 19th century, the establishment of the MONTREAL AND LACHINE RAILROAD in 1847, and the expansion of the trucking businesses in the 20th century gave Lachine a major role in the trade network extending to SW Canada and the US. The town's industrialization, one of the most rapid in Canada, attracted a large working-class population. Today, its economy is dominated by steel plants and by the electrical-appliance and electronics industries.

SYLVIE TASCHEREAU

Lachine Raid French westward expansion in the 1670s and 1680s cut off the IROQUOIS Confederacy from new sources of beaver and threatened New York's fur trade. As long as France and England were at peace, little could be done to impede French traders, but after the Glorious Revolution of 1688-89, New York authorities could encourage the Iroquois on the warpath. On the morning of 5 Aug 1689 some 1500 warriors fell on the little settlement of Lachine just W of Montréal, killing or capturing nearly 100

settlers. The ferocity of this attack terrorized the inhabitants of the Montréal region, who were to suffer many more such raids in the following decade. *See* IROQUOIS WARS. JOHN A. DICKINSON

Lachute, Qué, City, pop 11 729 (1981c), inc 1885, is located on the Rivière du Nord where the first Laurentian foothills meet the plain of Montréal. Having developed through its close connection with the paper and textile industries, its economy is now increasingly diversified. The first settlers, who arrived in 1789, came from Jericho, Vermont. Early in the 19th century, population grew so rapidly that the settlers needed a flour mill to grind their grain, and built one at the foot of a rapids that stretched across the Rivière du Nord at a spot subsequently called "Lachute." GILLES BOILEAU

Lacombe, Albert, Oblate priest, missionary (b at St-Sulpice, LC 28 Feb 1827; d at Midnapore, near Calgary 16 Dec 1916). A successful missionary to the CREE and BLACKFOOT, Lacombe used his trace of Indian blood to gain an entry to the hearts and minds of the Fort Edmonton Métis and Indians in 1852 when he came to serve them. In due course, he either founded or ministered at the Alberta missions of Lac Ste Anne, St Albert (1861) and St-Paul-des-Cris (Brosseau) 1865. After 7 years as a travelling missionary among the Indians, he moved to Manitoba in 1872 and took over St Mary's parish, Winnipeg. On his return to Alberta in 1882, he became priest of Calgary's St Mary's parish and also served in southern Alberta at Fort Macleod and from his "Hermitage" at Pincher Creek. In 1883, when the CPR came into conflict with the Blackfoot, who threatened to block the route across the reserve, Father Lacombe successfully negotiated on behalf of the railway with Chief CROWFOOT. In 1894 Lacombe was principal of an industrial school at Midnapore; he initiated the colony of St-Paul-des-Métis in 1895, and in 1909 he started the Midnapore Old Folks' Home. As the church's spokesman for the prairies, he played a significant part in influencing government policy, as well as helping settle the prairies. His love for the native people never faded. Called by the Indians "The Man of the Good Heart," he wrote a Cree grammer and a dictionary. J.G. MACGREGOR

Reading: J.W. Grant, *Moon of Wintertime* (1984).

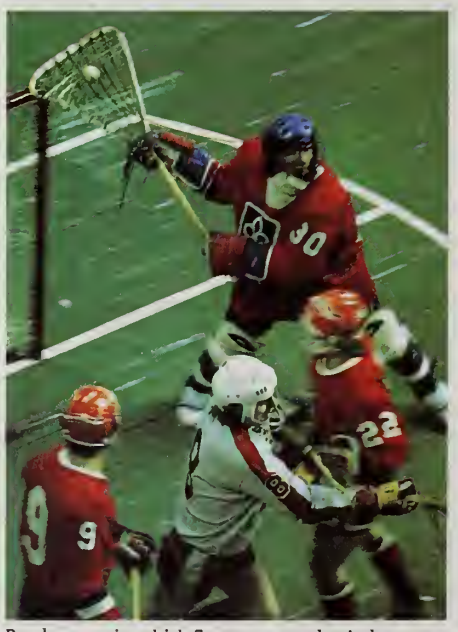
Lacroix, Richard, printmaker, painter, sculptor (b at Montréal 14 July 1939). He learned etching, lithography, silk-screen and block printing in Montréal with Albert DUMOUCHEL. Under an Arts Council of Canada grant (1961) he went to Paris, where he studied with Stanley Hayter at Atelier 17 and learned that studio's method of multicolour printing from one plate, a technique unknown in Canada. Shortly after his return to Montréal in 1964, Lacroix set up his own workshop and quickly drew other artists eager to learn the new techniques. Committed to reaching the widest audience possible, he established La Guilde graphique (1966) to generate public interest by distributing prints. In 1964 he and several other artists had formed Fusion des arts in an attempt to reflect the concerns of Quebec society through a Québec popular art. Fusion's activities were later politically scrutinized, resulting in police raids on its offices and the loss of a group commission for Expo 67. Lacroix himself provided a kinetic sculpture and produced a show for this event.

Lacroix's prints are often highly organized geometrics or carefully orchestrated abstractions of great technical expertise. By pioneering colour printing in intaglio, working to establish the print as an "original" work of art and attempting to make the public more aware of the print medium, he has greatly increased respect for Canadian prints. *See* PRINTMAKING.

CAROL ANN POPE

Lacrosse originated among the Algonquin tribes of the St Lawrence Valley in eastern Canada. For this reason, it is often described as the oldest organized sport in N America. The game has 2 forms. Field lacrosse is played outdoors on a ground that is 110 by 64 m, by teams of 10 players each. A hard rubber ball is passed and thrown between players by means of large, curved sticks with a pocket of netting or webbing. The object is to score points by tossing the ball into the opposing team's goal. The field game is played in England, Australia and New Zealand and by colleges along the eastern seaboard of the US. Although this form is Canadian in origin, box lacrosse or "boxla" is more commonly played in Canada. In the latter form 7-man teams play on an indoor surface the size of a standard hockey arena.

Historians have recorded that the French missionary Jean de BRÉBEUF first saw the game in 1683 and called it *la crosse* because the sticks reminded him of a bishop's crozier or *crosse*. The Indian term for the original game was *baggataway*, derived from the Ojibwa word *pagaadowewin* or "ball." Thus, white men named the game from the stick used, while the Indians named it after the ball. Lacrosse had an important role in Indian society, as it held religious significance and functioned in the training of young warriors. Since wagers were frequently taken on the outcome of matches between tribes, it also could play an economic role, raising or lowering a tribe's fortunes. Indian baggataway was a rough melee. Matches could last 2 or 3 days and goals, marked by bushes or trees, could be 450 m or more apart. The arrival of French and later English fur traders and the consequent opening of trade routes throughout N America may have helped spread the game to other Indian nations. Perhaps the most famous incident in the game's history occurred in 1763. Ojibwa used the game as a cover to gain entry to Ft Michilimackinac and massacred the English soldiers camped inside. In 1834 a team of Caughnawaga first demonstrated the game before a white audience on the St Pierre racecourse in Montréal. The first all-white lacrosse team was formed in 1842 as part of the Montreal Olympic Athletic Club. Next year, the first game between whites and Indians took place. Until 1867 lacrosse's growth was slow and uneven and largely confined to Montréal and the towns of the Ottawa Valley.



Box lacrosse, in which 7-man teams play indoors on a surface the size of a hockey arena, is the form of lacrosse now most commonly played in Canada (*photo by Toby Rankin/Masterfile*).

One of the game's primary exponents at this time was George BEERS, who in 1860 at age 17 had been goalkeeper in a match played before the Prince of Wales. That same year, he set down lacrosse's first code of rules. A strong Canadian nationalist, Beers saw lacrosse as a way to encourage fitness and bravery among the young men of the new nation. In Sept 1867 he organized a convention in Kingston, Ont, at which the National Lacrosse Assn was formed. Beers was an ardent promoter of the sport and it was he who gave rise to the enduring misconception that lacrosse is the officially recognized national game of Canada. If lacrosse is not by law Canada's national game, it can be said that by 1889 its popularity was such that it was in fact the national game. Through the 1880s, it enjoyed sustained growth, spreading from coast to coast, and by 1900 its position seemed secure. It was also beginning to be played outside of Canada. In 1868 the first international match had been held in Buffalo, NY. Tours of Canadian teams to England were organized in 1876 and 1883 to introduce the game there. In 1901 Gov Gen Lord Minto presented the Minto Cup for the senior amateur Canadian championship. Within 3 years it had become emblematic of the professional championship and, in 1910, the gold Mann Cup was donated for the Canadian amateur title. Although Canadian teams won Olympic gold medals in 1904 and 1908, the sport during this period was embroiled in unending disputes over professionalism. Finally, in 1912, the Amateur Athletic Union of Canada stepped in to form the Canadian Amateur Lacrosse Assn. By then, lacrosse was being played by only a small portion of the population. It had no minor system to develop young players and was not played in the country's schools, as was FOOTBALL. Following WWI, BASEBALL replaced lacrosse as a summer sport. The automobile's growing popularity affected the game as well, as it took potential players and spectators out of the cities on weekends and holidays. After struggling with these problems, the Canadian Amateur Lacrosse Assn decided to adopt box lacrosse as its official game. It was hoped this move would increase the game's popularity, as well as make use of unoccupied arenas during the summer months. An attempt was made to start up a professional lacrosse league in Montréal and Toronto, but by 1937 the professional game was gone and the Minto Cup was placed in junior competition.

The game is now largely played on Canada's West Coast and in medium-sized towns in Ontario. In fact, both national championships are held alternately in BC and Ontario. The switch to box lacrosse also effectively isolated the Canadian game from international competition. Eventually, supremacy by Canadians in the game they invented was severely challenged. In 1967, a world field lacrosse championship was held in Canada as part of the centennial celebrations. The US won. The best Canada could do at the 1974 world lacrosse series in Australia was a 2nd-place tie. In 1978, however, at the first true world championship, in Stockport, Eng, the Canadian team won after a dramatic last-minute goal in the final game. In 1982 the US took the title, while Canada finished third.

J. THOMAS WEST

Reading: W.G. Beers, *Lacrosse: The National Game of Canada* (1869); C. McNaught, *Birth and Development of Canada's National Game* (1873); S.F. Wise and D. Fisher, *Canada's Sporting Heroes* (1974).

Lady Byng Trophy is awarded annually to the NATIONAL HOCKEY LEAGUE player chosen by hockey writers as best combining sportsmanship and skill. It was first presented in 1925 by Lady Byng, wife of the governor general. After Frank BOUCHER won the trophy 7 times, he was given it to keep, and another was donated to the league. JAMES MARSH



A species of orchid, the pink lady's slipper (*Cypripedium acaule*) is the floral emblem of Prince Edward Island (*photo by Mary W. Ferguson*).

Lady's Slipper, common name for some members of the ORCHID family in which modified petals (labella) fold inward to make the toe of the "slipper." Insects must pass through the structure to obtain nectar, pollinating the plant in the process. Only the genus *Cypripedium* is hardy enough to withstand the Canadian climate. Its 50 species are scattered throughout northern temperate regions of America and Eurasia. Of the 13 N American species, 8 are native to Canada. The pink or stemless lady's slipper (*C. acaule*), also known as moccasin flower, has 2 leaves at the base of the plant and produces a single flower. The 5 cm long slipper is split along its length. This spring-flowering plant grows in moist places, preferably in acidic soil, from Newfoundland to Manitoba. The lady's slipper was selected (1947) as the PROVINCIAL FLORAL EMBLEM of PEI. The showy lady's slipper (*C. reginae*) was chosen first but, because it is rare, was replaced in 1965 by the pink lady's slipper. As it is difficult to grow, the lady's slipper should not be disturbed in its native stands. The sedative qualities of a root infusion of yellow lady's slipper (*C. calceolus*) or of moccasin flower were known to Canadian native people. *See* PLANTS, NATIVE USES.

CÉLINE ARSENEAULT

Ladysmith, BC, Town, pop 4558 (1981c), inc 1904, is located on the E coast of VANCOUVER I, 95 km N of Victoria. It is situated on Oyster Harbour on the northern edge of a lucrative farming area. Indians were attracted here by the abundance of oysters. The area's COAL mines and Ladysmith's fine harbour spurred development in the late 1890s. Initially designed by Premier James DUNSMUIR as a recreation area and dormitory for miners, it was named after the relief of Ladysmith in the SOUTH AFRICAN WAR. In the 1930s lumbering became the economy's mainstay. Commercial fishing is also important, and tourism is developing as an industry.

ALAN F.J. ARTIBISE

Lafitau, Joseph-François, priest, Jesuit missionary, legal philosopher (b at Bordeaux, France 1681; d there 3 July 1746). He was the discoverer of GINSENG in N America, and his landmark study of the laws and customs of the IROQUOIS, *Moeurs des sauvages amériquains, comparées aux moeurs des premiers temps*, was published in 4 vols in Paris in 1724, subsequently translated into Dutch and German, and even circulated in China. Stationed at Sault-St-Louis [Caughnawauga] in NEW FRANCE by his Jesuit superiors in 1713, Lafitau spent 5 years observing the customs of the Iroquois with a view ultimately to illuminating those of the ancient civilizations he had studied at several European universities through comparison and contrast with Iroquois practices. *Moeurs*, the result of this empirical ethnography, bears a striking resemblance to philosopher Montesquieu's famous *De l'esprit des lois*, published 28 years later, although Montesquieu did not cite Lafitau. Largely ignored by other Enlightenment thinkers, this early philosopher has only received prolonged attention in the 20th century, prinicipally as a result of the favourable review of his work by such contemporary historians of ideas as Arnold Van Gennep, Gilbert Chinard, Alfred Métraux and Peter Stein.

G. BLAINE BAKER

Laflamme, Joseph-Clovis-Kemner, priest, educator, scientist (b at St-Anselme, LC 18 Sept 1849; d at Québec C 6 July 1910). After studying at the Séminaire de Québec and later spending periods at Harvard and in Europe, Laflamme became professor of geology and mineralogy at Laval in 1870. He also taught physics 1875-93. From 1880 on, he was given several assignments to conduct explorations in Québec on behalf of the GEOLOGICAL SURVEY OF CANADA. Despite his contributions in this field, he is better known for his activities in education and in the dissemination of scientific knowledge. A founding member of the RSC, he became its president in 1891. In 1893 he was appointed rector of Laval. Through his lectures, science manuals and numerous newspaper articles, Laflamme made French Canada aware of the major scientific discoveries of his era, particularly the new uses of electricity, the telephone and X rays. At the end of his life he was unanimously recognized as the leading scholar of French Canada.

RAYMOND DUCHESNE

Laflèche, Louis-François, Roman Catholic bishop (b at Ste-Anne-de-la-Pérade [La Pérade, Qué] 4 Sept 1818; d at Trois-Rivières, Qué 14 July 1898). After a diversified career as missionary to RUPERT'S LAND (1844-56), professor and administrator of the Collège de Nicolet (1856-61) and diocesan bursar (1861-66), he became bishop of Trois-Rivières (coadjutor, 1867-70; titular, 1870-98). A faithful disciple of Mgr Ignace BOURGET, he was a member of the intransigent Ultramontane group that battled liberalism and opposed Archbishop E.-A. TASCHEREAU and his allies over the Programme catholique, the university question, the issue of undue clerical influence in electoral campaigns and the reform of the CIVIL CODE; after 1876 he was the recognized and unyielding leader of the group. Despite his weakened standing within the office of the archbishop and in Rome he again took up the cudgels over the MANITOBA SCHOOLS QUESTION and was supported by most Québec bishops. When the pope refused to condemn the compromise policy of Wilfrid LAURIER, Laflèche acquiesced and until his death devoted himself to his religious duties. His ideas, summarized in his *Quelques considérations sur les rapports de la société civile avec la religion et la famille* (1866), had a long-lasting influence on nationalist and Catholic circles in Québec. *See* ULTRAMONTANISM.

NIVE VOISINE

Reading: Nive Voisine, *Louis-François Laflèche, deuxième évêque de Trois-Rivières* (1 vol to date, 1980).

Lafleur, Guy Damien, hockey player (b at Thurso, Qué 20 Sept 1951). His outstanding 1971 junior exploits (130 goals and the Memorial Cup for his team, the Québec Remparts) made him a much heralded rookie with the MONTREAL CANADIENS. In his first 3 professional seasons Lafleur struggled to meet the high standards expected of him, but in 1975 he turned his career around dramatically. Playing bareheaded in the era of the helmet, his streaming hair accented a fluid skating style that, along with instinctive playmaking and an accurate shot, carried him to 6 consecutive 50-goal seasons and NHL all-star selections (1975-80). He won the HART TROPHY 1977-78, the ART ROSS TROPHY 1976-78, and while contributing to Montreal's STANLEY CUP wins of 1973 and 1976-79 was awarded the 1977 CONN SMYTHE TROPHY. On 20 Dec 1983 he became only the tenth player in NHL history to reach the 500-goal plateau. He retired early in the 1984-85 season.

DEREK DRAGER

LaFontaine, Sir Louis-Hippolyte, also La Fontaine, politician (b at Boucherville, LC 4 Oct 1807; d at Montréal 26 Feb 1864). Educated at the Collège de Montréal, LaFontaine was called to the bar of Lower Canada in 1828. He began his political career with election to the Lower Canadian Assembly in 1830. Although a radical follower of PAPINEAU, he opposed the 1837 call to arms, and travelled to London to plead with the imperial government for constitutional reform. He was arrested in 1838, but released without trial. He then became leader of the French Canadian moderate reformers.

After the 1841 union, he worked with Robert BALDWIN and Francis HINCKS to found a united party of Upper and Lower Canadian reformers. He insisted on speaking French in the Assembly, and because of his action the imperial government later repealed the ACT OF UNION clause prohibiting official use of French. In 1842 he formed an administration with Baldwin, but resigned in Nov 1843 to protest Governor General Sir Charles METCALFE's political actions. In 1848, he was again called to form a ministry, this time by Lord ELGIN, who fully recognized RESPONSIBLE GOVERNMENT. LaFontaine thus became the first prime minister of Canada in the modern sense of the term. During this second administration, he demonstrated the achievement of responsible government by the passage of the REBELLION LOSSES BILL, despite fierce opposition and violent demonstrations. His ministry also passed an AMNESTY ACT to forgive the 1837-38 rebels, secularized King's College into U of T, incorporated many French Canadian colleges, established Laval University, adopted important railway leg-



LaFontaine, a tall, portly man who resembled Napoleon, was instrumental in the achievement of responsible government and was in effect the first PM of Canada (*courtesy Public Archives of Canada/C-5961*).

islation and reformed municipal and judicial institutions.

LaFontaine retired to private life in 1851 but was appointed chief justice of Canada E in 1853. In 1854 he was created a baronet by Queen Victoria and a papal knight by Pius IX. A tall, portly man, resembling Napoleon, LaFontaine was a master politician who commanded respect and inspired others with his high ideals and patriotism. JACQUES MONET, SJ

Reading: J.M.S. Careless, *The Union of the Canadas* (1967); Jacques Monet, *The Last Cannon Shot* (1969).

Lagemodière, Jean-Baptiste, also spelled Lagimodière, Lagimonière and Lajimodière, fur trader (b at Trois-Rivières, Qué 26 Dec 1778; d at St-Boniface, Man 7 Sept 1855). Going west as a hunter and trapper about 1800, he returned to Québec in 1806, where he married Marie-Anne Gaboury. Taking her west, he was a free trapper near the RED RIVER COLONY and later near Ft Edmonton. In 1815, during the troubles at the Red River settlement, he was given despatches to take to Montréal for the Hudson's Bay Co, informing Lord SELKIRK of the dangerous situation in the West. He made the arduous 3000 km journey in 5 months, but on his return was captured near Ft William and held prisoner by the North West Co for 56 days. Upon his release and return to Red River, he was given a land grant across the river from Ft Garry.

HUGH A. DEMPSEY

Lagemodière, Marie-Anne, née Gaboury, western pioneer (b at Maskinongé, Qué 2 Aug 1780; d at St-Boniface, Man 14 Dec 1875). Married to Jean-Baptiste LAGEMODIÈRE, a fur trader, in 1806, Marie-Anne returned to the Red River and Ft Edmonton areas with him, becoming one of the first white women on the western prairies. Her daughter, Reine (b 1807), was the first legitimate white child in the West. Of Marie-Anne's 8 children, the second youngest, Julie, was the mother of Louis RIEL.

HUGH A. DEMPSEY

Lagomorpha, order of MAMMALS containing 2 families: the RABBITS and HARES (Leporidae), with long ears and hindlimbs, small tufted tail and hopping gait; and the small, lesser-known PIKAS (Ochotonidae), with smaller, rounded ears, hindlegs and forelegs of approximately the same length, no apparent tail and running gait. Approximately 61 species are found in a wide variety of habitats, on every continent except Antarctica. Seven species are native to Canada (5 leporids, 2 ochotonids); 2 leporid species have been introduced. They range from the US border to the arctic islands and are a familiar sight to almost every Canadian. All lagomorphs are terrestrial, herbivorous and active year-round. Pikas are most active during the day, rabbits and hares mainly in the evening and at night. Both groups exhibit coprophagy (the reingestion of feces), which allows them to extract maximum nutritional value from fibrous plant food and is somewhat reminiscent of chewing the cud in ruminant mammals. Two types of fecal pellets are produced: soft, moist pellets which are eaten, and hard, fibrous ones which are discarded. The lagomorphs were classified as rodents until formally separated, in the early 1900s, on the basis of numerous differences in dentition, skeleton and musculature. Rodents are no longer considered to be even close relatives. The origin of the lagomorphs is uncertain. M.L. WESTON

LaHave, NS, UP, pop 195 (1981c), is located at the mouth of the LaHave R, 11 km SW of LUNENBURG. The Micmac called it *Pijelooeekak* ("having long points"). In 1604 de MONTS gave the name La Hève to the nearby cape. In 1632 de RAZILLY brought with him from France several families to settle the area. A fort was built to protect the settlement; a school, said to have been the first Acadian school, was established. The settlement was later transferred to PORT-ROYAL, though a few families remained behind. By the 1760s an English fishing base had been established at the former Acadian settlement. The 19th century saw industries connected with the fisheries, such as shipbuilding and sawmills, become an important part of the LaHave R economy, while farming remained a support industry. At this time the centre of development shifted upriver to Bridgewater. Today, residents are mostly of German descent. JEAN PETERSON

LaHave River Estuary is a narrow, shallow inlet of the Atlantic Ocean extending 24 km from Bridgewater, NS, to the coast. This lovely sheltered waterway is favoured for recreational sailing and fishing, especially for salmon and striped bass. The principal industry is fishing, with smaller amounts of farming and shipbuilding. East LaHave was the first land reached by de MONTS in 1604 and later became the site of one of the earliest European settlements in the province. (It was named after Cap de la Hève, near Le Havre, France.) In the early 1800s LaHave was used as a depot by pirates preying on New England shipping. Cape LaHave I is the largest of a group extending 7 km offshore from the mouth of the estuary. P.C. SMITH

Lahontan, Louis-Armand de Lom d'Arce, Baron, officer, author (b at Lahontan, France 9 June 1666; d in Europe before 1716). During Lahontan's 10 years in NEW FRANCE (1683-93), he fought the Iroquois, explored the Mississippi and helped defend Québec in 1690 and Newfoundland in 1693 against English attacks. Lahontan's fame rests on the 1703 publication of his colourful travels and memoirs (*Nouveaux Voyages dans l'Amérique septentrionale; mémoires de l'Amérique septentrionale*) and on a supplementary volume of imaginary dialogues with an Indian chief that contributed to the vogue of the "noble savage." The 3 volumes, retouched in 1705 by an unfrocked Benedictine monk, Nicholas Gueudeville, were frequently republished and translated for European readers during the 18th century. DAVID M. HAYNE

Laidler, Keith James, chemist, professor (b at Liverpool, Eng 3 Jan 1916). After studying at Oxford and Princeton, and holding appointments at the National Research Council and Catholic U, Washington, DC, he joined University of Ottawa in 1955. He is coauthor of *The Theory of Rate Processes* and has published 246 research papers, 6 research monographs on chemical kinetics and 3 chemistry textbooks. His research has covered the principal fields of chemical-reaction kinetics, fundamental theoretical aspects of kinetics and experimental study of many types of systems. Elected a fellow of the RSC in 1960, he received the Chemical Institute of Canada Medal in 1971 and the Queen's Jubilee Medal in 1977. B. CONWAY

Lake The hydrologic cycle supplies the world's landmasses with WATER as precipitation. In areas where precipitation is neither totally retained as ICE nor totally evaporated, excess water must find its way back to the sea via surface runoff, RIVERS and GROUNDWATER percolation. Where these flows are intercepted by a naturally occurring impervious basin or depression, a lake may result. A lake represents a short-term dynamic balance and a long-term evolution. A constant water level is maintained only if inflows from precipitation, runoff and groundwater percolation balance losses from outflow, evaporation or groundwater movement. Over geological time, lakes are transient; inflows carry dissolved and suspended material washed from the surrounding high ground, and biological productivity adds organic material to the accumulating sediments. These sediments gradually fill the basin. Human activities in a lake's DRAINAGE BASIN can accelerate the aging and infilling processes through increased EROSION accompanying agricultural and urban developments and through addition of biologically active materials or nutrients.

The 6 most important geological processes involved in lake formation are described in order of importance.

Glacial Movements of ice sheets and valley GLACIERS in past ICE AGES have scoured basins in underlying terrain. Glacial deposits (eg, MORAINES, ESKERS, DRUMLINS) may create favourable sites for lakes and ponds. Most Canadian lakes are of glacial origin.

Tectonic Movements of the Earth's crust, ie, folding and faulting, can create basins later filled by lakes. Lake Superior has been formed by glacial and tectonic processes.

Coastal Waves contribute to erosion and generate coastal currents which move sediments along the shore to zones of relative calm. The sandbars thus formed may block the entrance to a bay, forming a lagoon. If fresh water drains into the lagoon, a coastal lake, separated from the sea by a narrow barrier, may result. Many small lakes so formed occur along the Atlantic coast of NS, and several good examples occur within Lk Ontario, eg, Hamilton Harbour.

River Processes In floodplains, river meanders can be separated from the main flow and become oxbow lakes or sloughs. Deposition of sediments across the mouths of tributaries can flood the upstream tributary valley. At river mouths, where a DELTA is formed, a combination of river and coastal processes can form shallow deltaic lakes.

Volcanic Centres of volcanic cones may collapse into craters, forming crater lakes, often very deep in relation to their surface area. Lava flows may dam rivers to form lakes.

Solution Relatively soluble rock may be slowly eaten away by percolating groundwater, creating caverns which may collapse into water-filled depressions or solution lakes. This process occurs most frequently in limestone or gypsum regions. A somewhat analogous process occurs in the Arctic when collected surface water melts underlying PERMAFROST, forming a thaw lake.

Distribution of Lakes in Canada

Recent surveys suggest that there may be as many as 2 million lakes in Canada. About 7.6% of Canada's nearly 10 million km^2 is covered by fresh water; enough water is contained by these lakes and rivers to flood the entire country to a depth of over 2 m. Canada possesses nearly 14% of the world's lakes having surface areas over 500 km^2. Although Canada stores a disproportionate share of the world's surface fresh water, the amount available for use depends more on the volume supplied annually than on that stored over many years. Therefore, despite an apparent abundance, the freshwater resource must be managed carefully.

Surface GEOLOGY and CLIMATE govern the nature and distribution of lakes. It is convenient to describe lakes in relation to the PHYSIOGRAPHIC REGIONS of Canada. Many lakes are distributed through a 1000 km swath of land surrounding Hudson Bay, the Canadian SHIELD. Nearly all are of glacial origin. Thin soils and high resistance of the rocks to weathering tend to make the lakes clear, biologically unproductive and relatively long-lived because of slow sedimentation. The Shield is dome-shaped in cross section, dipping to contact the softer SEDIMENTARY ROCKS of the Hudson Bay Lowlands and the Western Interior Lowlands. The lowlands along the SW shore of Hudson Bay have only recently emerged from the sea as the land rebounds from the last GLACIATION. This region of poor, disorganized drainage is carpeted with MUSKEG and peat bogs. Within the peatlands are many small, shallow lakes and ponds having a teardrop shape aligned to the prevailing winds, the result

of wave action on the fragile shorelines. Close to the coast, ancient beach ridges define long, narrow, shore-parallel lakes and ponds. Old river channels, abandoned as the land rises, are frequently occupied by lakes in this region.

The line of contact between the Shield and the Western Interior Lowlands is marked by a band containing Canada's largest lakes, ranging from Great Bear Lk, NWT, to the Great Lakes, Ont. Glaciers pouring off the Shield and carrying with them hard granitic debris, gouged deeply into the thin edge of the softer sedimentary rocks before spreading over the lowlands. Glacial deposition of till, rather than extensive scouring, marks the effect of glaciers on the plains. Unlike Shield lakes, prairie lakes are formed in a thick overburden of clay, till and soil. Lakes in the Western Interior Lowlands tend to be more shallow, more rapidly filled by sediments and more biologically productive than Shield lakes.

Annual rainfall decreases and evaporation increases from NE to SW; the corresponding trend in lake distribution is for fewer, sometimes seasonally transient lakes, carrying higher concentration of dissolved materials. In the dry SW, numerous alkali lakes and ponds occur in which concentrations of dissolved materials reach saturation and evaporite crystals, usually sodium sulphate, precipitate out. Glacial deposition in the SW has left the ground pocked with small depressions which fill to become ponds or sloughs in spring, often drying up by late summer. Although the total water volume of these ponds is small in comparison with well-established lakes in other places, they are important to AGRICULTURE and as WATERFOWL habitat. In the Far North, parkland and forest yield to the boreal forest proper, with extensive areas of muskeg and bog lakes.

Lakes in the rugged terrain W of the Great Plains are relatively sparse compared with those of eastern Canada (covering less than 2% of surface area), but they are extremely varied. Lakes in western Canada are mainly of glacial origin: large lakes in BC and the YT are generally confined to deep, glaciated valleys; smaller scour lakes are found on upland plateaus. Tectonic processes associated with MOUNTAIN building provide other natural basins. The Cariboo region (Southern Interior Plateau) of BC, in the rain shadow of the Coast Range, is relatively arid and contains alkali ponds and lakes. Some lakes occupy the heads of ancient FJORDS near the coast. Powell Lk, near Vancouver, was formed when isostatic rebound (the tendency for land to rise once the heavy ice cover melts) isolated a fjord from the sea. Although this took place thousands of years ago, the lake's bottom water is still salty, a fossil seawater.

The Atlantic provinces lie in a region of ancient mountains, a northern extension of the Appalachians. This land was also heavily glaciated. The many lakes in areas underlain by hard IGNEOUS or metamorphosed rocks closely resemble the lakes of the Shield. More permeable sedimentary rocks underlie eastern NB, northwestern NS and PEI, and hence fewer lakes occur in these areas. Many small coastal lakes occur in NS.

The St Lawrence Lowlands and lower Great Lakes region contain some of Canada's richest farmland, but compared to the scoured region of the Shield, small- and medium-sized lakes are rare. However, this region is adjacent to the Great Lakes, which together constitute the largest body of fresh water on Earth. Lakes SUPERIOR and HURON lie across the contact between shield rocks and the more recent sedimentary rocks. Lakes Michigan, ERIE and ONTARIO are underlain by sedimentary rocks with thick overburdens of glacial deposits. The geology of the drainage basins has affected the primordial character of each lake and has determined the settlement patterns, which in turn have had a considerable impact on Lakes Erie and Ontario.

Biological Properties

Lakes are ecosystems: biological energy flows through a food chain and spent organic matter is recycled into materials that are again available to living organisms. The first and most important stage, primary productivity, is photosynthesis, where nutrients are combined into organic matter through the energy of sunlight and the action of chlorophyll contained in plant cells. Most lake plants are single-celled microscopic ALGAE (phytoplankton), which are suspended in the water and move with it. In abundant quantities, they may colour the water, rendering it turbid. A host of tiny ZOOPLANKTON graze on the phytoplankton and, in turn, are eaten by fish. Bacteria decompose dead material into constituents available for new cycles of life. Carbon, hydrogen and oxygen are usually freely available in sunlit surface waters. Usable forms of nitrogen and phosphorus may be scarce, limiting primary productivity. Nutrients may be supplied by inflows and by local runoff; their distribution within a lake is controlled by physical processes.

Physical Properties

Water movements in lakes are governed by 3 sources of energy: the flow of water from inlet to outflow and the stirring action of wind (both mechanical sources), and heat energy, gained in spring and summer, lost in fall and winter. The longest time scales of motion, having perhaps a yearly cycle, are those associated with the flow of water through a lake from inlet to outlet (hydraulic component of flow). Outflow removes dissolved and suspended materials along with the water. Since lakes vary widely in size and rate of outflow, it is useful to define a flushing time as the volume of the lake divided by the average rate of outflow (ie, the time required to drain the lake at the mean outflow rate). Permanent lakes with flushing times much less than a year are quite rare, and their behaviour is strongly marked by vigorous flow, biological productivity usually being depressed. At the other extreme, lakes with flushing times greater than 10 years are considered sensitive to external changes; recovery from a polluted state requires at least one flushing time.

Superimposed on this motion are movements driven by wind and by convection caused by surface cooling or heating. Wind-driven motions, mechanically the most important, include surface waves, turbulent mixing and systems of currents circulating around the lake. These motions distribute dissolved and suspended materials through the lake.

Lakes gain heat from solar radiation; they lose heat as water evaporates from the surface; they may gain or lose heat directly from the atmosphere. Except for solar radiation, these fluxes are absorbed or emitted in the top few centimetres of the water column. Solar radiation, which powers photosynthesis in addition to heating the water, may penetrate effectively to a depth of 30 m in a very clear lake, or may be absorbed in the top metre of a lake made turbid by suspended sediments or an abundance of plankton. A kilogram of water must absorb or lose 4200 joules of heat to raise or lower its temperature by 1°C. This is one of the largest "specific heats" of all substances. Compared with the land, lakes can store and release huge amounts of heat; therefore, large lakes may moderate the climate near their shores. Stone fruits can be grown on the Niagara Pen because it is protected from severe winter weather by the open waters of Lk Ontario.

As the surface water warms or cools in response to the surface heat flux, its density changes. Fresh water is most dense not at freezing point (0°C) but at 4°C. As water is warmed above or cooled below 4°C, its density decreases (it expands). If the heat flux acts to increase the surface density (fall cooling or early spring warming), surface water tends to sink and mixing by convection takes place. If the heat flux decreases the surface density (winter cooling just before freezeup, spring and summer warming), the lighter surface water tends to float on the heavier underlying water. Wind mixing may not be strong enough to overcome this extra stability, particularly in summer, and a layered distribution of warm and cool water can persist through the summer in deep lakes. These lakes are said to be thermally stratified, and it is usually possible to define 3 layers: a warm, actively wind-stirred upper layer called the epilimnion; a cool, relatively homogeneous bottom layer called the hypolimnion; and a transitional layer called the thermocline between the warm and the cool layers.

Stratification strongly affects all other physical, biological and biochemical processes. It influences the horizontal distribution of nutrients, and the speed with which nutrients trapped in the hypolimnion and in bottom sediments are made available to algae in the surface waters. Furthermore, inflows and outflows often occur at shallow depths within the epilimnion. If the inflowing water is of equal or lesser density than the surface water of the receiving lake, the hydraulic flow and attendant flushing is confined to the epilimnion. This restriction may retard the effective flushing of a contaminant from a lake since much of it will be stored in the sheltered hypolimnion.

Seasonal thermal stratification has other important consequences. Diversity of habitat encourages diversity of living organisms; therefore, stratified lakes may permit the coexistence of warm-water fish (eg, bass) and cool-water fish (eg, trout). Diversity may be limited by the interaction of stratification with primary productivity and bacterial decomposition, which may be influenced by human activities.

Overfertilization by sewage or agricultural runoff may lead to an increase in algal growth, with a corresponding rise in dead organic material in the cool waters of the hypolimnion. This results in depletion of oxygen, caused by increased bacterial decomposition, and may lead to the loss of cool-water fish species. If the system has been pushed far enough, recovery may become impossible, even with greatly reduced external loading of nutrients. Poor FORESTRY practices (eg, extensive clear-cutting in inappropriate areas) can have similar effects because increased runoff carries soil nutrients into nearby lakes. Logging and settlement in the basins of Lakes Ontario and Erie are thought to have modified these lakes considerably.

Canada's Fifteen Largest Lakes
(Source: *Canadian Survey on the Water Balance of Lakes*, UNESCO, 1973)

Lake	*Province*	*Area (km²)*[a]
Superior[b]	Ont	84 500
Huron[b]	Ont	63 500
Great Bear	NWT	31 400
Great Slave	NWT	28 400
Erie[b]	Ont	25 800
Winnipeg	Man	24 400
Ontario[b]	Ont	19 300
Athabasca	Alta/Sask	7 940
Reindeer	Sask	6 640
Nettiling	NWT	5 530
Winnipegosis	Man	5 360
Nipigon	Ont	4 850
Manitoba	Man	4 630
Lake of the Woods[b]	Ont	4 340
Dubawnt	NWT	3 830

[a] Total lake area, including islands
[b] Includes portion located in the US

Other Human Impacts

Overenrichment (cultural eutrophication) is not the only problem in lake management. Many compounds used in agriculture or industry are dangerous toxins; the more insidious have chemical affinities to natural organic material and enter the food chain, becoming increasingly concentrated (*see* HAZARDOUS WASTES, WATER POLLUTION). Another serious problem arising from human activities is ACID RAIN, which results from the burning of fossil fuels. The effects of the fallout on lakes are strongly governed by the region's surface geology. Shield lakes are vulnerable to these effects, which may include a complete loss of fish. Lakes in limestone-rich areas are less vulnerable because acidity is neutralized by dissolution of limestone.

In Canada many lakes have been created by damming rivers for RESERVOIRS for hydroelectric developments, sources of water for irrigation and domestic use, and for flood control. Reservoir design and management draw on all aspects of lake science. For example, the large fluctuations in water level accompanying reservoir operation can cause accelerated shore erosion and are potentially harmful to fish spawning in shallow water. F.M. BOYCE

Lake Carriers, or "lakers," are ships whose design is unique to the GREAT LAKES of N America. The lake carrier's long and flat shape reveals its basic purpose — to move bulk cargoes through the ST LAWRENCE SEAWAY and Great Lakes, a total distance of 3766 km. The *John B. Aird*, a typical modern Canadian lake carrier, was launched in 1983 by Collingwood Shipyards on Georgian Bay, is 219 m long and has a deadweight tonnage of 30 700 tonnes. Similar to an increasing number of lake carriers of her size which are fitted with cranes or conveyor belts, the *John B. Aird* is a self-unloading lake carrier.

Ships of this size can carry one million bushels of wheat on a single voyage (27 000 tonnes). Wheat and other feed grains account for about 40% of all cargoes carried by Canadian lake carriers, followed by coal, iron ore and limestone. The annual 9-month shipping season of the lake carriers does not include the winter months of late December to early March when the seaway is closed and ice covers much of the Great Lakes.

Most of the 247 lake carriers in service in 1984 belonged to member companies of the Dominion Marine Assn (DMA) of Ottawa, founded in 1903, and the US Lake Carriers' Assn, formed in Cleveland, Ohio, in 1892. Of these vessels, 143 are Canadian ships on the DMA register and the remaining 104 are US-owned vessels. The Canadian lake-carrier fleets have a total deadweight tonnage of 3.5 million tons and in 1983 carried bulk cargoes worth an estimated $7 billion.

The modern Canadian lake carrier is the result of more than 100 years of continually changing Great Lakes ship design and modification (*see* SHIPBUILDING AND SHIP REPAIR). Earlier types of cargo carriers on the Great Lakes, all of them built for the bulk transit of goods, included the exotically named hermaphrodite barquentines of the age of sail and the whalebacks and canalers of the age of mechanical propulsion. As becomes the name "hermaphrodite," which means having 2 opposite qualities, this class of sailing ship had 2 masts, with square-rigged sails on the foremast for maneuvering in and out of dock and in narrow passages, and fore-and-aft rigged sails on the mainmast for speed. Except for their tall funnels and awkward deck structures, the whaleback of the age of coal-fired steam engines, squat and broadbeamed, looked like the modern nuclear submarine. The whalebacks were also called "pig boats" because their bows ended in a steel snout built above the waterline. The later canalers were designed to fit snugly into the narrow locks of the old Welland Canal, linking Lakes Erie and Ontario and passing near St Catharines, Ont, and the canal system between Lk Ontario and Montréal which terminated at the Lachine Canal. The canaler was one-third the length of the *John B. Aird*. In 1959 canalers were replaced in the wider and longer locks of the St Lawrence Seaway system by upper lakers, which had previously been restricted to the upper lakes above Niagara because of their size. These locks can take ships up to 222.5 m in length and 23.16 m in breadth.

Some of these larger carriers, though designed primarily for the inland lakes, have been built for both the coastal trade and deep-sea service and are called ocean lakers. This is not entirely a new trend since some earlier lakers were requisitioned to serve on the N Atlantic during WWII, and a few of them were sunk by German U-boats.

The Great Lakes have been a graveyard for hundreds of ships, most of them lost during the age of sail between 1750 and 1870, in storms, fires and collisions. Despite their size, even modern lake carriers can be victims of severe ice conditions and storms. The tragic sinking on 10 Nov 1975 of the *Edmund Fitzgerald*, a 222 m long US iron-ore carrier, was commemorated in song by Gordon LIGHTFOOT. After battling 7.5 m waves and record 125 km/h winds on Lk Superior, she suddenly plunged to the bottom with the loss of the entire crew of 29, including her experienced captain. JOHN D. HARBRON

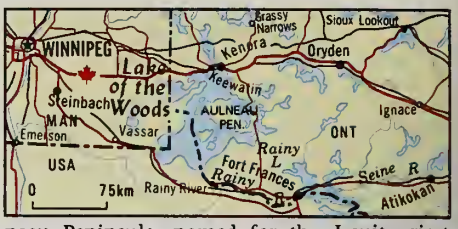
Reading: H.C. Campbell, *Early Days on the Great Lakes: The Art of William Armstrong* (1971); J. Lesstrang, *Lake Carriers: The Saga of the Great Lakes Fleet* (1979).



The *John B. Aird*, a bulk carrier with a self-unloading system. The lake carrier's characteristic shape, long and flat, reveals its purpose of moving bulk cargoes (*courtesy Lucas Photographics, Thunder Bay*).

Lake Louise, 2.4 km long, elev 1731 m, is located in BANFF NATIONAL PK SW Alberta; its outlet is a stream flowing into the BOW R. Indian guides took CPR workman Tom Wilson to the site in 1882; he named it Emerald Lk, but the name was changed (1884) to honour Princess Louise Caroline Alberta, fourth daughter of Queen Victoria and wife of Gov Gen the marquess of LORNE. The community of Lake Louise (UP, pop 355, 1981c) is near the lake, on the site of the former CPR station, Laggan, which was base camp for 12 000 workers in 1884, when CPR construction proceeded through KICKING HORSE PASS. The jewellike lake, framed by blue mountains and gleaming snowfields, is one of the most famous mountain vistas on the continent. Chateau Lake Louise stands atop the huge glacial moraine that dams the lake. JAMES MARSH

Lake of the Woods, 4349 km² (of which 3149 km² are in Canada), elev 323 m, fed by Rainy R from the S and drained to the NW by the WINNIPEG R; it is a remnant of former glacial Lake AGASSIZ. The S shore is regular, low and sandy, contrasting with the granite edge, myriad channels, peninsulas and 14 632 islands of the N shore. Thrust into the lake from the E is Aul-



neau Peninsula, named for the Jesuit priest Jean-Pierre Aulneau (1705-36) who, along with 17 other members of the LA VÉRENDRYE party, was killed in the area by Sioux warriors. The French explorer Jacques de Noyon reached the lake in 1688, and La Vérendrye built Fort Saint-Charles on the N shore (1732). The lake was part of the main FUR-TRADE ROUTE, and voyageurs frequently lost their way among its islands. Cree, Ojibwa and Sioux lived in the area first, and rock paintings have been found at several sites. About 2000 native people still live around the lake in numerous reserves. The Canada-US border runs from the mouth of Rainy R NNW across the lake, leaving a small peninsula of US territory above the 49th parallel.

The scenic lake attracts a thriving tourist trade. In early August, sailboats from Canada, Britain and the US take part in the Lake of the Woods Regatta, a 7-day race from KENORA around the lake. The lake's islands are wooded, but the name is likely a mistranslation of an Indian word meaning "inland lake of the hills." JAMES MARSH

Lake Superior Provincial Park (est 1944, 1540 km²), located N of SAULT STE MARIE, Ont, includes part of the wild shoreline of eastern Lk SUPERIOR and a hinterland of rugged, forested Canadian SHIELD country. Pink granitic hills and boulders dominate the landscape but lavas are found near Cape Gargantua and sandstones on the offshore islands. The mixed forest of maple, birch, poplar and spruce produces a magnificent display of colour in autumn. The commonest mammal is the moose, but visitors may also see white-tailed deer, red squirrel, chipmunk, beaver, bear, wolf and some 250 species of bird, including Canada goose, heron and sandhill crane. Except for garter snakes, there are few reptiles. Animals such as caribou, lynx and pickerel feature prominently in the PICTOGRAPHS visible especially along the coast. These rock paintings reflect some 10 000 years of Indian occupation. There has been sporadic mining for copper and gold, commercial fishing and lumbering. Early in this century the region attracted the attention of the GROUP OF SEVEN painters. Lake and river fishing and, in autumn, moose hunting are possible. JOHN S. MARSH

Lakehead University, THUNDER BAY, Ont, was founded in 1965. Lakehead Technical Institute, est 1946, added introductory university courses to its program in 1948; its name was changed to Lakehead College of Arts, Science and Technology in 1956, and in 1957 the city of Port Arthur donated the land for a new college campus. Second-year arts courses were added in 1960-61, and in 1962 the college received some university powers. Its first degrees were awarded in 1965, the year that Lakehead became a university with all degree-granting powers. B. BEATON

Enrolment: Lakehead University, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
3 188	128	1 525	146

Lalemant, Charles, Jesuit missionary, first superior of the Jesuits at Québec (b at Paris, France 17 Nov 1587; d there 18 Nov 1674), brother of Jérôme LALEMANT. He organized the first Jesuit

mission to Canada in 1625, returning to France in 1627 to counter the objections of merchants and Protestants to mission work. He went back to Canada in 1634, having been taken prisoner of war and shipwrecked twice in the meantime. He ministered to the French immigrants at Québec until 1638 when he returned to Paris to serve as first procurator of the missions of New France until 1650, a period when missions and fur trade were complementary. He brought together *dévots* of the Compagnie du Saint-Sacrement who planned and founded the utopian colony of VILLE-MARIE on Montréal I in 1642. In addition to many letters, he wrote a devotional treatise on the Eucharist. CORNELIUS J. JAENEN

Lalemant, Jérôme, Jesuit missionary (b at Paris, France 27 Apr 1593; d at Québec City 26 Jan 1673), brother of Charles LALEMANT. He arrived in Canada in 1638 and was named superior of the Huron mission. He completed the first census of a native nation, introduced *données* (lay workers) as domestics and in 1639 founded STE MARIE AMONG THE HURONS, a fortified headquarters and model community. Author of *Relations des Jésuites,* 1639, 1644, and much of the *Journal des Jésuites,* he was superior at Québec 1645-50. In 1649 the Huron mission was destroyed, and in 1656 he returned to France and taught at La Flèche college. Recalled as superior at Québec 1659-65, he helped resettle Huron refugees. CORNELIUS J. JAENEN

Laliberté, Alfred, sculptor, painter, memorialist (b at Ste-Elisabeth de Warwick, Qué 19 May 1878; d at Montréal 13 Jan 1953). In 1896 he began studying modelling and design at the Conseil des arts et manufactures (CAM), Montréal. In 1902 he left for Paris, where he studied at the École des beaux-arts, met SUZOR-CÔTÉ and had several showings at the Salon du printemps. He was named a professor at the CAM, Montréal, in 1907, and had his first showing at the Art Assn. His work totaled some 925 bronze, marble, plaster and wooden statues, plus about 500 canvases of lesser interest. He sculpted busts, historical statues (BALDWIN, BRÉBEUF), public and commemorative monuments (LAURIER, Louis HÉBERT), allegorical and religious statues, and over 200 small bronzes illustrating legends, customs and rural trades. While influenced by various sources, his work reflects the nationalist and conservative ideology of his Québec contemporaries who gloried in their national history and were strongly attached to the land. Three of Laliberté's manuscripts appeared in 1978 under the title, *Mes souvenirs.* JOHN R. PORTER

Lalonde, Édouard, "Newsy," hockey and lacrosse player (b at Cornwall, Ont 31 Oct 1887; d at Montréal 21 Nov 1970). He excelled at both sports and gained notoriety and fame for his intense competitiveness. He picked up his nickname during a stint as reporter and printer for the Cornwall *Freeholder.* He played hockey with Cornwall and turned professional with Sault Ste Marie. He was a member of MONTREAL CANADIENS at their inception (1910) and rejoined them in 1913, winning the scoring title 4 times and scorinto brawls. Lalonde was the best LACROSSE player of his generation and was in great demand posing players, notably Joe Hall, often erupted into brawls. Lalonde was the best lacrosse player of his generation and was in great demand across Canada; a Vancouver team paid him $6500 for one season. He was voted Canada's outstanding lacrosse player of the first half century. JAMES MARSH

Lalonde, Marc, politician (b at Île Perrot, Qué 26 July 1929). Educated at U de M, Oxford and U of Ottawa, Lalonde at first sought a legal and academic career but interrupted it to become special adviser in 1959-60 to E. Davie FULTON, minister of justice under PM DIEFENBAKER. After practising law in Montréal, Lalonde returned to Ottawa as special adviser to PM PEARSON in 1967, and stayed on in the PMO as Pierre TRUDEAU's principal secretary 1968-72. In 1972 he ran successfully for Parliament and under Trudeau held various portfolios, including minister of national health and welfare, minister of state for federal-provincial relations, minister of energy, mines and resources (1980-82) — in which capacity he implemented the National ENERGY POLICY — and minister of finance under both Trudeau and PM TURNER (1982-84). Lalonde was closely identified with Trudeau and his various causes and was a vigorous federalist advocate in Québec and Ottawa. He did not run in the 1984 federal election. ROBERT BOTHWELL

Lamarche, Gustave, priest, dramatist (b at Montréal 17 July 1895). He is best known for the vast dramatic frescoes on religious themes, often reminiscent of medieval passion plays, that he began to compose and direct in Québec in the 1930s, especially his *Jonathas* and *Tobie* (both 1935), *La Défaite de l'enfer* (1938), *Notre-Dame-des-Neiges* (1942) and *Notre-Dame-de-la-Couronne* (1947), the latter 2 performed outdoors before thousands of spectators. His collected 6-vol *Oeuvres théâtrales* (1971-75) include 34 plays. In restoring the respectability of stage arts, long considered suspect in French Canada, Lamarche has made an important contribution to contemporary Québec culture. L.E. DOUCETTE

Reading: René Pageau, *Gustave Lamarche, poète dramatique* (1976).

LaMarsh, Judy Verlyn, lawyer, politician, broadcaster, novelist (b at Chatham, Ont 20 Dec 1924; d at Toronto 27 Oct 1980). Liberal MP for Niagara Falls 1960-68, Judy LaMarsh was a controversial member of PM PEARSON's Cabinet and was responsible for some of that government's more innovative legislation. Under her aegis as minister of national health and welfare 1963-65, the CANADA PENSION PLAN was implemented and Canada's "medicare" system designed. As secretary of state 1965-68, she brought in the Broadcasting Act, presided over the CENTENNIAL YEAR celebrations, and established the Royal Commission on the STATUS OF WOMEN IN CANADA. Her books include *Memoirs of a Bird in a Gilded Cage* (1968). HARRIET GORHAM

Lambert, Betty, née Elizabeth Minnie Lee, playwright (b at Calgary 23 Aug 1933; d at Burnaby, BC 4 Nov 1983). Author of some 70 adults' and children's plays for radio, TV and stage, Lambert also taught at Simon Fraser from 1965 until her death. Often called a feminist, she was concerned with injustice to and victimization of men as well as women, concerns which appear as ironic wit in her comedies and as compassion and a profound sense of evil in her tragedies. She is author of the children's play *The Riddle Machine* (performed 1967, published 1974); *Sqrieux-de-Dieu* (1975, 1976); the novel *Crossings* (1979); and *Jennie's Story* (1981, 1982).

ANN MESSENGER

Lambeth, Michel, filmmaker, writer, photojournalist, teacher, publisher (b at Toronto 21 Apr 1923; d there 9 Apr 1977). He served in the Canadian Army 1942-45, and then studied art in London and Paris. Returning to Toronto in 1948, he supported himself with clerical work and free-lance writing. By 1959 he had become a committed photojournalist, and during the 1960s worked for the *Star Weekly, Saturday Night, Maclean's, Time* and *Life.* He had numerous shows and the National Film Board of Canada toured his exhibition *Encounter* nationally. He was honoured with the Canadian Centennial Medal in 1967. During the 1970s he taught and became a spokesman for Canadian Artists' Representation. His photography reflects a love for working people, and the reality of street life and the social conditions of the disadvantaged.

MAIA-MARI SUTNIK

Lamèque, Île, 150 km², is located off the NE corner of New Brunswick at the entrance to CHALEUR BAY. Originally called Shippegan I, its present name was confirmed in the 1970s and derives from a MICMAC word describing tidal flows in the area. Nineteen km long and 11 wide, the island is sandy and flat, covered in grasses and a few stunted trees. Originally inhabited by Micmac, its modern residents are mainly French speaking. As well as a small fishing industry, the island features vast bogs of PEAT moss, sold primarily to the US. The island is connected by bridge across the Shippegan Sound to the mainland community of Shippegan and by ferry to MISCOU I, its sister island to the N.

DANIEL FRANCIS

Lamontagne, Joseph-Georges-Gilles-Claude, air-force officer, politician (b at Montréal 17 Apr 1919). Lamontagne studied at the Collège Jean-de-Brébeuf and the École des hautes études commerciales in Montréal. A bomber pilot in the RCAF, he was shot down over Holland and was a prisoner until 1945. He bought an importing firm in Québec C in 1946, was elected mayor of Québec C in 1965, and Liberal member to the House of Commons for Langelier in 1977. In 1978 he became postmaster general and in 1980 minister of national defence. In February 1984 he was named lt-gov of Québec. JEAN PARISEAU

Lamontagne, Maurice, economist, politician (b at Mont Joli, Qué 7 Sept 1917; d at Ottawa 13 June 1983). A graduate of Laval and Harvard, Lamontagne taught at Laval 1943-54. In 1954 he became a federal civil servant and in 1957 professor of economics at U of Ottawa. He also served as an adviser to Lester PEARSON, 1958-63, and ran for the House of Commons in 1958 and 1962, finally getting elected in 1963. Lamontagne, a strong federalist, promoted bilingualism and biculturalism and worked to strengthen the Liberal Party's base in Québec. After serving as president of the Privy Council and secretary of state in Pearson's Cabinet, 1963-65, he was appointed to the Senate in 1967. ROBERT BOTHWELL

Lamothe, Arthur, film director, producer, editor (b at St-Mont, France 7 Dec 1928). Lamothe immigrated to Canada in 1953 and joined the NFB in the late 1950s as a researcher and writer. His first film was *Bûcherons de la Manouane,* a documentary made in 1962 about lumber camps. He soon left the NFB to start his own production company where he directed a full-length fictional film, *Poussière sur la ville* (1965), which was not a commercial success. Lamothe returned to documentaries, particularly those with a social perspective. In 1970 he produced for the Confederation of National Trade Unions a full-length film on the working conditions of construction workers. *Le Mépris n'aura qu'un temps* firmly determined the direction of Lamothe's future work: social and economic criticism designed to promote change. In 1973 he began work on *Carcajou et le péril blanc* (1973-76), a series of 8 films on the Montagnais culture and the first such film study to adopt the Indian viewpoint. He continued this theme in a more political series of 4 films, *Innu Asi / La terre de l'homme* (1979-80), and a more anthropological one of 3 films, *Mémoire battante* (1983). PIERRE VÉRONNEAU

Lampman, Archibald, poet (b at Morpeth, Canada W 17 Nov 1861; d at Ottawa 10 Feb 1899). Lampman is by common agreement the finest of Canada's late 19th-century poets. After an attack of rheumatic fever at age 7, he was educated at home and then sent to a private school in 1870. He went to Trinity Coll School and finally to Trinity Coll, Toronto, graduating in classics in 1882. Lampman then joined the civil service in Ottawa and worked in the Post Office Dept until his untimely death. *Among the Millet,* his first book of poems, appeared in 1888, followed by *Lyrics of Earth* in 1895. His third



Archibald Lampman, generally considered the finest of Canada's late 19th-century poets, was at the height of his powers when observing and contemplating nature (*courtesy Public Archives of Canada/C-68854*).

book, *Alcyone and Other Poems*, was being readied for publication when he died; his friend and literary executor, D.C. SCOTT, edited a collection of his poems that included *Alcyone* in 1900. Along with Scott and William Wilfrid CAMPBELL, Lampman also contributed a weekly literary column, "At The Mermaid Inn," to the *Globe* in 1892.

Lampman was at the height of his powers when observing and contemplating nature. His habitual stance begins in watching, closely observing the details of a natural setting, and closes with a reverie, a dream in which the watcher and the scene momentarily coalesce. Though his favourite form was the sonnet, Lampman also wrote several longer narrative poems, including the apocalyptic "The City of the End of Things," which dramatizes his horror at mechanized, industrialized society. But Lampman's power and sensitivity are most effectively fused in sonnets such as "Heat" or "In November." Although the English Romantic influence, in particular that of Keats, is evident in his poetry, Lampman had the genius to create a distinctive voice recognizably his own. His acute powers of observation, along with his gift for immersing his meditations in a keenly perceived natural setting, distinguish his poetry as the most luminous 19th-century Canadian response to its own natural landscape. NEIL BESNER

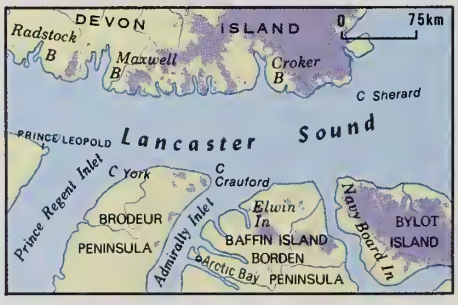
Lamprey, group of primitive VERTEBRATES which together with HAGFISH and various extinct forms comprises the FISH class Agnatha. Lampreys have a cartilaginous skeleton and an eellike body form. They lack scales and paired fins, but have 1 or 2 dorsal fins. Seven external gill openings appear on each side of the body, near the head. Development begins with a larval stage, the wormlike ammocoete, which has a life span longer than that of the adult. The ammocoete has a broad, hoodlike structure overhanging the mouth. Its principal food is microscopic algae. Eyes are rudimentary and hidden under the skin. For respiration and feeding, water enters the mouth and is extruded through the gill openings. At the onset of metamorphosis the ammocoete shrinks in length. In adults, water for respiration enters and exits only through the gill openings. Metamorphosed individuals acquire a sucking disc with horny teeth. They may be nonparasitic, lacking a functional intestine and not feeding after completion of metamorphosis; or parasitic, retaining a functional intestine and feeding primarily on the blood and body fluids of fish. Of the 37 Northern Hemisphere species, about 15 are parasitic. Nonparasitic species are confined to freshwater habitats. Although adults of certain species can live in salt water, all species spawn only in fresh water in specially prepared nests, and die shortly after. Before spawning, mature males and females shrink in length. Eggs are small (1 mm diameter); 1000-260 000 may be laid, depending on the length of the female.

Lampreys occur in both Northern and Southern hemispheres. About 41 extant species are known, as well as FOSSIL forms dating from the Mississippian and Pennsylvanian (345-280 million years ago) in the US. Twenty-three species are found in N America, of which 21 are indigenous. Twelve species occur in Canada. Three N American species are very destructive to FISHERIES: Atlantic sea lamprey (*Petromyzon marinus*), 900 mm maximum length, spends some time in the Atlantic and becomes landlocked in the Great Lakes; Pacific lamprey (*Entosphenus tridentatus*), 690 mm maximum length, found in the West; and arctic lamprey (*Lententeron japonicum*), 625 mm maximum length, of arctic regions of N America and Eurasia. These species attack other fish, attaching themselves by their oral discs and sucking the blood and flesh of the host. In the Great Lakes, the Atlantic sea lamprey contributed to the decline of the lake trout and other fishes. The species always lived in Lk Ontario, but was first found in Lk Erie in 1921, apparently having passed through the Welland Canal, and was established in the Great Lakes by 1940. The Canadian and American governments have instituted a program to reduce the population. Although *Lampetra fluviatilis* is considered a delicacy in Europe, lampreys are little eaten in N America, except by natives of the West Coast. *See also* PARASITOLOGY.

VADIM D. VLADYKOV

Lancaster, Ronald, FOOTBALL player, coach (b at Fairchance, Pa 14 Oct 1938). He quarterbacked the Ottawa Rough Riders from 1960 with Russ JACKSON and was later traded to Saskatchewan (1963-78). In his 19-year playing career Lancaster completed 3384 passes for 50 535 yards and 333 touchdowns. He set 30 CANADIAN FOOTBALL LEAGUE records, was twice selected the outstanding player in the country, and 17 times led his team into the playoffs (and to 2 Grey Cup wins). His quick, analytic play and determination earned him the nicknames "little general" and "little assassin" — he is 178 cm tall. After retirement he was head coach of the SASKATCHEWAN ROUGHRIDERS (1979-80). FRANK COSENTINO

Lancaster Sound, arm of BAFFIN BAY and major passage through the ARCTIC ARCHIPELAGO, 400 km long and some 100 km wide. It lies at the N end of BAFFIN I and is connected to Barrow Str on the W. As a result of the interaction of currents, the sound is rich in nutrients and supports a biologically varied community of birds, mammals and fish. It provides breeding grounds for some 3 million seabirds alone. The area has provided sustenance for INUIT cultures for thousands of years: ringed seals, walrus and polar bears, and narwhals, belugas, killer and bowhead whales. Arctic fox is trapped in almost every inlet, and arctic char is taken at the mouths of rivers. European interest began in the 17th century, with the search for the NORTHWEST PASSAGE, and William BAFFIN was likely the first to discover the sound (1616). It was named for English navigator Sir James Lancaster (d 1618). WHALING became important at the end of the 19th century, and trading posts were established at Port Leopold, Button Pt, Albert Harbour, Arctic Bay, Pond Inlet and Dundas Harbour. Today, interest centres on geological evidence of petroleum, and on mining sites at Mary River (iron), Arvik (lead-zinc) and Nanisivik, where some 150 000 tonnes of lead-zinc are being taken. With ICEBREAKERS, the passage could be used year-round for local shipping and for tankers from the BEAUFORT SEA. Increased human activity threatens the area's wildlife, which is concentrated at a few sites and therefore highly vulnerable. JAMES MARSH



Land, in LAW, is an area of the Earth's solid surface which is the property of an individual, group or state. Hence, the Canadian polity controls a total of 9 167 165 km^3 of land, and 755 165 km^3 of fresh water, for a total territory of 9 922 330 km^3. In popular usage, "land" refers simply to the ROCK and SOIL that make up the solid part of the Earth's surface.

Land Claims are dealt with by a process established by the federal government to enable INDIANS, INUIT and MÉTIS to obtain full recognition of their rights under treaties or as the original inhabitants of what is now Canada (*see* INDIAN TREATIES; ABORIGINAL RIGHTS). At the core of the process is negotiation between native groups and the federal government, and in some cases the provincial and territorial governments and other third parties. The process is formally based on legal concepts such as land title and treaties, and is intended to make economic and social adjustments between 2 different societies.

Historical Basis, 1763-1969 The Royal PROCLAMATION OF 1763 reserved an unspecified area of what is now Canada for the use of Indians, and forbade any unauthorized purchase or possession of those lands by non-Indian settlers. The British government, followed after 1867 by successive Canadian governments, concluded treaties with various groups of Indian people to legitimate European settlement in their lands.

The gradual occupation of Canada by immigrants, with or without treaties, has continued for almost 400 years and has made the native people a small minority within an industrial nation. In some cases Indian bands that had concluded treaties have lost control of reserve lands, and in others the reserve lands promised according to treaty were not requested or allocated (*see* INDIAN RESERVES). Native people, many of whom had been nomadic, often found themselves isolated on reserves with little or no access to wildlife and no money, skill or natural resources to make a living from their reserves. For those Indians, Inuit and Métis who did not sign treaties or take reserve land, the impact of being surrounded or overrun by agriculture, industry, cities and "foreign" institutions has been similar to that on the treaty Indians. They have suffered the shock of great change in every aspect of their lives and in their homelands.

Development of the Claims Process Although native people have from the beginning struggled to maintain their identity, the "movement" for aboriginal rights and native claims which began for a few bands in the 19th century did not become prominent until the 1960s. Many factors contributed to the expression of native aspirations. Minority rights of all kinds and concern for the environment became worldwide causes. The search for new sources of oil, gas and hydroelectricity brought the native peo-

ple of the NORTH into the mainstream of Canadian life. At the same time, although an imposed education system threatened native languages and cultures, it also prepared young native people to enter and challenge the "white man's" political and legal system (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

Canada has been influenced by the treatment of claims and aboriginal rights in other countries. In 1946 the US government created an Indian Claims Commission and in 1971 legislated the Alaska Native Claims Settlement. Australia passed an Aboriginal Land Rights Act in 1976, and in 1980 Denmark granted home rule to Greenland. Proposals to establish a body similar to the US Indian Claims Commission in Canada resulted in the drafting of 2 bills, 1963 and 1965, which proved unsatisfactory to the Indian people and were never enacted. In 1969 the federal government appointed Lloyd Barber as commissioner of Indian claims to determine and recommend appropriate means of resolving native claims. Early in the 1970s the government set up a system of research funding for native political and cultural associations to enable them to document and organize their land claims.

In 1972 the Indians of Old Crow in the Yukon Territory presented a petition to Parliament concerning oil and gas exploration on their hunting grounds. In the *Calder* case in 1973 the Supreme Court of Canada split 3 to 3 in recognizing the aboriginal land title of the Nishga Indians of BC, and in the same year the Yukon Indian Brotherhood presented a formal claim to the federal government.

In 1973 Justice Morrow of the NWT recognized the aboriginal title of the Dene of the Mackenzie R Valley (*see* DENE NATION) and in 1973 Justice Malouf of Québec recognized the title of the CREE and Inuit of Québec. These decisions were later appealed and overturned, but they gave important weight to the native cause.

The Process On 8 Aug 1973 the federal government, wishing to clear the way for industrial development of the North and to improve the position of native peoples in Canada, announced a new policy for the settlement of native claims. The policy confirmed the responsibility of government to meet its lawful obligations through fulfilment of the terms of the treaties and to negotiate settlements with native groups in those areas of Canada where native rights based on traditional use and occupancy of the land had not been dealt with by treaty or superseded by law. The policy emphasized that the co-operation of provincial and territorial governments would be required. The Indian interpretation of "lawful obligations" was broader than that of the government, and the debate over the meaning of "lawful" as opposed to "legal" or purely technical obligations remains an obstacle to claims settlement.

In order to carry out the new policy, the Office of Native Claims (ONC) was created in 1974 within the Department of INDIAN AFFAIRS AND NORTHERN DEVELOPMENT. Under the leadership of an assistant deputy minister, negotiators, lawyers and researchers deal with 2 main types of claim: specific and comprehensive. Specific claims are based on problems arising from the administration of Indian treaties, the INDIAN ACT, Indian funds and disposition of Indian land. Although negotiation is the preferred course of action to settle these claims, settlement may also be reached by administrative remedy or court action. Specific claims are usually made by Indian groups living in the provinces, as opposed to the territories, and most settlements consist of compensation of land. Since 1973 there has been widespread Indian complaint about the limited basis of settlements offered by the government. In 1982 the federal government reaffirmed a commitment to settle claims,



Nellie Cournyea, after the signing of land claims agreement June 1984 (*photo by Stanley Klenganberg/Inuvialuit Communications Society*).

as outlined in the booklet *Outstanding Business*. Comprehensive claims are based on the traditional use and occupancy of land by Indians, Métis or Inuit who did not sign treaties and were not displaced from their lands by war or other means. These claims, which are settled by negotiation, involve the 2 territories and the northern parts of some provinces. The areas of land and the numbers of native people involved are usually greater than in the case of specific claims. Settlement of these claims comprises a variety of terms including money, land, forms of local government, rights to wildlife and rights protecting native language and culture. The federal government policy booklet, *In All Fairness* (1981), outlines its comprehensive claims policy. Various native organizations have also produced policy statements (eg, the Dene Nation).

The federal government provides funding in the form of contributions to native associations for the research and presentation of their claims. Once claims are submitted, lawyers of the Dept of Justice and officials of the ONC are supposed to determine whether or not the claims are acceptable according to government policy and law. If they are, additional funding is granted in the form of loans to the associations for further research and for negotiation. These loans must be reimbursed from the proceeds of the eventual settlements.

In 1980 the government appointed the first chief government negotiator from outside the public service to bring a fresh and more neutral perspective to the negotiation of comprehensive claims. These claims are now negotiated by such appointees, who work on contract, assisted by negotiating teams in the ONC.

The Progress of Specific Claims In Nov 1984, 87 specific claims, as defined by the ONC, had been filed or submitted to the federal government for review; 83 others had been accepted and were under negotiation; and 19 others had been settled. Many more claims are likely to be identified and put forward in the future. In BC, a number of Indian bands sought restitution for land that was "cut off" from reserves by the federal and provincial governments; several of these claims have been settled. In Alberta, Saskatchewan and Manitoba most of the claims concerned lands to which the Indians were entitled under various treaties but which were not fully allocated. In Manitoba several bands received benefits under the terms of the Manitoba Flood Agreement of 1978, concerning the effects of damming certain rivers flowing to Hudson Bay. A special Indian Claims Commission had been established in Ontario to facilitate the negotiation of claims there. Other specific claims had been accepted for negotiation in Québec, NS and NB. The claims of the Wagmatcook Band, NS, and the Oromocto Band, NB, were settled in Jan 1981 and Mar 1983, respectively, through negotiations.

The Progress of Comprehensive Claims Comprehensive claims cover about half of the total area of Canada. Problems include the differing powers and objectives of federal and provincial governments; the different legal status and goals of Indians, Métis and Inuit; the overlapping of native territorial claims; the divergence of native desire for independence and government's wish to exercise control; conflict caused by industrial development and political evolution in the North and constitutional changes in Canada.

By Nov 1984, 7 comprehensive claims had been filed or submitted for review (6 in BC, 1 in Nfld). Sixteen claims had been accepted for future negotiation (13 in BC, 1 in Qué and 2 in Labrador). Five claims were under negotiation (Council for Yukon Indians, all of Yukon Territory; Dene Nation and Métis Assn of NWT, Mackenzie R Valley; Tungavik Federation of Nunavut; Conseil Attikamek-Montagnais du Québec, east-central Québec; and Nishga Tribal Council, Nass R Valley, BC). Three claims had been settled and legislated (JAMES BAY and Northern Québec Agreement, settled Nov 1975; Northeastern Québec Agreement, settled Jan 1978; and Inuvialuit Final Agreement [*see* COPE], settled June 1984).

Recent Developments During the decade of formal treatment of comprehensive claims, the circumstances that gave rise to the claims changed. Improved transportation and communication and the educational nature of the claims process itself modified the differences between native and non-native people. In the northern territories, native people gained effective political influence, and national economic conditions reduced both the scale of industrial development and native opposition to such development.

The CONSTITUTION ACT, 1982, with its recognition of aboriginal and treaty rights, will have important implications for native claims, but the details have not yet been worked out.

KEITH CROWE

Reading: P. Cumming and N. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); G. Dacks, *A Choice of Futures* (1981); R.C. Daniel, *A History of Native Claims Processes in Canada* (1980).

Land God Gave to Cain, The, was Jacques CARTIER's description of the N shore of the Gulf of St Lawrence, which he first sighted in 1534. Cartier was presumably alluding to Genesis 4, in which Cain, having killed his brother, is condemned to till land that is barren.

Land Question, PEI In 1767 the British government decided to allocate, prior to settlement, virtually all of PEI to proprietors who would become semi-feudal resident landlords paying annual quitrents to the Crown to finance the cost of governing and colonizing the island. Most proprietors remained absentees, their quitrents perpetually in arrears and their colonizing obligations unfulfilled. Soon after 1770, PEI residents sought to force the proprietors either to live up to their obligations or to surrender their land to those in actual possession. An attempt by Walter Patterson's island government to force the sale of land by distraint proceedings (seizure of property) in 1780-81 failed. The question had already taken on a circular quality it was never to lose. The island's elite insisted that the terms of the grants, which were quite unrealistic, be fulfilled or the land be forfeited, whereas the proprietors insisted that they could not fulfil the terms because the actions of the island's elite and government made any investment on the island insecure.

Escheat, the process by which unimproved lands would revert to the Crown and become subject to reallocation, became the rallying cry throughout the 19th century, although it shifted considerably in meaning. Under Edmund Fanning, lieutenant-governor 1787-1804, and his immediate successors, escheat implied little

more than the transfer of proprietorship from absentee to resident landlord. But the 1830 enfranchisement of Roman Catholics, most of them tenants, led to the emergence of a popularly based Escheat Party, which called for distribution of the land to those in actual occupation. The British government, ever protective of property rights, opposed escheat without compensation. Gradually the absentees were eliminated. By the 1880s most of PEI was owned by the small yeoman farmers in actual occupation. But resentment over the Land Question remained, particularly against Britain for its refusal to respect the popular will, and in some quarters against Island governments which had acquiesced in the principle of compensation.

J.M. BUMSTED

Landform Regions, *see* PHYSIOGRAPHIC REGIONS.

Landlord and Tenant Law, governed by provincial statutes and judge-made law, varies considerably from province to province. Essentially, a landlord and tenant relationship is contractual (*see* CONTRACT LAW). The tenant acquires an interest in land and the right to exclusive possession of defined premises. However, not every person permitted to occupy the premises of another is a tenant in the eyes of the law; for example, boarders or lodgers, who are not granted exclusive possession, would not qualify. Most leases are either for a fixed period, eg, 1 year, or for a periodic term, eg, from month to month. If the latter, the lease may be terminated by either party by giving appropriate notice (usually set out by statute). Leases do not have to be written, although in some provinces long-term leases must be in written form and signed by the parties. Many of the obligations owed by the landlords and tenants to each other defy precise definition; in the absence of express, agreed terms upon which they generally depend, the law will imply certain obligations. The tenant's primary responsibility is to pay rent; the landlord's corresponding obligation is to provide the premises to the tenant, together with the assurance that the tenant has the right to enjoy possession of the premises. Consequently, a landlord who interferes with this possession, even indirectly, eg, by permitting noxious fumes to seep into the rented premises, may be in breach of the lease agreement.

Within the last 20 years statutory reforms have greatly redefined the obligations of both landlords and tenants, but they have been primarily concerned with residential leases and have not greatly altered the existing law respecting commercial leases. They have tended to enhance the legal position of the tenant, and many new tenant rights cannot be altered by a contrary provision in the lease. In commercial tenancies, landlords are under no statutory obligation to keep the premises in good or even reasonable state of repair, but under the reforms the landlord of residential property must undertake all major repairs. The tenant's only obligation is to maintain the property in a reasonably clean condition and to use it suitably. Tenants have a right to assign or sublet the rented premises to others, unless the lease provides otherwise. Sometimes the tenancy agreement will require the landlord's consent to any assignment or sublease, in which case the landlord may not unreasonably or arbitrarily withhold consent. If a tenant violates the tenancy agreement by failing to pay rent or by abandoning the premises prior to the termination of the lease or in other ways, a landlord may sue the tenant to recover arrears of rent or damages. A landlord may sue to repossess the premises, in which case a court order may be necessary if the tenant does not consent.

M.M. LITMAN AND BRUCE ZIFF

Landry, Sir Pierre-Amand, lawyer, politician, judge (b at Memramcook, NB 1 May 1846; d at Dorchester, NB 28 July 1916). He was the first NB Acadian Cabinet minister and Supreme Court judge, and the only knighted Acadian (1916). He articled with Albert J. SMITH and practised in Dorchester. In 1870 he was elected MLA for Westmorland County. Defeated in 1874, he was re-elected in 1878 and in 1883, serving as commissioner of public works and provincial secretary. Elected MP for Kent County in 1883 and 1887, he carried Acadian support to John A. MACDONALD and lobbied for Acadians and for NB. In 1890 he was appointed a county court judge and was raised to the NB Supreme Court bench in 1893. DELLA M.M. STANLEY

Landscape Architecture refers to the conscious modification and shaping of outdoor environments for human use. In the past, those who conceived and implemented landscape designs were trained in such diverse skills as horticulture, gardening, ARCHITECTURE, AGRICULTURE, SILVICULTURE and hydraulics. Although the field was generally regarded as horticultural, adoption by mid-19th century of the term landscape architecture was meant to convey the growing significance of both environmental concerns and professionalism in landscape design. Today's landscape architects are often involved in projects relating more to planning or URBAN DESIGN. While they continue to work extensively with plant materials and landform, they do so with regard to ecological considerations, resource conservation and the creation of outdoor spaces rather than simply for the aesthetic qualities of plants.

European and American influences have affected landscape architecture in Canada. Publications and immigrants from both countries were sources of ideas about gardening styles, park design, new-town planning, garden suburbs and city beautification. Americans were also influenced by British ideas, but they expanded the scope of landscape architecture beyond garden design to include large-scale planning. European and American landscape architects were brought to Canada to work on important projects such as the National Capital Region Plan, Mount Royal Park, the Niagara parks and numerous city planning schemes in the early 20th century. Since a university degree in landscape architecture was not offered in Canada until 1964, many Canadians went to the US to study and to work before returning to practise in Canada.

The work of early Canadian practitioners clearly indicates their varied origins and training. George Laing and Charles Woolverton came from an agricultural and horticultural tradition, as their gardenesque designs for large estates indicate. H. Dunnington-Grubb and his English wife Laurie were trained in the aristocratic traditions of the beaux-arts style, of which the Oakes Garden at NIAGARA FALLS is a surviving example. Others such as Gordon Culham, Frederick Todd, Humphrey CARVER and Carl Borgstrom were more concerned with social issues and the integration of nature into urban environments. The National Capital Region is probably the best example in Canada of the continuing influence of landscape architects in the design process, though the work done by Calvert Vaux at the Houses of Parliament no longer exists and that of Frederick Todd was never implemented as he had envisioned (*see* NATIONAL CAPITAL COMMISSION).

Since WWII, opportunities for landscape architects in Canada have greatly increased. Rapid urban expansion, economic growth and various government programs have meant more involvement in urban design, regional planning, and the design of recreational areas, housing environments and industrial sites (*see* URBAN AND REGIONAL PLANNING; ZONING). The Canadian Society of Landscape Architects was established in Toronto in 1934 and professional programs at Canadian universities have been developed; both the society and the programs have encouraged landscape architecture that is better adapted to Canadian needs and conditions. Major projects such as EXPO 67, Don Mills, campus planning, urban open-space systems and Olympic development have helped to bring public recognition to the profession and establish its role in the environmental design process (*see* DEVELOPMENT INDUSTRY).

Landscape architecture involves economical and efficient use of land, together with a concern for its visual appearance and social purpose. Projects may range in scale and emphasis from detailed site design to comprehensive development plans. Though landscape architects work primarily on recreational, commercial and institutional projects, they are now becoming more involved in large-scale planning, landscape rehabilitation and reclamation, visual resources management and historic landscape conservation and restoration. These new specializations require additional training in environmental psychology, HERITAGE CONSERVATION, soils chemistry, and public-participation processes, although the basis of the profession continues to lie in an ethic of conservation and stewardship of the land.

The universities of Guelph and Manitoba and the PUBLIC ARCHIVES OF CANADA house important archival material relating to landscape architecture in Canada. Of particular interest are the J. Austin Floyd Papers at PAC and the collected drawings of H. Dunnington-Grubb at Guelph. Evidence suggests that landscape architects have worked in Canada since the early settlement period, but little is known about them or their works. Protection and restoration of some important examples of landscape architecture have been undertaken by Parks Canada (eg, MOTHERWELL HOMESTEAD, Sask), and other groups are also becoming increasingly active in preservation.

The first professional landscape architecture program in the world was established at Harvard in 1900. The first Canadian professional degree program was instituted at Guelph in 1964 and is available at both a bachelor's and master's level. The U of Manitoba offers a master's degree, and U of T, U de Montréal and UBC offer Bachelor of Landscape Architecture degrees. Diploma courses in landscape technology and architecture are available from several colleges and technical schools.

The Canadian Society of Landscape Architects deals with matters pertaining to maintenance of high standards of professional practice in Canada, including ethics, publicity, education and archives. In matters of licensing and registration, associations from each province (the Maritimes has a joint association) are the controlling bodies. SUE DONALDSON

Reading: S. Buggey and J. Stewart, "Canada's Living Past: Historic Landscapes and Gardens," *OALA Review* 2 (Aug 1976).

Landslide, downward and outward movement of a SOIL mass that formed part of a slope. Although the term landslide often has a broad meaning, this entry is restricted to landslides in soils and excludes creep movements, falls and ROCKSLIDES. A landslide may occur with or without any apparent disturbance and involves a soil mass ranging from a few to several million cubic metres. Slope failure may occur within a few minutes or take several months or even years. Landslides occur in every province in Canada and in both natural and man-made slopes. Slope failures have been responsible for loss of life, destruction of property, reduction in property values, loss of productivity of agricultural and forested land, disruption of transportation systems and destruction of utilities.

The common landslide types (circular-arc failure and noncircular-arc or translational failure) can be analysed and the risk of failure cal-

culated. The major causes of slope failure are removing material at or near the base of a slope by natural EROSION or human excavation; adding weight to the upper part of a slope by natural or human agencies; increasing the water pressure within the slope by rainfall or snowmelt, local irrigation or leaking sewer or water mains. Land-use studies in the design stages of a project can avoid or minimize subsequent landslide activity.

Clayey soils were deposited in the CHAMPLAIN SEA that invaded the St Lawrence and Ottawa River lowlands between 11 000 and 8000 years ago. These sediments are termed sensitive CLAYS and transform from a brittle soil to a viscous fluid when sufficiently disturbed. This transformation occurs quickly and with little warning. The remolded mass can flow for long distances. Thousands of landslides have been identified on air photographs. In 50 large, documented landslides in sensitive clays in eastern Ontario and Québec over 100 people have been killed and 40 000 ha of land destroyed. The South Nation River landslide (16-17 May 1971) occurred at a site 48 km E of Ottawa and involved nearly 28 ha. Debris from the failure was carried upstream and downstream, filling nearly 2.5 km of the riverbed to a depth of 11 m. At St-Jean-Vianney, Qué, another major landslide in the sensitive clay destroyed 27 ha and 40 homes, and killed 31 persons in 5 minutes (4 May 1971).

Landslides contribute to the retreat of the stiff clay bluffs along the N shore of Lk Erie and the Scarborough Bluffs E of Toronto on Lk Ontario. In Winnipeg, slope instability along the Red and Assiniboine rivers has been a problem for many years.

Over large areas of the western Canadian PRAIRIE, a thin veneer of late Pleistocene deposits rests on the soft rocks of Upper Cretaceous age. During deglaciation, some 10 000 years ago, RIVERS were diverted from their preglacial courses and rapidly eroded deep, steep-walled, postglacial valleys (*see* GLACIATION). Geologic evidence indicates that the rivers have been eroding laterally for about the last 6000 years (*see* RIVER LANDFORM). This lateral erosion, which removes support at the base of the slopes, results in reactivation of ancient landslides and in many recent landslides. Because the soil strata are flat lying, the failed mass undergoes a dominantly translational movement. At a site on the South Saskatchewan River, S of Saskatoon, erosion at the toe of the slope is causing slope failure. Many similar cases have been documented in Saskatchewan and Alberta. A landslide, largely the result of toe erosion, is endangering the bridge across the Little Smoky River N of Valleyview, Alta. The bridge was completed in 1957; movement was noticed the following year. The distribution of landslides along major rivers in southern Alberta shows that clayey bedrock deposited in ancient marine seas is most prone to failure. Slope failures in Saskatoon appear to be caused mainly by erosion from groundwater seepage, augmented by lawn watering. In the Edmonton area, many landslides have been induced by human activity.

In the Vancouver area, the most common and destructive landslides are debris AVALANCHES and debris flows. These failures are triggered by heavy rains that saturate the surface layer of soil. As this saturated mass moves down the steep slopes, it gains volume and velocity. The major result is damaged and destroyed property near the base of the slope. Dikes were installed at Port Alice on Vancouver I to protect the town from debris flows such as those which occurred in 1973 and 1975.

In the PERMAFROST areas of the western Canadian Arctic, many landslides are caused by melting ground ice which is exposed by sea or river erosion or by the destruction of vegetation on slopes by forest fires. The ice melts during summer and the overlying soil collapses and is carried away by the meltwater. The retreat of the top of the slope can amount to several metres per year. S. THOMSON

Landymore, William Moss, naval officer (b at Brantford, Ont 31 July 1916). He joined the Royal Canadian Navy in 1936 and was promoted lieutenant in 1940. Landymore saw action in the Arctic, Atlantic and Pacific oceans during WWII and commanded the destroyer *Iroquois* off Korea, 1951-53. He was promoted captain in 1953 and held a series of posts until 1963 when, as rear admiral, he became flag officer, Pacific coast. In 1965 he was appointed officer commanding, Maritime Command, but a bitter public disagreement over unification led to his early retirement in 1966. MARC MILNER

Lane, George, rancher (b near Des Moines, Iowa 6 Mar 1856; d at Bar U Ranch, near Pekisko, Alta 24 Sept 1925). Lane came to the Canadian West from Montana in 1883 and was hired as a ranch foreman by the North West Cattle Co. In 1891 he went into the stock business for himself and, with the 1905 purchase of the Bar U Ranch, became one of the largest ranchers in Alberta. Lane also developed one of the continent's outstanding Percheron breeding herds and was one of the "Big Four" who organized the first CALGARY STAMPEDE. DAVID H. BREEN

Reading: David H. Breen, *The Canadian Prairie West* (1983).

Lane, Patrick, poet (b at Nelson, BC 26 Mar 1939). Lane began publishing himself and others in the 1960s when still leading a nomadic knockabout life in northern BC logging camps, small towns and mines, and his poetry has remained true to the ideals of brutal honesty and self-reliance. Important early collections were *Letters from the Savage Mind* (1966) and *Separations* (1969). There were also many chapbooks and broadsides published from wherever the poet happened to be at the moment and distributed to other poets. Such people constituted his primary readership until the publication by Oxford University Press of *Poems New and Selected* (1978, Gov Gen's Award). Lane's poetry at its most characteristic deals straightforwardly, yet with lush descriptive imagery, with man's rough treatment of his environment and of his fellow human beings. Several of his books are illustrated with his own graphic works. Lane is the brother of the near-legendary poet Red Lane (1936-64) and he edited the *Collected Poems of Red Lane* (1968). DOUG FETHERLING

Lang, Charles Benjamin, industrialist (b at Thornton, Ill 17 Sept 1887; d at Montréal 23 Feb 1958). For 44 years Lang was an executive of the Dominion Steel and Coal Corporation (DOSCO), Maritime Canada's largest integrated steel producer. After working with the Brownell Improvement Co and several Chicago-area steel companies, Lang went to Montréal 1914 as manager of Peck Rolling Mills. By 1920 he was managing director. In 1930 he joined DOSCO as a vice-president. He had a sound knowledge of the steel industry and utter devotion to his company. In 1948 he became president of DOSCO and its subsidiary companies and was chairman from 1950 until he retired in 1957. The unexpected death of his successor as president obliged Lang to return to DOSCO at age 70. He died in office. DUNCAN MCDOWALL

Langevin, André, writer (b at Montréal 11 July 1927). His first 3 books made him one of the most celebrated novelists in Québec before 1960, first year of the QUIET REVOLUTION These books introduced a new problematic into Québec letters, inspired by existentialism and Albert Camus's humanism; *Poussière sur la ville* (1953) is still the best known. With its sympathetic presentation of secular (rather than the traditional, church-dominated) culture and its tragic but nonpuritanical view of love, the novel foreshadowed value changes that have since become part of Québec. Two later novels had a more contemporary treatment, especially *L'Elan d'Amérique* (1972), which borrowed aspects of the French nouveau roman. *Une chaîne dans le parc* (1974) in some ways echoed *Évadé de la nuit* (1951), with its autobiographical themes. Langevin's novels are moving, packed with meaning and carefully written. All deal with man's vain efforts to escape fate, which sometimes wears the Christian face of an evil Providence. Langevin is also a playwright and columnist (notably in *Le Magazine Maclean,* 1961-69), dealing with culture, education and politics. ANDRÉ BROCHU

Langevin, Sir Hector-Louis, lawyer, journalist, politician (b at Québec C 25 Aug 1826; d there 11 June 1906). He was admitted to the bar on 9 Oct 1850 and turned to journalism in 1847, becoming editor of *Mêlanges religieux* and a contributor to *Journal d'Agriculture;* editor of *Le Courrier du Canada* in 1857; political editor of *Le Canadien* 1872-75; and owner of *Le Monde* in 1884. He began his political career as mayor of Québec C (1857-61) and was elected in 1857 to represent Dorchester County in the Assembly, serving as solicitor general for Lower Canada 1864-66 and postmaster general 1866-67. He was also head of the ST-JEAN-BAPTISTE SOCIETY in Québec C 1861-63 and of the INSTITUT CANADIEN 1863-64.

Langevin was a FATHER OF CONFEDERATION, defending Québec's interests at the CHARLOTTETOWN and QUÉBEC CONFERENCES in 1864 and at the LONDON CONFERENCE in 1866. After 1867 he represented Dorchester County in both Québec and Ottawa until dual representation was abolished in 1874. In Ottawa he was secretary of state and superintendent of Indian affairs in John A. MACDONALD's Cabinet 1867-69 and minister of public works 1869-73. He succeeded George-Etienne CARTIER as leader of the Québec wing of the Conservative Party 1873-91. He was implicated in the PACIFIC SCANDAL and did not stand in the next federal election. His return to active political life in 1876 was delayed by a contested election in Charlevoix, but in 1878, after a defeat in Rimouski County, he was elected for Trois-Rivières. Langevin had considerable influence in the Macdonald government following the 1878 election. He headed the post office 1878-79 and then public works 1879-91. Compromised by another scandal and linked to Thomas McGreevy's patronage, Langevin was forced out of the Cabinet after Macdonald died. He retired from politics in 1896. ANDRÉE DÉSILETS

Reading: Andrée Désilets, *Hector-Louis Langevin* (1969).

Langford, Sam, "The Boston Tar Baby," boxer (b at Weymouth Falls, NS 4 Mar 1886; d at Cambridge, Mass 12 Jan 1956). Langford fought professionally in the lightweight, welterweight, middleweight and light-heavyweight ranks, finishing as a heavyweight. His best weight was just over 77 kg, though he retired weighing over 90.7 kg despite his 167 cm height. He has been considered one of the best half-dozen heavyweight boxers ever to fight, though he never fought for the world championship. He was denied a bout with champion Jack Johnson, because Johnson's management claimed that 2 blacks would not draw. Langford held the Welsh middleweight crown and the heavyweight championships of England, Spain and Mexico; he won the last despite being declared legally blind at the time of the 1923 fight. Canadian Press named him "Boxer of the Half-Century." A.J. "SANDY" YOUNG

Langley, BC, District Municipality, pop 44 617 (1981c), inc city 1955, is located about 45 km E of Vancouver. FORT LANGLEY, an HBC post built 1829 and now restored, was BC's first capital. It

was named after HBC director Thomas Langley. Before the advent of the Trans-Canada Hwy in the early 1960s, the area had an economy based largely on agriculture; Langley City was its trade and service centre. Improved access and land suited for subdivision led to a residential construction boom. Large industrial estates have drawn numerous manufacturing and warehousing operations and made Langley a regional commercial and industrial centre. Enterprises include a distillery, cedar-products firm, machine shops and meat packers. Poultry productions, dairying, beef farming and berry growing are part of a thriving agricultural economy. Attractions include historic Fort Langley.

ALAN F.J. ARTIBISE

Langstaff, Annie, née MacDonald, feminist, legal scholar, aviatrix (b at Alexandria, Ont 1887; d at Montréal 29 June 1975). First woman graduate of McGill's professional schools and first woman graduate in law in Québec (first-class honours, 1914), she achieved notoriety as a result of litigation against the Québec Bar, in which she sought permission to take its qualifying examinations Defeated, Langstaff returned as a para-legal in 1916 to the Montréal law firm of her sponsor and advocate, Samuel W. Jacobs. She wrote several articles on FAMILY LAW published in popular women's journals, as well as the unique *French-English, English-French Law Dictionary* (1937), and continued to agitate for the admission of women to law practice in Québec until it was achieved in 1942. Langstaff herself was never admitted to the bar. G.B. BAKER

Reading: M. Gillett, *We Walked Very Warily* (1981).

Langton, Hugh Hornby, librarian, editor, historian, translator (b at Québec C 29 Aug 1862; d at Toronto 30 Sept 1953), son of John LANGTON. Educated at U of T, he was the first full-time registrar of the university 1887-92 and its librarian 1892-1923. He established the library on a firm footing after the fire of 1890, and he developed the collection, staff, services, procedures and traditions from which the present system has grown. He also brought high standards to his role as the first general editor of the university's scholarly publishing program, 1897-1923, and as joint editor with George M. WRONG of the *Chronicles of Canada* (32 vols 1914-16) and of *The Review of Historial Publications Relating to Canada* (1897-1919), which at his initiative became the the CANADIAN HISTORICAL REVIEW. After retiring in 1923 he continued to translate for the CHAMPLAIN SOCIETY, to edit and to write biographies. His last publication was an edition of journals and letters of his aunt Anne Langton, *A Gentlewoman in Upper Canada* (1950).

ROBERT H. BLACKBURN

Langton, John, first auditor general of Canada (b at Blythe Hall near Ormskirk, Eng 6 Apr 1808; d at Toronto 19 Mar 1894). Educated at Cambridge, he immigrated to Canada in 1833 where he established a farm near Fenelon Falls, Upper Canada. He represented Peterborough in the Assembly of the Province of Canada 1851-55. His grasp of administration led in 1855 to his appointment as first auditor for the Province of Canada. As auditor he established systematic and responsible accounting, and after Confederation he became the first auditor general of the Dominion. When the Treasury Board was founded in 1869 he was its secretary. From 1870 till his retirement in 1878 he was in the unique and somewhat anomalous position of being both auditor general and deputy minister of finance. As vice-chancellor of University of Toronto, elected in 1856, he pushed ahead with plans to convert a large part of the endowment into the University College building, a project he managed to get planned and completed within 3 years.

ROBERT H. BLACKBURN

Language is a term that covers a vast array of concepts best understood through a series of basic distinctions. Language is a form of communication — specifically, a communication system based on human sounds. There are several types of communication systems, which can be based on touch, scent, movement, colour, gesture and even the electrical impulses that pass through computers. A bee is able to communicate the location of nectar by performing a dance for other bees in the hive, just as the peacock can communicate by displaying brightly coloured feathers and strutting about. However, such forms of communication do not match the marvelous complexity of human language.

Linguist C.F. Hockett suggested that there are some universal features of human language that distinguish it from other forms of communication. Perhaps most important is "productivity," a feature implying that there are no limitations to what speakers can express through language. We can talk about anything; we are able, with no effort, to utter and understand sentences that we have never heard before. Hockett also noted that language is an arbitrary (or conventional) system: it does not matter what sequence of sounds is used to symbolize a thing or idea, as long as it is mutually agreed upon by the speakers in the community.

A user of language employs syntax (including word order), morphology (word roots, affixes), phonology (functional sounds) and prosody (intonation, stress, tone) in order to categorize things, events and ideas. What is expressed in one language by differences among words may be expressed in another language by differences in grammar or intonation. For example, in Classical Arabic, the notion "to cause" (as in "to cause to remember") is expressed by systematically modifying the verb form. In English, on the other hand, we use either a syntactic construction ("to cause to remember") or a completely different verb (eg, "to remind").

A further distinction within the concept of language should be made between natural and artificial languages. Some artificial languages were invented in response to a desire for a universal medium of communication. Esperanto, Novial and several hundred other artificial languages have been proposed over the past few centuries, but none of them has met with universal acceptance. Computer technology has brought about another kind of artificial language: FORTRAN, BASIC and COBOL are some of the codes with which humans can communicate with machines, but none of them is nearly as elaborate as a natural language. Natural languages have evolved within communities, some of them over many millennia; they are all based on human speech sounds, with the exception of sign languages (used by the deaf). An infant surrounded by individuals speaking a particular language will eventually learn that language just as he learns the behaviours expected of him by his family and community.

Only those who succeed in speaking a language to the satisfaction of a given linguistic group are eventually integrated into the group. It is as if the speech community were to say, "this person, who speaks like one of us, must be one of us." Language, even more than religion, social behaviour, dress, food or custom, is the most integrative and exclusive component of culture. As a living monument fashioned by countless generations of users it has encoded all that its speakers have considered important. It has also left uncoded that which was considered unimportant. For example, nomadic Canadian Inuit on the fringes of the Arctic seas had little interest in distinguishing different types of trees; what they needed were words to talk about snow. In some Inuit dialects, more than 50 words referring to ice and snow are in use. All cultures have words that reflect their needs.

Language, Dialect and Register It has been said that no 2 people, not even twins, speak the same language in exactly the same way. Every individual has an *idiolect*, yet the degree of individual difference cannot be such as to make mutual comprehension impossible. Groups of people who communicate frequently develop a common speech and a threshold of tolerance for individual speech differences. Consequently, people living in the same region are likely to speak in a similar way; ie, they speak the same *dialect*. Dialects have traditionally been described along 2 parameters, geographic and social. Just as people tend to speak in a manner similar to that of those living nearby, their speech usually resembles that of their socioeconomic peers. An example of a dialect based on social position is the British *RP* "received pronunciation", the "public school" accents of English as spoken by the people educated in the private schools of Great Britain. Language varies in degree of formality depending on the occasion and on the relative familiarity of the speakers. Thus everyone speaks a number of different *registers*. What is appropriate in speaking to a family member may not be acceptable to a group of strangers at a public meeting, and we adjust our speech accordingly.

Languages of the World Since the difference between adjacent speech communities is one of degree, there has not always been total agreement on what dialect belongs to which language, and in some cases there is debate as to whether a given dialect is, in fact, a separate language. This has influenced estimates of the number of languages there are in the world: counts have ranged from 3000 to about 8000. Recognition of a dialect as a language is a matter of circumstance. In the past, the dialect of the royal court, the capital city or the seat of national government was usually selected as a state's language (*see* ENGLISH LANGUAGE; FRENCH LANGUAGE). Today linguists seek more objective criteria (eg, mutual intelligibility) for recognizing a language. If 2 speech communities can understand each other they are commonly thought to speak dialects of the same language, whereas 2 communities using mutually unintelligible speech might claim to be speaking 2 different languages. This is generally the way in which distinctions are made today, although political boundaries still have an influence on linguistic classification.

Languages are grouped into families, a language family being a number of languages that have all developed historically from the same *protolanguage* (source language). There are a number of families in the world, including Sino-Tibetan, Afro-Asiatic, Uralic-Altaic, Austronesian and Uto-Aztecan. The languages of Canada's native people have been grouped into Algonquian, Athapaskan, Salishan, Wakashan and other families (*see* NATIVE PEOPLE, LANGUAGES). One of the world's largest and most widespread language families is Indo-European, whose members include English, French, Irish, Spanish, Romanian, Russian, Greek, Farsi (Persian), Armenian and Hindi. The English language belongs to the so-called Germanic branch of this family, as do German, Dutch, Yiddish, Danish, Icelandic and many others. French belongs to the Italic branch, which includes Italian, Latin, Portuguese, Spanish, Italian, Romanian and others.

Language Change Language differentiation is a function of time and space. When a group of people emigrates from its home community, the farther away it goes and the longer it remains isolated, the more different its language will become from that spoken in the area of origin. Although related languages may be mutually incomprehensible, it is possible, using techniques of comparative reconstruction, to establish sound-to-sound and word-to-word rela-

tionships — even if the groups have been apart for a thousand years or more. The same techniques that permit the identification of related languages also show how one language evolves into another. By comparing forms of the same word in documents of different dates, linguists have demonstrated, for example, the conditions under which the Latin of the Roman legions and their subjects developed into Spanish in Spain, French in France and Romanian in Romania. The process continues today, as the Haitian language clearly shows: on the early plantations of Haiti, the African slaves speaking mutually incomprehensible languages developed their own simplified version of the speech of their French-speaking supervisors; in a few generations, this creole developed into the national speech of all Haitians.

Official Languages A nation in which many languages are spoken may choose to do all its legal, administrative and other official business in one or more official languages. Canada, which has a great many languages as a result of both indigenous development and immigration, has adopted 2 OFFICIAL LANGUAGES, English and French. A language may be official according to 2 principles, the principle of territoriality and the principle of personality. According to the first, it is the individual who must accommodate to the language of the state. According to the second, it is the state that must accommodate to the language of the individual. The principle of territoriality was adopted for the first time in 1974 as the basis for Québec's Official Languages Act. By contrast, in 1969 both Canada and New Brunswick had formalized through their Official Languages Acts the application of the principle of personality in all dealings, in English or French, between the government and its citizens. *See* BILINGUALISM; DICTIONARY; ETHNIC LANGUAGES; LANGUAGES IN USE; LINGUISTICS; TRANSLATION WILLIAM F. MACKEY

Language Policy, official efforts to affect the relative status and use of one or more languages. Language policies of one sort or another have featured in human history from the earliest times. Latin was carried along with the military conquests of the Romans; French, once one of several dialects within France's borders, was deliberately developed as a unifying national tongue at Cardinal Richelieu's instigation.

In a strictly monolingual society, language policy is usually concerned exclusively with promoting an approved, standard grammar of the common language, but in Canada the term is more often associated with a multilingual situation where several languages are in contact or even in conflict. Language policy in Canada is designed to influence the relative use of the various languages in whatever ways are currently judged to serve the general interest. As those perceptions change over time, so does the consensus about what constitutes linguistic justice. Language policy is not a fixed law, but an evolving accommodation to changing linguistic circumstances and the social and political climate (*see* ETHNIC AND RACE RELATIONS).

The History of Language Policy in Canada Canadian language policy is the fruit of the historical relationships among various language communities. The national language debate has often focused on the use of English and French (see FRANCOPHONE-ANGLOPHONE RELATIONS), but both Canada's official languages were preceded by the languages of the Inuit and Indian races and succeeded by many other European and non-European languages (*see* NATIVE PEOPLE, LANGUAGES).

Of the 3.5 million inhabitants of the 4 original Canadian provinces in 1871, over 2 million were British in origin and over 1 million were French. By 1981, the proportion of those of British origin in the population had decreased substantially. Of 24 350 000 Canadians, 6.2 million claimed French as mother tongue; 15 million claimed English, and over 3 million claimed a language other than English or French. The English-speaking community is distributed fairly evenly across Canada, but French speaking Canadians are concentrated in Quebec, New Brunswick, Ontario and parts of Manitoba.

It may be assumed that the earliest language policy in the colonies resulted from the usual highly pragmatic and commercial decisions that characterize new contacts between language groups, eg, decisions about which of the available native or European languages best suited the task at hand. But as the confrontation between the 2 colonizing powers spread to N America, the stage was set for generations of conflict over language and the development of distinctively Canadian language policies. Since the concerns of Indian and Inuit languages were seldom given serious attention, the heart of the Canadian language question became the relative standing and sanctioned uses of English and French.

The terms by which French territory was ceded to the British in 1763 were, on the surface, unusually tolerant. Continued use of French by the French-speaking population was, in principle, enshrined in the QUEBEC ACT of 1774 and the CONSTITUTIONAL ACT, 1791. Whether this was prudent was warmly debated. The view that it was politically unwise to foster the coexistence of 2 major linguistic communities within a single state was expressed by Lord DURHAM, who argued to that effect in his report. Others argued that, because the French and English were effectively partners in the founding of the colonies and therefore of Canada, some degree of linguistic pluralism was inherent in a united Canada.

French in Canada, whether through official tolerance or native resilience, remained vigorous in many domains of public and private life. By consecrating some of the more institutional uses of French — in laws, legislatures and courts — the Act of Union (1841) and the BRITISH NORTH AMERICA ACT (1867) were in effect formalizing policies that had already taken root in the developing country. Parents' right to educate their children in English or French was not enshrined in the BNA Act, but the right to maintain denominational schools was, and has often been interpreted as a guarantee of the language of education.

If the French language held its own until Confederation, the next 50 years of Canada's expansion and modernization took a heavy toll both of the use of French and of the policies believed to support it. During the late 19th and early 20th centuries, several public Acts, such as the abrogation of official bilingualism in Manitoba in 1890 (*see* MANITOBA SCHOOLS QUESTION), the abolition of French schools in Ontario in 1912 (*see* ONTARIO SCHOOLS QUESTION) and the strict limitations imposed on French-language instruction in other provinces, were deliberately aimed at repressing the use of French. Moreover, because English was the language of N American commerce, the attractiveness of French tended to decline as the continental economy expanded.

By 1963, when the Royal Commission on BILINGUALISM AND BICULTURALISM was created by PM Lester Pearson, the relative status of the French language had declined to an unacceptable extent. The commission, asked to review and assess Canadian language policy, was primarily concerned with promoting a concerted federal-provincial response to what it called the "crisis" in English-French relations. It also had to take account of the fact that increasing numbers of Canadians no longer had any inborn allegiance to either English or French. Language relations had already entered a new era, but language policy lagged behind. The B and B Commission found that French lagged behind English, eg, in the public service, to a politically and socially unacceptable extent. It urged that a "new charter for the official languages of Canada, a charter founded on the concept of equal partnership" be implemented by both the federal and provincial governments. In 1969, in response to the commission's recommendations Parliament passed the OFFICIAL LANGUAGES ACT, which was supported by all parties. In an ambitious program that followed, the federal government sought to improve its own capacity to deal with Canadians in the official language of their choice and to allow public servants to use either language at work.

Reaction to federal government reforms was often extremely negative. Besides overseeing federal efforts to comply with the Act, the Commissioner of OFFICIAL LANGUAGES (appointed 1969) and others have had to devote much energy to persuading Canadians that these reforms are necessary and just. Some provinces, eg, Ontario and New Brunswick, provide government services in both languages and have tried to implement their own language policies, particularly in regard to minority-language and second-language education.

The principles of the Official Languages Act and other important components of language policy were enshrined in the 1982 Constitution through the CANADIAN CHARTER OF RIGHTS AND FREEDOMS. The impact of the Act, particularly on the field of minority education, has been felt but it does not make federal and provincial policies complementary in every respect. Recent language-policy initiatives by the Quebec government appear to be based on the conviction that it is vital that the interests of the French-speaking majority be fully protected before significant concessions can be made to any other language group, including the English. In 1977 Quebec adopted the charter of the French language, BILL 101, making French the only official language within the province and strengthening its position as the most important language of work, commerce and community life. The right to choose English as the language of schooling has been restricted, as has the public use of any language other than French. However, as the use of French has become more firmly established, the provincial government has shown some willingness to relax these restrictions. New Brunswick has its own provincial Official Languages Act, parallel English and French school systems and legislation requiring equal government treatment of both language groups. In Ontario, home to the largest francophone population outside Quebec, the provincial government has not passed legislation guaranteeing equal status to French as an offical language, although it has gradually expanded French-language services in those parts of the province where the majority of Franco-Ontarians live and has passed legislation making French an official language of courts. Manitoba, under the terms of its entry into Confederation (1870), formally recognized the use of French and English in its laws, its legislature and its courts. It failed, however, to abide by these provisions. Following a 1979 Supreme Court decision requiring reinstatement of institutional bilingualism, the province has been engaged in debating whether to comply retroactively with the Manitoba Act of 1870 or to devise a compromise that would attempt to give contemporary expression to the bilingual spirit of that fundamental law. The matter was submitted to the Supreme Court of Canada in 1984.

Language policy strongly influences EDUCATION POLICY across Canada. Many provinces, supported financially by the federal government, have extended and improved their minority- and second-language education programs (*see* SECOND-LANGUAGE INSTRUCTION). During

the 1970s and 1980s several provincial governments that had not previously done so took steps to provide primary and secondary schooling in French. In spite of recent developments, the English educational network in Quebec remains the most complete minority-language educational system in Canada. In English-speaking provinces the number of students enrolled in French immersion has increased dramatically, and English as a second language is still a compulsory subject for French-speaking children in Quebec through a large part of their elementary and secondary schooling.

There are over 100 languages spoken in Canada, and in some places people of non-English and non-French origin are more numerous than those of English or French extraction, a fact often ignored in the continuing struggle between English and French communities over power sharing. Some social services are available in languages other than English or French, but although Canadian governments officially endorse MULTICULTURALISM, they are vague about the rights and privileges to be accorded these other languages. Whereas the various Inuit and Indian languages are receiving some belated institutional recognition, the so-called "heritage" languages, brought to Canada from all over the world, only rarely enjoy a degree of official support, usually in the form of educational privileges. Some languages, eg, Ukrainian and German, are relatively well established in certain parts of Canada, but many others are maintained voluntarily, almost completely within the family or the community. No clear policy toward all Canadian language groups has been devised. *See also* ENGLISH LANGUAGE; FRENCH LANGUAGE.

MAX YALDEN

Reading: Annual Report of Commissioner of Official Languages; C.A. Sheppard, *The Law of Languages in Canada* (1971); R. Wardhaugh, *Language and Nationhood: The Canadian Experience* (1983).

Languages in Use Canada has 2 official languages (*see* ENGLISH LANGUAGE and FRENCH LANGUAGE), but the country's linguistic wealth is much greater. Beginning with the oldest languages, there are no fewer than 53 Indian and Inuit tongues, some of which seem to be disappearing. In 1981 only about 167 000 persons (0.7% of Canada's 24 million inhabitants), declared these languages as their mother tongue, compared to the 1971 figure of 180 000. According to the 1971 census, 25% of those claiming one of these languages as their mother tongue no longer used that language in the home, at least not as their main language. This is not a new phenomenon; in 1971 those whose mother tongue was an Indian or Inuit language comprised only 58% of those who stated that they were of the corresponding ethnic origin. Since "mother tongue" is defined as the first language learned in childhood and still understood, this figure means that the parents or ancestors of 42% of those with Inuit or Indian backgrounds had already abandoned their ancestral languages (*see* NATIVE PEOPLE, LANGUAGES).

The dominant languages in Canada — English and French — are those of the colonizers. In 1763, when New France was ceded to England, there were about 80 000 French and 20 000 English in the territory that is now Canada. Forty years later, the English were becoming dominant, and by the mid-19th century a state of equilibrium had been established. Although the relative size of the language groups fluctuated in subsequent years, the balance remained fairly constant. Only since 1931 have Canadian censuses provided information on mother tongues for the country as a whole; for earlier periods it must be calculated from information concerning population distribution by ethnic origin. In 1871, however, there was probably not much difference between mother tongue and corresponding ethnic origin.

Language Spoken at Home

	Mother Tongue*	Home Language*	Gain (+) or Loss (−) in %
English	12 974	14 446	+11.3
French	5 794	5 546	− 4.3
Other	2 801	1 576	−43.8

* In thousands

Number of persons whose mother tongue (1981 and 1971) and home language (1971) were one of the 10 most widely spoken languages in Canada
(Source: Canadian censuses, 1971 and 1981)

Language	Mother Tongue* 1981	Mother Tongue* 1971	Home Language* 1971
English	14 918	12 974	14 446
French	6 249	5 794	5 546
Italian	529	538	425
German	523	561	213
Ukrainian	292	310	145
Chinese	224	95	78
Portuguese	166	87	75
Dutch	145	145	36
Polish	128	135	71
Greek	123	104	87

* In thousands

The table indicates that English representation has again risen almost to its 1871 level. French representation fluctuated between 27% and 31% until 1961, and has since decreased. The other language groups grew in relative size until 1931 but since then have declined. The explanation for these movements is very complex, but 2 factors appear primarily responsible — first, the arrival of immigrants who spoke languages other than English or French, which initially increased the size of the "other" group; and second (and more decisive in the long term), the adoption of English by the descendants of these immigrants.

The power of attraction of the English language is easily illustrated by information on the language usually spoken at home, provided for the first time by the 1971 census. When the number of persons with a given mother tongue is compared to the number of persons who use this language mainly in the home, the gains or losses of each language group become clearer.

English gained 1 472 000 but at the expense of the 2 other groups; French lost 248 000 and other languages, 1 225 000. The relative loss of the "other" languages was thus almost 44%. However, closer examination reveals that abandonment of that "other" language, especially in favour of English, is even greater. Among adults with "other" mother tongues, 80% of those born in Canada (40% if born abroad) generally speak a language other than their mother tongue at home. Of adults whose mother tongue is English and who were born in Canada, only 1% (3% if born abroad) do not generally speak English at home, while 8% of those whose mother tongue is French (20% if born abroad) do not generally use their French at home. The long-term ability of the other languages to survive thus appears to be very weak.

Some of these languages, however, are still quite strong. According to the 1981 census, each of 40 languages, other than English and French, is the mother tongue of at least 10 000 people; of these, 18 are spoken by between 10 000 and 25 000 people each; 9 by between 25 000 and 50 000 people; 5 by between 50 000 and 100 000 people; and 8 by between 100 000 and 530 000 people. Table 2 shows the number of people whose mother tongue in 1981 and 1971 was one of these last eight languages, as well as the number of those using mainly these languages in the home (home language) in 1971.

Comparison of the numbers for mother tongue and home language in 1971 reveals the losses suffered by all these languages (except English), and particularly by German, Ukrainian, Dutch and Polish.

A distinction does exist between Québec and the rest of Canada. In Québec, 98% of Francophones keep their mother tongue all their lives; this is also the case for 90% of Anglophones (about 10% have adopted French as their home language), and for about 70% of persons with other mother tongues. Yet in Québec, which is over 80% French-speaking, about 66% of immigrants who have chosen to learn one of the 2 official languages have chosen English (although this may alter as a result of the effects of BILL 101). In the rest of Canada, the situation is more clear cut; almost all Anglophones keep their language; almost all non-English-speaking people who abandon their language choose English; and about 40% of adults with French as their mother tongue speak mostly English at home. In 1976, 94.6% of Anglophones (home language) lived outside Québec; on the other hand, 84.8% of all Francophones lived in Québec. The percentage of Anglophones in Québec (14.7% in 1971) will probably be between 9% and 12% by the year 2000; that of Francophones in the rest of Canada (only 4.4% in 1971) between 2.5% and 3.5%.

Official Languages (%)

Known	1931	1951	1961	1971
English	67.5	67.0	67.4	67.1
French	17.1	19.6	19.1	18.0
English and French	12.7	12.3	12.2	13.4
Neither	2.7	1.1	1.3	1.5
Total	100.0	100.0	100.0	100.0

English-French bilingualism is not very widespread. It is especially prevalent, though, among mother-tongue Francophones and Anglophones living in Québec. For Canada as a whole, 7% of those with English as their mother tongue and 46.2% of those with French as their mother tongue are bilingual. In Québec the figures are 44.9% and 37.8%, and for the rest of Canada, 4.4% and 88.8%.

Here we find another aspect of English language dominance in Canada: while the majority of Anglophones in Québec can ignore the French language, the same is not true for Francophones in other provinces with respect to English. It is conceivable, however, that fewer and fewer Anglophones will be able to live exclusively in English if they wish to remain in Québec.

JACQUES HENRIPIN

Representation of the 3 Major Language (Ethnic) Groups in Canada (%)
(Source: Canadian censuses)

Mother Tongue or Ethnic Origin	1871[1]	1901[2]	1931[3]	1961[4]	1981[4]
English (British)	61.5	57.0	57.0	58.5	61.3
French	29.0	30.7	27.3	28.1	25.7
Other	9.5	12.3	15.7	13.4	13.0
Total	100.0	100.0	100.0	100.0	100.0

[1] Ethnic origin; estimate for territory now comprising Canada
[2] Ethnic origin; Canada without Newfoundland
[3] Mother tongue; Canada without Newfoundland
[4] Mother tongue; all of Canada

Languirand, Jacques, dramatist, essayist (b at Montréal 1 May 1931). In the 1950s and 1960s he was Canada's most important exponent of the theatre of the absurd, having been much influenced by playwrights in vogue during his stay in Paris, 1949-53. Several of his dramatic texts were performed on radio in Montréal before his first stage play, *Les Insolites*, which was performed in 1956 (pub 1962) and awarded the prize for best Canadian play at the Dominion Drama Festival. Other successes were *Les Grands*

Départs (1958) and the musical comedy *Klondyke* (1970). Although his plays focus on the isolation of the individual in a modern society bereft of traditional values, they failed to attract Québec audiences after the onset of the QUIET REVOLUTION. Languirand has since abandoned theatre in favour of more esoteric pursuits in works such as his mystical *La Voie initiatique* (1978) and *Mater Materia* (1980). L.E. DOUCETTE

Lansdowne, Henry Charles Keith Petty-Fitzmaurice, 5th Marquess of, politician, governor general of Canada 1883-88, viceroy of India 1888-93 (b at Lansdowne House, London, Eng 14 Jan 1845; d at Clonmel, Ire 4 June 1927). Henry was educated at Eton and Balliol Coll, Oxford. He entered the Lords as a Liberal and served as a lord of the Treasury 1869-72, as undersecretary for war 1872-74 and, after Gladstone's Liberals returned to power in 1880, as undersecretary of state for India. A model governor general, he presided over the turbulent political period of the NORTH-WEST REBELLION without incident. Soon after he arrived in Canada he organized the despatch of the NILE EXPEDITION. Lansdowne seemed to regard his Canadian years as a respite from the more arduous duties of British public life. CARMAN MILLER

L'Anse Amour Burial Site, located on the Str of Belle Isle coast of southern LABRADOR, was occupied between at least 5500 and 2000 BC by Maritime ARCHAIC Indians who used the area for fishing and hunting harp seals and walrus. The earliest known portion of the site consists of a burial mound which has been radiocarbon dated to between 5500 and 5000 BC. The mound, 8 m across and covered with large boulders, protected an empty burial cist of upright slabs extending one metre below the surface; ½ metre farther below was found the skeleton of an adolescent child covered with red ochre and accompanied by several stone and bone spearpoints and knives, a walrus tusk, harpoon head, ivory carving and bone whistle. It is estimated that the burial ceremony must have involved at least one week's labour for the local hunting band. L'Anse Amour site is the earliest mound burial of this type known at present anywhere in the world. *See also* ARCHAEOLOGY; PREHISTORY.
ROBERT MCGHEE

L'Anse aux Meadows, the first authentic Norse site found in N America, is located on the northern tip of Newfoundland's Great Northern Peninsula. Newfoundlander William A. Munn suggested in 1914 that Norse landings had occurred on this spot, but remains were not discovered until 1960 when the Norwegian explorer and writer Helge Ingstad and his wife, archaeologist Anne Stine, searched the area. The site was excavated by Anne Stine, 1961-68, and by Parks Canada, 1973-76. The Norse remains consist of 3 building complexes, each comprising a large dwelling and associated workshops. Finds show evidence of ironworking and carpentry, the first known iron smelting in the New World. Distinctive artifacts include a bronze pin, a spindle whorl, sewing tools and broken wood objects. Building types, artifacts and radiocarbon dates indicate an occupancy of short duration between 990 and 1050 AD. The site also contains evidence of Groswater, Maritime ARCHAIC and DORSET occupations predating the Norse, and several Indian occupations ranging in date between 900 and 1600 AD. Since 1977 L'Anse aux Meadows has been a National Historic Park administered by Parks Canada. The site was declared a UNESCO World Heritage Site in 1978. The modern settlement (UP, pop 66 by the 1981 census) was first a French fishing station; in 1835 William Decker, an English seaman, founded the fishing and sailing community which since 1977 has derived most of its employment from the park. *See also* NORSE VOYAGES; ARCHAEOLOGY; PREHISTORY. B. L. WALLACE

Lapalme, Georges-Émile, politician (b at Montréal 14 Jan 1907). Leader of the Québec Liberal Party 1950-58, he left his mark as a reformer of the party and thus helped prepare it for its role as catalyst of the QUIET REVOLUTION. The Liberal member for Joliette-L'Assomption in the federal House of Commons, 1945-50, he was afterwards the Liberal member of the Québec Assembly for Outremont 1953-66. He served as deputy premier 1960-64 and attorney general 1960-63, but his greatest contribution was as the first minister of cultural affairs 1961-64. As such, he supervised the creation of the department and was responsible for the actions of the Québec state in cultural matters. After retiring from active political life he was first chairman of the CANADIAN FILM DEVELOPMENT CORP in 1968 and headed the Commission des biens culturels. He published his memoirs 1969-73.
DANIEL LATOUCHE

Lapointe, Ernest, politician, (b at St-Éloi, Qué 6 Oct 1876; d at Montréal 26 Nov 1941). Educated at Rimouski Coll and Laval, he was called to the bar in 1898 and practised law in Rivière-du-Loup and Québec City. He was elected Liberal MP for Kamouraska in 1904. In 1919 he shifted to Québec E, the former riding of Sir Wilfrid LAURIER, which he represented until his death. Lapointe was a little-noticed backbencher in his early years, but the burly, slow-moving member learned English and gradually won respect for his sound judgement and unswerving loyalty to the party. In Laurier's last years he was the most prominent among the younger French Canadian members, and led the debate on the controversial ONTARIO SCHOOLS QUESTION. Under PM Mackenzie KING, Lapointe was minister of marine and fisheries (1921-24), minister of justice (1924-30, 1935-41) and, more importantly, was recognized as King's Québec lieutenant and his most influential adviser. He shared King's commitment to Canadian autonomy, accompanied him to the Imperial Conference of 1926 and chaired the Canadian delegation in the discussions that led to the STATUTE OF WESTMINSTER in 1931. In domestic affairs he was identified with the low-tariff wing of the Liberal Party and with provincial autonomy. As minister of justice he disallowed some of ABERHART's Social Credit legislation in Alberta because of its encroachment on the federal sphere. He did not disallow DUPLESSIS'S PADLOCK ACT, despite its threat to civil liberties, because he believed DISALLOWANCE would strengthen Duplessis's political position in Québec. In 1939 Lapointe's prestige, coupled with his guarantee that there would be no CONSCRIPTION for overseas service, was instrumental in winning French Canadian support for Canadian participation in WWII. His intervention in the Québec provincial elections of Nov 1939 contributed to Duplessis's defeat and the election of a more co-operative Liberal government under GODBOUT. Under Lapointe's leadership, Québec was a federal Liberal stronghold, a pattern that survived long after his death in 1941. H. BLAIR NEATBY

Lapointe, Paul-Marie, writer, journalist (b at St-Félicien, Qué 22 Sept 1929). His unique synthesis of a surrealist heritage and a profoundly N American outlook, along with the richly imaginative nature of his writing, make him one of Québec's greatest poets and among those with the widest influence and audience.

After studies in Chicoutimi and at the École des beaux-arts in Montréal, he published *Le Vierge incendié* (1948), a piercing and violently surrealistic collection, just when Paul-Emile BORDUAS and his friends put out their REFUS GLOBAL manifesto. He then was silent for 12 years while pursuing a career in journalism. He was with *L'Evénement-Journal* 1950-54, *La Presse* 1954-60, was information officer with the short-lived *Nouveau Journal* 1963, and then was editor-in-chief of *Le Magazine Maclean* 1963-68, before joining Radio-Canada where he became programming director for radio. Lapointe published *Choix de poèmes: Arbres* (1960) and *Pour les âmes* (1964), which were republished in 1971 along with *Le Vierge incendié* in his retrospective *Le Réel absolu* (Gov Gen's Award). His poetry was relatively unaffected by the 1960s nationalism, but is imbued with rebellion and sensuality, is close to nature, and shot through with a keen awareness of Western history. His works have been translated for various anthologies and foreign magazines and in 1976 won the prize of the International Poetry Forum in the US. Other collections, including *Tableaux de l'amoureuse* (1974) and *Ecritures* (1980), have joined this exclusively poetic body of work. PIERRE NEPVEU

Laporte, Pierre, politician (b at Montréal 25 Feb 1921). Kidnapped by the FRONT DE LIBÉRATION DU QUÉBEC on 10 Oct 1970, he was killed on Oct 17 and his body was found in St-Hubert, Qué. Originally a journalist and parliamentary correspondent for *Le Devoir*, 1945-61, he was one of Premier Maurice DUPLESSIS's fiercest opponents. He was elected Liberal member for Chambly in a 1961 by-election and served as minister of municipal affairs 1962-66 and cultural affairs 1964-66 during the Jean LESAGE administration. Defeated as a candidate for the Québec Liberal Party leadership in 1970, he held the posts of minister of immigration and of manpower and labour in Robert BOURASSA's government until his death. His murder intensified the OCTOBER CRISIS and was the federal government's justification for imposing the WAR MEASURES ACT.

Larch is the Lat name for CONIFERS of genus *Larix* of the PINE family (Pinaceae). All 10-12 species of *Larix* grow in the Northern Hemisphere; 3 in Canada. Tamarack (*L. laricina*) is a small tree of cold, wet areas from eastern BC to the Atlantic provinces. Alpine larch (*L. lyallii*) occurs at high elevations in southern BC and Alberta. Western larch (*L. occidentalis*) is a large tree of southern BC and southwestern Alberta. Larches are slender, with straight, gradually tapering trunks and narrow, irregular crowns. Larches are the only Canadian deciduous conifers, turning golden and shedding their leaves in fall. The leaves are needlelike, soft and borne in clusters on dwarf twigs. The cones are 1-4 cm long and composed of smooth scales and pointed bracts (modified leaves). Western larch is the most important timber-producing larch. Tamarack is used for pulp. Tannin, for tanning leather, can be extracted from the bark of the larch. JOHN N. OWENS

Eastern larch, or "tamarack" (*Larix Laricina*), with young fruit (pink) and older cones (*artwork by Claire Tremblay*).



Lark, common name for small songbirds of the primarily Old World family Alaudidae. Larks inhabit open country and are ground dwelling. Characteristically, they run or walk, rather than hop. The hind claw is long and sharp; wings are long and pointed. Both sexes are similarly coloured, mainly in subdued browns, which blend with their usual surroundings; young are spotted. Many larks have elaborate, impressive flight songs. Of the world's 75 species, 2 occur in Canada. The horned lark (*Eremophila alpestris*) is a native, holarctic species found throughout Canada. Fond of open expanses, it breeds across prairies, arctic and alpine tundra and sea coasts, even in airports, cultivated fields and pastures. In settled areas, horned larks eat quantities of weed seeds and insects. Although migratory, larks begin nesting before the snow disappears (late Mar). The female constructs the nest, a grass-lined cup dug into the ground, and incubates 3-6 eggs. Horned larks winter from southern Canada southward, congregating in loose flocks. The Eurasian skylark (*Alauda arvensis*), introduced in 1902-03, is now resident on southern Vancouver I. The population remains low and has spread little. The skylark's song is immortalized in English poetry and prose. The MEADOWLARK is not a lark. PHILIP S. TAYLOR

Larkin, Peter Anthony, zoologist, educator (b at Auckland, NZ 11 Dec 1924). Educated at U Sask and at Oxford (Rhodes scholar), he joined the faculty of UBC, where he has served as head of ZOOLOGY, dean of graduate studies and, since 1980, VP of research. Larkin has exerted great influence on the development of policies for natural resource management, both in Canada and abroad, particularly in fisheries. He has also made many original scientific contributions in fish biology, ecology and in the mathematical modelling of biological systems, and he was a founder and director of the Institute of Animal Resource Ecology at UBC.

Larose, Ludger, painter (b at Montréal 1 May 1868; d there 13 Nov 1915). Like many other painters of his day, Larose studied art under Abbé Chabert. In 1887 he left for France where he studied in Delauney's studio at École des beaux-arts, Paris; he subsequently studied with Gustave Moreau and Jean-Paul Laurens. In Rome, around 1891, the young Larose received his first design award. He also made a copy of the famous Raphael painting, *Disputa del Sacramento,* which hangs in the Stanza della Segnatura in the Vatican. His copy was destined for the Sacré-Coeur chapel of Notre-Dame de Montréal. Later, in Paris, he produced 6 more large canvases for this same chapel. Returning home 1894, he taught design at the École normale du Plateau in Montréal until 1910. From 1912 until his death, he taught painting at Westmount Public School. He died after a bout of typhoid fever at age 47, leaving behind some 380 portraits, still lifes and landscapes. MICHEL CHAMPAGNE

Larsen, Henry Asbjorn, mounted policeman, seaman, explorer (b at Fredrikstad, Norway 30 Sept 1899; d at Vancouver 29 Oct 1964). He went to sea in a square-rigger at 15; inspired by the career of his countryman Roald Amundsen, he dreamed of exploring the Arctic. After a voyage to the Beaufort Sea he became a Canadian citizen in 1927, and in 1928 joined the RCMP. He was assigned as first mate to RCMP schooner ST. ROCH on her maiden voyage to the western Arctic in 1928; later that year he was made skipper, a position he retained until 1948. Under Larsen, called by the Inuit "Hanorie Umiarjuag" or "Henry with the Big Ship," the *St. Roch* patrolled the Canadian Arctic coast, often wintering in the North. The first ship to traverse the NORTHWEST PASSAGE from W to E (1940-42), it was the first to make the passage in both directions (1944); later it was the first ship to circumnavigate N America (1950). Larsen retired with the rank of superintendent in 1961.

W.R. MORRISON

Reading: Henry Larsen, *The Big Ship* (1967).



Captain Henry Larsen, who was called Hanorie Umiarjuag ("Henry with the big ship") by the Inuit, is shown aboard RCMP patrol schooner *St. Roch* in the Arctic (*courtesy Public Archives of Canada/C-70771*).

Laser (*l*ight *a*mplification by *s*timulated *e*mission of *r*adiation), device used to generate high-intensity light. Unlike light from conventional sources, which is emitted incoherently (ie, light waves are unsynchronized or scattered) and over a range of frequencies, laser light is coherent (waves move in unison) and monochromatic (of a single colour/frequency). The frequency of the light emitted is determined by the nature of the atoms and molecules making up the laser medium. The maser is a similar device that emits coherent radiation at microwave frequencies. The 3 major components of a laser are the laser medium, an optical cavity for producing feedback (eg, pairs of mirrors), and a means of exciting the laser medium, thereby increasing the energy level (excitation) of the constitutent atoms and molecules (eg, a flash lamp).

Types Maser emission was first demonstrated in 1954 by J.P. Gordon, H.J. Zeiger and C.H. Townes at Columbia University. Arthur L. Schawlow, a graduate of University of Toronto, and Townes proposed a technique for obtaining laser emission in a paper published in 1958. Operation of the first laser was reported by American physicist Theodore Maiman in 1960. This device had a ruby crystal medium.

The first gaseous laser, demonstrated in 1960, used a mixture of helium and neon as the laser medium and had an output power of 15 milliwatts. In 1960 John C. POLANYI, working at University of Toronto, suggested a new type of laser based on the exchange of molecular vibrational energy in a gas. In 1964 this suggestion led to the development by C.K.N. Patel of the carbon dioxide laser, which operates in the infrared. Carbon dioxide lasers are the most powerful CW lasers available at present with outputs of up to 100 000 W. An important advance in carbon dioxide later technology, made in 1970 by A. Jacques Beaulieu, a scientist at the Defence Research Board laboratory in Valcartier, Qué, allowed these lasers to operate efficiently under pulsed conditions and has resulted in many new industrial applications for these devices.

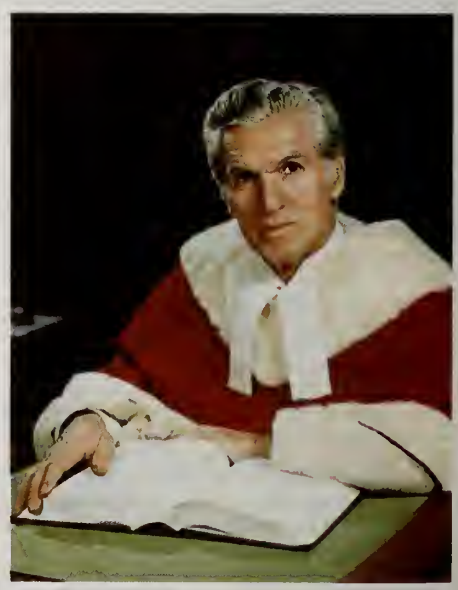
Applications Lasers are widely used in many areas of technology. In industry the high power and narrow beams available have led to applications in materials forming, joining, machining, heat treating and marking. Lasers are extensively used in the manufacture of semiconductor elements and devices (*see* MICROCHIPS). The monochromaticity of laser radiation has opened up new areas in chemistry, through the use of laser radiation to modify chemical reactions and separate isotopes. In COMMUNICATIONS, lasers are used as optical transmission links, often through optical fibres. The science of holography, the generation of 3-dimensional pictures, has expanded with laser development. In medicine, lasers are routinely used in eye surgery and, in the case of the carbon-dioxide laser, as a scalpel in various surgical techniques. Optical lasers, used to read the digital information on compact discs, have revolutionized the home audio industry. The ability of a laser to project a beam of light over vast distances has resulted in the use of lasers for REMOTE SENSING of atmospheric pollutants. Several studies are proceeding in which very high-power lasers are being used in an effort to achieve NUCLEAR FUSION. *See* PHYSICS.

W.W. DULEY

Lash, Zebulon Aiton, lawyer, civil servant, businessman (b in Nfld Sept 1846; d at Toronto 24 Jan 1920). Called to the Bar of Upper Canada in 1868, he joined the federal Dept of Justice in 1872 and was deputy minister 1876-82. In this period the department assisted in defining the central government's powers by reveiwing provincial legislation and frequently recommending DISALLOWANCE. The department also played a key role in the colonization of the PRAIRIE WEST. Lash administered the MANITOBA ACT to encourage maximum dispersal of the MÉTIS, thus freeing over 1.2 million ha for Ontarians. He then entered private practice in Toronto with Edward BLAKE and developed many links with business, especially firms with interests in the West. Lash was also a leading imperial federationist. His publications include *The Banking System of Canada* (1907) and *Defence and Foreign Affairs* (1917).

D.N. SPRAGUE

Laskin, Bora, lawyer, judge (b at Fort William [Thunder Bay], Ont 5 Oct 1912; d at Ottawa 26 Mar 1984). After graduating from U of T (BA 1933, MA 1935), Laskin received an LLB from Osgoode Hall in 1936 and an LLM from Harvard in 1937. Called to the Ontario Bar in 1937, he taught law at U of T from 1940 to 1945, Osgoode Hall from 1945 to 1949, and returned to U of T from 1949 to 1965. He was appointed QC in 1956, to the Ontario Court of Appeal in 1965, and a puisne judge in the Supreme Court of Can-



Bora Laskin, chief justice of Canada (1973-84), was well known as a civil libertarian and a brilliant legal scholar (*courtesy National Film Board/Photothèque*).

ada in 1970. Named chief justice of Canada in 1973, he died in office. Known throughout his career as a civil libertarian and as a brilliant legal scholar, especially in constitutional and labour law, he was author of *Canadian Constitutional Law* (1963) and *The British Tradition in Canadian Law* (1969). FREDERICK VAUGHAN

Lasnier, Rina, poet (b at St-Grégoire d'Iberville, Qué 6 Aug 1915). She studied at the Collège Marguerite Bourgeoys, Montréal, and at U de M. Her first publication was *Féerie indienne* (1939), a religious play followed by several others: *Le jeu de la voyagère* (1941), *Les fiançailles d'Anne de Noüe* (1943), *Notre-Dame du Pain* (1947). Her predominant interest lies in poetry and in the renewal of its forms and themes. After *Images et proses* (1941) and *Madones canadiennes* (1944), in which prose poems accompany pictorial equivalents, Lasnier published *Le Chant de la montée* (1947), a Biblical meditation upon the human antecedents of the Incarnation. *Escales* (1950) demonstrates the richness and complexity of her mature poetic style. After travelling in Europe (1953-54), she published in 1956 *Présence de l'absence*, which symbolically expresses inner conflict and sorrow. *Miroirs* (1960) consists of autobiographical prose texts while *Mémoire sans jours* (1960) envisions poetic creation as an arduous submarine quest. Much recognition has come her way, including the Prix Duvernay (1957), the MOLSON PRIZE (1971), the Prix France-Canada (1973) and The Prix David (1943). Her symbolic vision continues to unfold through her work of the 1960s and 1970s: *Les Gisants* (1963), a meditation on death and eternity; *L'arbre blanc* (1966), dramatizing the poetic vocation in today's Québec; *La Salle des rêves* (1971) with its measured response to the intuitions of psychology. Her poetry was collected in *Poèmes I et II* (1972), but she has published many works since that time, including *L'invisible* (1969), *Le Rêve du quart jour*, (1973), *Amour* (1975), as well as the prose poems *L'Échelle des anges* (1975), *Les Signes* (1976), *Matin d'oiseaux* (1978), *Paliers de paroles* (1978), *Entendre l'ombre* (1981) and *Voir la nuit* (1981), in which she continues to probe for the unity that may lie beyond sensory experience. EVA KUSHNER

Latin Americans are among the most recent cultural groups to arrive in Canada. According to unofficial figures released by several community agencies there are about 200 000 people of Latin American extraction now living in Canada.

Origins Most historians and sociologists studying Latin America have generally done so from a colonial Spanish and Portuguese perspective; as a result, Latin Americans see themselves as a product of the Spanish conquest in the 16th century, and as a consequence the history of the region is wrongly considered to have begun with the Spaniards' arrival in the new world. The Inca, Aztec and Maya civilizations are merely looked upon as "prehistory." The region's culture, however, is a mixture of European elements (primarily Spanish, Portuguese, but also Italian, German and Dutch) and native elements. There are 19 countries in Latin America.

Migration The first wave of Latin American immigrants arrived in Canada between 1970 and 1973. (Official figures show that Canada's total Latin American population was less than 3000 before 1970.) The influx of Latin Americans (some 68 000) in the early 1970s can be partly attributed to Canada's "open door" IMMIGRATION POLICY. From 1969 to 1972 it was possible to arrive in Canada as a tourist without a visa and later apply for landed immigrant status from within the country. At the same time, due to a growing demand for labourers willing to perform jobs with low social status (*see* IMMIGRANT LABOUR), Canada relaxed its immigration requirements. Argentinian immigrants, who before 1970 had arrived at a rate of 200 yearly, numbered 948 in 1973, 1088 in 1974 and 674 in 1975. The vast majority of Chilean political REFUGEES emigrated to Canada by way of Argentina after the overthrow of the Allende regime. From 1963 to 1973, only 2135 persons were recorded as emigrants from Chile; by 1976, 4600 had immigrated to Canada as part of the Special Chilean Movement initiated by the Canadian government. During the early 1970s about 20 000 Ecuadorians in search of a better life emigrated to Canada, primarily to Montréal and Toronto. Since the beginning of 1982 several hundred Central Americans have arrived as refugees.

Settlement Pattern Most Latin Americans settled originally in the downtown areas of Toronto and Montréal. But since industry, and above all light manufacturing requiring semi-skilled workers, is located in the suburbs of Toronto and Montréal, the need to live near their work forced many Latin Americans to move to some of the more isolated neighbourhoods.

Hundreds of Latin American families have migrated west, mostly to Alberta, in search of work. There are now Latin Americans settled in all provinces and territories.

Economic Life The service industry, light industry manufacturing and the garment industry are the areas of employment to which Latin Americans gravitate. There is a perceptible shift, over time, from lower skilled jobs obtained upon arrival to positions requiring greater skills. With the growth and stabilization of the Latin American community in the late 1970s and early 1980s, a number of its members have entered occupations such as insurance, real estate, restaurants and travel agencies. Also, a growing number of professionals and academics, mostly from Chile and Argentina, have now revalidated their qualifications in Canada and are entering their professional fields of expertise.

Social Life and Community The social life of Latin Americans is centered around community activities and family gatherings. Clubs regularly hold dances and sporting events. These mutual-aid clubs serve to maintain group ties and keep cultural heritage alive. Latin American associations include the Centre for Spanish-Speaking Peoples in Toronto and the Latin Association de Sud Americanos in Montréal.

The community is not divided by class or income (although a small number of professionals and executives see themselves as a separate group) but rather by nationality. Chileans have formed organizations such as the Winnipeg Chilean Association, which has committees for education and culture, finance, women and social welfare. In Toronto and Montréal, The Ecuadorian-Canadian Soccer League holds weekly matches.

The biggest challenge so far for the Latin American community seems to be the newly gained independence of women. Feminist self-assertion, which comes from living in a more liberal N American environment, is a constant source of contention between Latin American couples.

Religion and Cultural Life Although most Latin Americans are baptized as Catholics, many do not consider themselves practising members of the church. In Canada this separation has been reinforced because of the absence of social pressures and the opportunity to engage in alternative activities.

Spanish-language newspapers, 2 of which are published in Toronto, one in Vancouver, and others in Calgary and Edmonton, serve the Latin American community in Canada. Theatre presentations, poetry recitals and art exhibits are becoming more frequent in the community. Dozens of folkloric groups, both dance and music, are very active. Several Latin American writers, poets, painters and journalists are becoming known in Canada.

Education In 1970, in the combined school systems of Toronto and Montréal, there were 342 students from Latin America. By 1980 their number had climbed to 9738. The number of students in Canadian universities and technical colleges who claim Spanish as their mother tongue increased from 67 in 1970 to 583 in 1980. Largely because of emotional and behavioural problems, many Latin American children and parents experience difficulty in their adjustment to Canadian schools. The parents' own difficulties in adjustment and the problem of communication with the school are the major barriers to happy, successful schooling.

Group Maintenance Latin Americans, even those who, as political refugees, may have hoped to return to their countries of origin, have become increasingly involved in Canadian life. Many, as they succeed in Canada, may suffer the loss of their language and some isolation from their communities. WILSON RUIZ

Reading: Wilson Ruiz, *The Latin American Community Survey* (1982).

Latter Rain Movement, *see* NEW RELIGIOUS MOVEMENTS.

Latulippe, Rose, one of many girls in French Canadian tradition who were supposed to have danced with the devil, some to survive, others to be carried off and never to be seen again. Rose Latulippe neglected her fiancé, Gabriel, in favour of a handsome stranger whose horse breathed fire and who had claws inside his velvet gloves. Just as the devil tried to put his own necklace around her neck to bind her to him, the local parish priest (curé) rushed in, placed his stole around her shoulders and put the devil to flight, restoring Rose to her fiancé. Such stories were prevalent as sanctions against dancing, particularly during Lent or on Sundays. NANCY SCHMITZ

Latvians Latvia is a small country situated on the eastern shore of the Baltic Sea. Established as an independent state after WWI, Latvia was occupied by the Soviet Union in 1940, by the Nazis 1941-44 and then again by the Soviet Union. In 1945, 110 000 Latvians who had fled to western Europe were classified as displaced persons. Of these, 14 911 eventually emigrated to Canada.

The first Latvians (mainly farmers) to arrive in Canada were refugees from Tsarist Russia in the 1890s. They settled primarily in Manitoba and Alberta, although during the GREAT DEPRESSION many sought work in eastern Canada. The Canadian census of 1941 lists only 975 Canadians of Latvian origin, but by 1981, 18 515 Canadian residents claimed Latvian ancestry. Of these a majority reside in Ontario, particularly in Toronto, which has become the centre for almost all Latvian cultural, social and political life in Canada.

A very high percentage of post-WWII Latvian immigrants are professionals, eg, doctors, engineers and lawyers. They have been able to integrate into Canadian society with considerable success. The majority of Latvians belong to the Lutheran Church, although there are Baptists and Roman Catholics among them.

All sizable Latvian centres have their own congregations and professional and social organizations. The activities of these local groups are co-ordinated by the Latvian National Federation in Canada, headquartered in Toronto. The Latvian community also supports 10 Latvian-language Saturday schools.

The most spectacular demonstration of the Latvian culture is the song festival, dating from the 19th century. The tradition has been transplanted to N America. The one-week festivals

(massed choirs, symphony concerts, recitals, folk dancing, theatre performances and exhibits of fine arts and handicrafts) are held at 2- or 3-year intervals in Toronto and the US alternately. J. MEZAKS

Laure, Carole, stage name of Carole Champagne, later Carole Lord, actress, singer (b near Montréal 5 Aug 1949?). She studied for a career as a concert pianist and made her theatre debut in an experimental piece by Pierre Moretti called "Equation pour un homme actuel" and acted in the musical comedy "Demain Montréal m'attend" by Michel TREMBLAY. In 1973 she starred in Gilles CARLE's *La Mort d'un bûcheron* (1973). Her career has since paralleled that of Carle with whom she has made 6 films, including *La Tête de Normande St-Onge* (1975), *L'Ange et la femme* (1977), *Fantastica* (1980) and *Marie Chapdelaine* (1983). Her performance in *La Menace* opposite Yves Montand led to her role in *Préparez vos mouchoirs* (*Get Out Your Handkerchiefs*) directed by Bertrand Blier and Joyce Bunuel's *La Jument vapeur* (*Dirty Dishes*). Laure has recorded 2 record albums in France and once took the extraordinary step of taking over the Bobino Theatre in Paris to sing songs created especially for her by Lewis Furey.



Film actress Carole Laure in the 1983 film *Maria Chapdelaine* (*courtesy Canapress*).

Laurence, George Craig, nuclear physicist (b at Charlottetown 21 Jan 1905). Educated at Dalhousie and Cambridge (under Ernest RUTHERFORD), Laurence became the NATIONAL RESEARCH COUNCIL's radium and X-ray physicist in 1930, when J.A. GRAY's pupils at Queen's constituted the only Canadian laboratory for atomic physics. Most of the early NRC work was developing medical and industrial radiology, but in 1939-40 Laurence attempted, virtually alone, to build a graphite-uranium atomic reactor in Ottawa. In 1942 he joined the Anglo-French atomic research team in Montréal that built the ZEEP reactor, the first outside the US, at Chalk River in 1945, and served in the Canadian delegation to the UN Atomic Energy Commission (1946-47). Laurence then became a senior scientist at the CHALK RIVER NUCLEAR LABORATORIES and president of the Atomic Energy Control Board (1961-70). DONALD J.C. PHILLIPSON

Laurence, Margaret, née Jean Margaret Wemyss, novelist (b at Neepawa, Man 18 July 1926). She was educated in Neepawa and at United College, Winnipeg, and married Jack Laurence, a hydraulic engineer, in 1947. In 1949 they moved to England and later to Somaliland and Ghana where he worked as a dam builder with the British Overseas Development Service. Their 2 children were born in 1952 and 1954.



Margaret Laurence's novel *The Stone Angel* (1964) was a landmark event for Canadian literature, setting the town of Manawaka firmly in Canada's imaginative landscape (*photo by Doug Boult*).

In 1957 the family moved from Ghana to Vancouver, and in 1962 Margaret Laurence and the children moved to England, settling in the village of Penn in Buckinghamshire. Margaret and Jack Laurence were divorced in 1969, and in 1974 Margaret Laurence returned to live permanently in Lakefield, Ont.

From age 7 she wrote stories; though she wrote throughout high school and college and worked after graduation for the *Winnipeg Citizen*, a labour daily, her first work for publication did not occur until the Somaliland years. In 1954 the British Protectorate of Somaliland published *A Tree for Poverty*, her translations of Somali folktales and poetry. Africa transformed Laurence from an idealistic young western liberal to a mature woman who saw at first hand the problems of emergent nations, empathized with their peoples and read deeply in their history and literature. Her first published fiction was a story, "Uncertain Flowering," published in a Whit Burnett anthology for 1954; it was followed by the stories set in Ghana published in various journals and gathered into *The Tomorrow-Tamer* in 1963. *This Side Jordan*, her first novel, was set and drafted in Ghana and published in 1960. All her African fiction reflects a determined apprenticeship to writing and a burgeoning talent based on a passionate belief in the dignity and potential of every human being.

Back in Vancouver she revised her memoirs of the Somaliland years, published as *The Prophet's Camel Bell* (1963), and then turned her attention to Hagar Shipley, who had developed in her imagination out of her prairie background. *The STONE ANGEL* (1964), the story of Hagar's last journey towards recognition of love and freedom, was a landmark event for Canadian literature and the keystone of Laurence's career. It set the town, Manawaka, firmly in Canada's imaginative landscape and pointed the way for the works to follow. *A Jest of God* (1966) is the story of Rachel Cameron, who, through the ordeal of one summer in Manawaka in the 1960s, finds a fragile but sustaining selfhood. Seven of the 8 stories of *A Bird in the House* were published from 1962 onward; with the addition of an 8th they were gathered together and published in 1970. The maturing of Vanessa MacLeod, their heroine, is based on Margaret Laurence's own experiences. The deaths of her own parents, the changes caused first by loss and grief and then by the practical circumstances of her life are present in Vanessa's story, not in correspondence of detail, but in truth of spirit. Stacey MacAindra of *The Fire-Dwellers* (1969) is Rachel Cameron's sister. Married to a struggling salesman, living in Vancouver and mother of 4, Stacey is the beleaguered housewife of our time. She thinks of herself as commonplace and ordinary, but Laurence's great achievement is to reveal to us her extraordinary qualities of love, fortitude and vitality. *The Diviners* (1974), the story of writer Morag Gunn, is true in its spirit to Laurence's own maturing and is the climactic work of the Manawaka cycle. A complex and profound novel, it brings the Scottish pioneers and the Métis outcasts of Manawaka together and culminates in the joining of past and present and the affirming of the future in the person of Pique, the daughter of Morag and Jules Tonnere.

From time to time Margaret Laurence has found refreshment in writing children's books. *Jason's Quest* (1970) is a joyfully inventive tale about a mole and his friends, its essence a confrontation between the forces of darkness and light. *Six Darn Cows* (1979) is a carefully crafted story for very young readers, and *The Olden Days Coat* (1979, rev 1982) is a magic Christmas story. *A Christmas Birthday Story* (1980) is the retelling of a work first written when her own children were very young. In 1968 Margaret Laurence's continuing interest in African literature was expressed in *Long Drums and Cannons*, her tribute to the upsurge of Nigerian writing in English between 1958 and 1964. In 1976 she collected and introduced a group of her occasional essays, *Heart of a Stranger*. Margaret Laurence is much beloved and has been honoured in Canada and abroad, where her works are widely translated. She served a term as chancellor of Trent University in Peterborough, she is also active in many causes for world peace. CLARA THOMAS

Laurendeau, Joseph-Edmond-André, journalist, politician, playwright, co-chairman of the royal Commission on BILINGUALISM AND BICULTURALISM (b in Montréal 21 Mar 1912; d at Ottawa 1 June 1968). A lifetime French Canadian nationalist, he helped prepare the way for Québec's QUIET REVOLUTION by redefining nationalist aspirations for an urban and industrial society. After completing his classical education at Collège Sainte-Marie in Montréal, he pursued graduate work in literature and history at the U de M where he came under the influence of Abbé Lionel GROULX. After a brief sojourn in the separatist youth mouvement, Jeune-Canada, André Laurendeau spent 2 years in France, 1935-36, taking courses at the Sorbonne, the Collége de France and the Institute Catholique. While in Europe he came to embrace the social CATHOLICISM and the personalism of Emmanuel Mounier, Jacques Maritain and Étienne Gilson. He returned home critical of the concept of political independence for the French Canadian nation but determined to reorient FRENCH CANADIAN NATIONALISM toward socioeconomic issues. As editor of ACTION NATIONALE, 1937-43, he attempted to pursue this goal.

In 1942 he joined forces with other nationalists to create the Ligue pour la défence du Canada to fight for a "no" vote in the Apr 1942 plebiscite called by Mackenzie KING over CONSCRIPTION for overseas service. Following the success of the league — over 80% of French Canadians voted no — a nationalist third party was created in the fall of 1942. The BLOC POPULAIRE fought against the threat of conscription and demanded greater equality for Francophones in the federal system. Laurendeau was selected provincial leader of the Bloc in Feb 1944 and was one of the 4 Bloc members to win election to Québec Assembly in 1944. He denounced the centralist economic and social policies of the federal government and called upon the Union Nationale regime of Maurice DUPLESSIS to make provincial autonomy meaningful by

implementing long overdue socioeconomic reforms.

In 1947 he resigned from the party, then close of *Le* DEVOIR where Gérard FILION was editor and publisher. At the same time he was editor of *L'Action nationale* again 1948-54, and became editor in chief of *Le Devoir* in 1958. Along with his nationalist colleagues, Filion, Jean-Marc LÉGER and Pierre LAPORTE, he fought the politically and socially regressive regime of Duplessis, and turned *Le Devoir* into an effective forum for criticism. Laurendeau called for a redefinition of traditional French Canadian nationalism to reflect more clearly the problems and aspirations of an overwhelmingly urban and industrial society. This neo-nationalism was adopted by the Québec Liberal Party of Jean LESAGE prior to the 1960 provincial election in which the Union Nationale was defeated.

Fearing the political and economic implications of the rise of SEPARATISM in Québec after 1960, Laurendeau called upon the DIEFENBAKER and the PEARSON governments to investigate the crisis in Québec-Ottawa relations. PM Pearson responded by creating in 1963 the B & B Commission with Laurendeau and Davidson DUNTON as co-chairmen. Until his premature death in 1968, Laurendeau pursued diligently, but with a growing sense of despair, the challenge of finding a long-term solution that would provide a constitutionally entrenched equality for the French Canadian majority of Québec and the francophone minorities outside Québec. His fellow commissioners, reflecting the divisions within Canadian society at large, could not come to terms with the constitutional implications of linguistic duality and cultural pluralism, and thus the final volume of the Report never materialized. The country did respond to the crisis by making room for French Canadians at the federal level through the OFFICIAL LANGUAGES ACT.

In addition to his other work, Laurendeau was a radio and TV personality, and wrote articles, TV dramas, a play, *Deux femmes terribles* (1961), and a novel, *Une Vie d'enfer* (1965). He was a member of the Royal Soc of Canada and the Académie canadienne-francaise.

MICHAEL D. BEHIELS

Laurentia, the name given by geologists to a land mass that, between 600 and 500 million years ago, embraced eastern N America, most of Europe and much of Asia. Writers have also used the word "Laurentia" as their name for a utopian Québec. Jules-Paul TARDIVEL set his futuristic novel *Pour la Patrie* (1895; trans *For My Country*, 1975) in the "Laurentian Empire," a state separate from Canada. Lionel GROULX in 1937 defined his "Laurentia" as a separate French, Catholic state. The Latin name is that of Saint Lawrence, the Christian martyr burned to death by the Romans in AD 258. It was on St Lawrence's feast day, Aug 10, that Jacques CARTIER in 1535 named after the saint a bay he discovered; the name was later applied to the river.

JOHN ROBERT COLOMBO

Laurentian Highlands are part of the plateau and dissected southern rim of the Canadian SHIELD in Québec. Viewed from the valleys of the Ottawa and St Lawrence rivers, the S-facing escarpments of the Shield give the appearance of mountains 500-800 m high; looking across the plateau, the relief is more moderate and subdued. These scarps mark the dramatic southern edge of the highlands. Although the other limits are less well defined, the highlands may be considered to extend 75-150 km northward from the scarps and to stretch from the Gatineau R in the W (mean elev 400 m) some 550 km to the SAGUENAY R in the NE. Here they attain their maximum elevation N of Québec City in the Parc des Laurentides (1200 m). Individual summits rise above the plateau surface: Mont Sir Wilfrid (783 m) and Mont Tremblant (968 m) in the W, Mont Ste-Anne (815 m) at Québec, Mont Raoul-Blanchard (1166 m), Mont Bleu (1052 m) and Mont des Conscrits (1006 m) in Parc des Laurentides. Cap Tourmente (579 m) and Mont des Éboulements (770 m) are dramatic examples of the scarp face as it drops precipitously to the St Lawrence R.

The 1000-1700-million-year-old rocks of the Shield are mostly metamorphosed granites and gneisses in this area. They have been faulted, uplifted and eroded. The ice of the Pleistocene glaciation (1 million years ago) scraped the plateau surface bare in many sections, but elsewhere deposited rock, sand and gravel as moraines, resulting in a disrupted drainage system with many lakes and youthful rivers. The ice also overdeepened the valleys that lead southward from the Shield, the most dramatic of which is the fjord of the Saguenay R (500 m cliffs and 600 m depths). When the ice sheets finally melted (about 10 000-20 000 years ago) many of these valleys were partially filled by sands, gravels and other outwash material carried by the meltwaters. Postglacial uplift and continued downcutting by past and present rivers have resulted in the formation of terraces and plains along the river valleys. The resulting local relief of 300-600 m along these valleys adds to the ruggedness and scenic beauty of the highlands. The Rivière ST-MAURICE, flowing from the large GOUIN RESERVOIR on the Shield some 520 km to the St Lawrence at TROIS-RIVIÈRES, is one of the largest rivers, but the Nord at ST-JÉRÔME and the Montmorency and Jacques Cartier, flowing from Parc des Laurentides to the St Lawrence E of Québec, must also be noted.

The southern limits of the vast boreal forest of subarctic Canada cover most of the highlands. Black and white spruce, balsam fir, tamarack, poplar and white birch are the dominant tree species. Along the southern edge of the plateau and in the valleys these mix with white pine and deciduous species common to the ST LAWRENCE LOWLAND — sugar maple, beech, hemlock. These forests attracted the early explorers and settlers from the lowlands for hunting, trapping and eventually for forestry. Lumbering became a major industry and many species of trees were cut and floated down the numerous rivers to sawmills. These were located near rapids or falls where the rivers left the Shield or joined the Ottawa or St Lawrence rivers. Hull and LACHUTE at the mouths of the Gatineau and Nord rivers and Grand-Mère and Trois-Rivières on the St-Maurice are typical. As technology advanced and rivers were harnessed for electricity (SHAWINIGAN, 1899) the lumber mills were joined by other industries such as textiles at Lachute and St-Jérôme and pulp-and-paper mills and chemicals at Shawinigan and Grand-Mère.

The valleys leading from the Shield tempted some hardy, early settlers who, pressed by the scarcity of unoccupied farmland on the lowlands, tried to develop an agricultural base. An early wave in the mid-1800s of Irish and other European immigrants were partially successful in the lower valleys. A second wave of French settlers, inspired by Father LABELLE in the late 1800s, initiated several colonization schemes. St-Jérôme, founded in 1840, became the springboard for the push up the Nord and Rouge valleys. The railway (Petit Train du Nord) reached STE-AGATHE in 1892 and a first period of success occurred. The podzolic soils and the humid, cool continental climate proved unsuitable for agriculture, however, and within 2 generations most of this marginal land was abandoned. The farmers found work in the forest industries, which stretched even farther N in search of marketable trees, and in the industries and mills along the rivers.

The physical environment that was hostile to agriculture was ideal for recreation, a fact recognized by some of the colonists. As early as 1894 Ste-Agathe and the surrounding hills, lakes and streams attracted summer and, by the 1920s, winter tourists. Vacationers from the cities, not only nearby Ottawa, Montréal and Québec, but also from the US, began a seasonal migration. Tourists of all ages and incomes flock to the resort areas and family cottages throughout the highlands. The federal and provincial governments established nature and recreational parks to protect the natural environment and provide extensive areas for outdoor recreation. Gatineau Park N of OTTAWA-Hull, Mont Tremblant Park near St-Jovite, La Mauricie NW of Grand-Mère and Laurentides between Québec and Lac SAINT-JEAN offer a wide variety of hunting (moose, deer, grouse) and fishing (trout, perch, pike), camping, swimming and sailing. Winter sports include downhill and cross-country skiing, skating, snowshoeing and snowmobiling. Extensive modern road networks, particularly the Laurentian Autoroute N from Montréal (built in the late 1960s), provide rapid access to such centres as St-Sauveur, Ste-Agathe and Mont Tremblant and, near Québec City, MONT STE-ANNE.

R.N. DRUMMOND

Laurentian Thesis, an influential theory of economic and national development set forth by several major English Canadian historians from the 1930s through the 1950s. The theory received its most sustained and sophisticated expression in the writings of Donald CREIGHTON, especially *The* COMMERCIAL EMPIRE OF THE ST. LAWRENCE (1937). Creighton argued that Canadian economic and national development derived fundamentally from the gradual exploitation of key staple products — fur, timber and wheat — by colonial merchants in the major metropolitan centres of the ST LAWRENCE R system. That system provided the means by which both a transatlantic and a transcontinental market economy could be created. In stressing the connection with the metropolitan capitals of Europe, Creighton undermined the CONTINENTALISM implicit in American historian Frederick Jackson Turner's FRONTIER THESIS while emphasizing environmental factors. In Creighton's view, the 1885 completion of the CANADIAN PACIFIC RAILWAY marked an extension of the potential for national development inherent in the St Lawrence system. Creighton's theory was derived in part from the STAPLE THEORY advanced by H.A. INNIS, particularly in *The Fur Trade in Canada* (1930), in which Innis emphasized the importance of European linkages and determining environmental factors.

The Laurentian thesis, given complete expression by Innis and Creighton by 1940, was a major influence on historians writing after WWII. It was not, however, without critics. In a 1946 address called "Clio in Canada: the Interpretation of Canadian History" (published in *University of Toronto Quarterly*), W.L. MORTON warned of the potential for cultural and regional exploitation inherent in the expansion of central Canadian commerce and institutions, nevertheless accepting as historical fact, here and in *The Kingdom of Canada* (1963), the development made possible by the Laurentian waterway. J.M.S. Careless's *Canada: A Story of Challenge* (1953) also built upon the theory, although Careless paid closer attention to regional differentiation and metropolitan influence (*see* METROPOLITAN-HINTERLAND THESIS).

Since 1960 the Laurentian thesis has received much scholarly debate, particularly (as Morton warned) because it rests upon imperial exploitation and control over regional hinterlands. With the regionalization of the historical profession, and with the rise of a SOCIAL HISTORY sensitive to regional and class exploitation, most recent discussion has been critical; nevertheless, even under attack it continues to be the mechanism of

historical synthesis against which all others must compete as a means of explaining Canadian history. A. BRIAN MCKILLOP

Reading: Carl Berger, *The Writing of Canadian History* (1976).

Laurentian University, Sudbury, Ont, was founded in 1960; instruction is in both French and English. Laurentian U dates from 1913 when the Roman Catholic Collège du Sacré-Coeur was established in Sudbury. In 1957 it became University of Sudbury. In 1960 and 1963, respectively, representatives from the new Huntington U (United Church) and Thorneloe U (Anglican) joined in a nondenominational federation with the university. Each church-affiliated university provides a college for Laurentian. Nipissing College in North Bay, Collège de Hearst in Hearst, and Algoma College in Sault Ste Marie are also members of the Laurentian federation. B. BEATON

Enrolment: Laurentian University and Affiliates, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
Laurentian University			
2 669	99	2 184	105
Nipissing College			
423	—	1 211	—
Collège de Hearst			
23	—	215	—
Algoma College			
186	—	494	—

Laurier, Sir Wilfrid, lawyer, journalist, politician, prime minister of Canada (b at St-Lin, Qué 20 Nov 1841; d at Ottawa 17 Feb 1919). As leader of the LIBERAL PARTY 1887-1919 and PM 1896-1911, Laurier was the dominant political figure of his era. A skillful and pragmatic politician with a charismatic personality, he unceasingly sought compromise. Above all, he was a fervent promoter of national unity at a time of radical change and worsening cultural conflict.

After obtaining his law degree from McGill in 1864 and practising in Montréal, Laurier went in 1866 to live in L'Avenir and then Arthabaska, Qué, where he ran the newspaper *Le Défricheur*. Upholding the position of the radical PARTI ROUGE, Laurier, a former vice-president of the INSTITUT CANADIEN in Montréal, vigorously opposed CONFEDERATION. In 1871, when the Catholic Church in Québec led by Bishop BOURGET was ferociously attacking the Rouges and liberalism, he became the Liberal member for Drummond-Arthabaska in the Québec legislature. His lack of interest in regional questions led him to resign in 1874 and, reconciled to Confederation, he was immediately elected a Liberal member to the House of Commons of Canada. Thus began an uninterrupted stay of some 45 years in Ottawa. In Oct 1877, some months after giving a vigorous speech in Québec City in defence of political liberalism, he was appointed minister of inland revenue in Alexander MACKENZIE's Cabinet. The most prominent Liberal of his province, Laurier became the recognized leader of the Québec wing of the party. But his party's defeats in the elections of 1878 and 1882 meant a curb to his ambitions, though he himself was re-elected in Québec-Est, and he took less interest in political debate. In 1885 his ardour was aroused by the hanging of Louis RIEL and he vigorously defended the cause of the Métis leader and the need to unite the French and English in Canada. In 1887 Edward BLAKE, disappointed by the recent electoral defeat, chose Laurier to succeed him as leader of the Liberal Party, despite the opposition of several eminent Liberals.



Sir Wilfrid Laurier, 7th prime minister of Canada, 1896-1911, speaking at Sorel, Qué, 1911 (*courtesy Public Archives of Canada/C-16748*).

From 1887 on, Laurier devoted himself to building a truly national party and to regaining power gradually. His efforts were divided into 2 distinct phases. The first and less successful, 1887-91, emphasized the policy of unrestricted RECIPROCITY with the US; announced in 1888, the program was rejected in the 1891 general election. Perceived as a continentalist and as anti-British, Laurier was trampled by the Canadian electorate even though, for the first time since 1874, Québec gave a majority of its seats to the Liberals. The second more fruitful phase took place between 1891 and 1896; this was the period when Laurier, more sure of himself, managed to take his party in hand while the Conservatives, after the death of Sir John A. MACDONALD, were mired in difficulties. In 1893 Laurier organized an impressive political convention in Ottawa which approved a new program and the basis for a truly national structure. In the 1896 election, when the education rights of the Catholic minority in Manitoba, curtailed since 1890, became an important issue (*see* MANITOBA SCHOOLS QUESTION), Laurier, more a skillful politician than a sincere defender of the Catholic minority, avoided taking a definite stand. On 23 June 1896, Canadians chose him over Charles TUPPER to lead their country as prime minister.

During the period of prosperity that then ensued, Laurier and his government concentrated on the country's development and on implementing policies designed to heal the wounds to national unity. In 1896, with the signing of the Laurier-Greenway agreement, the prime minister decided the fate of educational rights for Manitoba's Catholic minority: never again would this group have the separate schools it enjoyed prior to 1890, but it would henceforth be possible to obtain, under well-defined conditions, religious instruction during the last half-hour of the school day and instruction in a language other than English. In the name of national harmony and the politics of the "lesser evil," Laurier thus launched his policies of compromise which kept him in power for many years but never completely redressed the wrongs committed against the Catholic minority. After beginning, with Clifford SIFTON, to reorganize the immigration system, and finalizing with William FIELDING the details of a tariff policy based on imperial preference, Laurier participated in 1897 in London, Eng, at his first colonial conference. Guided by his belief in the future independence of Canada, he resisted every effort the British Empire made toward unification. Nonetheless, in 1899 he agreed to help defray the costs of transportation and material of Canadians wishing to fight for England in the SOUTH AFRICAN WAR; this conciliatory stance would bring reproach from those French Canadians fiercely opposed to any participation. But Laurier and his Liberals easily won the 1900 general election, well supported by Québec which gave them 57 of its 65 seats.

After 1900, Laurier led his country forcefully. Within Cabinet, it was he who directed policy, and he did not hesitate to push aside dissenters such as the powerful Israel TARTE, who was forced to resign in 1902. In this year Laurier also commanded attention outside the country when, at the colonial conference in London, he again opposed all proposals to unify the Empire. In 1903, however, shortly after the failure of the ALASKA BOUNDARY discussions with the US, Laurier revealed the most important policy of his second term: the construction of a second transcontinental railway. The GRAND TRUNK PACIFIC would build the section from Winnipeg westward, while the government would undertake the construction of a line (called the National Transcontinental) from Moncton and Québec C to Winnipeg. Indeed, Laurier was so optimistic about the nation's progress that he allowed the CANADIAN NORTHERN RY to build a third transcontinental. By agreeing to this multiplication of railways, much of it at public expense, Laurier mortgaged the future with a heavy financial burden. At the peak of this prestige, Laurier would allow nothing to check his ambitions as prime minister. Moreover, the people agreed and re-elected him with a comfortable majority on 3 Nov 1904.

The progressive decline of the Laurier government began in 1905 despite Laurier's pursuit of ambitious projects such as the creation that year of 2 new provinces, Alberta and Saskatchewan. Although a reflection of the country's development, this undertaking necessitated defining the educational rights of the Catholic minority. Once again, yielding to pressures from Anglophones and Protestants, Laurier took refuge behind the status quo, thus depriving the minorities of separate schools. As a result, the last chance to establish genuine cultural dualism throughout Canada was lost. Offended by this retreat, French Canadian nationalists bitterly criticized Laurier, whose prestige in Québec began to fade. In the years that followed, the prime minister sought chiefly to counter accusations of corruption and patronage within his administration and to rebuild his Cabinet. In the 1908 general election, Canadians once again entrusted him with their destiny. His party's majority, however, though still solid in Québec, was somewhat reduced. After 1908, despite his desire to correct certain abuses arising from the far-reaching changes in society, Laurier focused his attention primarily on 2 bills which, in the final analysis, resulted in his defeat. The first, the NAVAL SERVICE Bill, presented in 1910, was to establish a Canadian navy composed of 5 cruisers and 6 destroyers; the navy was to be ready to fight with Great Britain anywhere in the world. Insufficient in the eyes of English Canadian imperialists, excessive according to French Canadian nationalists led by Henri BOURASSA, this moderate measure would cost Laurier precious support, especially in Québec. The second bill concerned reciprocity with the US, the old Liberal dream of 1891. Brought to the Commons early in 1911, it provided for the free trade

of several natural products and reduced duty for an imposing number of Canadian manufactured products entering the US. Despite the attractions of the plan, it raised the ire of Canadian industrialists and provided a target for the Conservative Party under R.L. BORDEN, who accused the Liberals of disloyalty toward England and of leading the country towards political annexation. To settle the issue the prime minister called a general election and, on 21 Sept 1911, suffered a bitter defeat.

Laurier was an energetic and vigilant leader of the Opposition. If he failed to renew his liberalism as progressive Liberals would have wished, he kept his troops united until at least 1916, and relentlessly attacked the government's failure to address problems such as the rising cost of living. Prior to 1914, he fought mainly against the emergency contribution of $35 million offered to Great Britain to help stengthen its navy and against the financial assistance given to the Canadian Northern Ry. Out of personal conviction, Laurier vigorously supported Canadian participation in WWI. He ardently promoted voluntary enrolment and proposed a political truce. In 1915-16, at age 75, he even held several recruiting meetings. In 1917, when the country was plunged into national crisis following imposition of military CONSCRIPTION, Laurier again turned to compromise. To save Canada's threatened unity, he refused to support this measure which was so repulsive to Québec and proposed instead a referendum and continued voluntary enlistment. This time, because his proposal was not supported by the majority of English Canadians, the formula collapsed in general bitterness. Idolized by his French Canadian compatriots who still remembered his vigorous defence of the rights of Franco-Ontarians in 1916, he became a symbol of division within the country. Now even his party disintegrated when several eminent English Canadian Liberals crossed the floor to join the UNION GOVERNMENT in which Laurier refused to participate. In the general election of Dec 1917, Laurier was overwhelmingly defeated by Borden's Unionist Party. The vote was divided along distinctly cultural lines. Laurier died on 17 Feb 1919, just after beginning his courageous effort to restructure his party and to rebuild Canadian unity.

Under Laurier's leadership the country continued its industrialization and urbanization and was strengthened by the addition of 2 provinces and 2 million inhabitants. A clever and eloquent politican, a true legend in his own time, Laurier has been judged in a variety of ways. For some, he was the spiritual successor to Macdonald, who pursued and consolidated Confederation. For others, Laurier, in the name of national unity and necessary compromise, too often sacrificed the interest of French Canadian Catholics to those of a majority little inclined to support the ideals of Confederation. Finally, some think he too often governed his country with only Québec's interest in mind. Support for each of these opinions can be found in Laurier's actions in Ottawa but the last view is most open to argument. RÉAL BÉLANGER

Readings: R.T. Clippingdale, *Laurier* (1979); J.W. Dafoe, *Laurier* (1922, new ed 1965); H.B. Neatby, *Laurier and a Liberal Quebec* (1973); J. Schull, *Laurier* (1965); O.D. Skelton, *Life and Letters of Sir Wilfrid Laurier* (1921, 2nd ed 1965).

Lauson, Jean de, governor of New France 1651-56 (b *c*1584; d at Paris, France 16 Feb 1666). Long before coming to the colony as governor, Lauson had enjoyed a close and lucrative connection with Canada. As intendant of the COMPAGNIE DES CENT-ASSOCIÉS since 1627, he had accumulated vast estates in the St Lawrence. As governor, Lauson used his authority to enrich himself and his family. In 1654, a time of declining prosperity, he gave himself a virtual monopoly in the fur trade, and 2 years later he seized pelts worth 300 000 livres from DES GROSEILLIERS. ALLAN GREER

Lauson de Charny, Charles de, acting governor of New France (b in France 1629?; d there after 1689). When his father, Jean de LAUSON, returned to France in 1656, Charles assumed command of the colony. A few months later, the death of his wife led him to turn to the priesthood. He served as vicar general and ecclesiastical superior of the HÔTEL-DIEU of Québec. ALLAN GREER

Laval, François de, first bishop of Québec (b François-Xavier de Montmorency-Laval de Montigny at Montigny-sur-Avre, France 30 Apr 1623; d at Québec 6 May 1708). Destined for the church at age 8, a would-be missionary, Laval was initially a political pawn. For 10 years he studied with the Jesuits, who nominated him for bishop of Québec in opposition to a Sulpician candidate, de Queylus, who would have kept the Canadian church within the crown-controlled state church of France, and who wanted to control the Jesuit missionaries serving the European colonists. To preserve their independence, the Jesuits, supported by the queen-regent and other notables, promoted Laval.

In defiance of French bishops and the *parlements* of Rouen and Paris, a papal nuncio in 1658 consecrated Laval bishop of Petraea, a diocese in Muslim lands — there being no diocese of Québec yet. Although he swore allegiance to the French king, Laval was the pope's vicar-general. After his arrival at Québec in June 1659, Laval asserted his primacy over de Queylus and rejected the governor's claim to precedence in religious ceremonies. Before leaving Canada, Governor Voyer d'ARGENSON wrote of Laval's "adherence to his own opinions and . . . zeal that bore him beyond his mandate . . . that he listens to no one." On his authority and on morality, Laval was inflexibly singleminded. Although willing to compromise on some issues, such as the scale of tithes, he fought an unrelenting battle against the liquor trade with Indians. With the king's backing and by quiet determination, Laval outlasted vociferous opponents, including governors.

His goal was a diocese of Québec in which all religious were subject to the bishop. To reduce lay control of the clergy, Laval instituted a church court to judge cases involving clerics. In 1663 he founded the SÉMINAIRE DE QUÉBEC as a theological college and a mother house of all secular priests. Curates could be recalled at will and their parishioners' tithes went to the seminary. His reluctance to appoint permanent, resident curates — as was done in France — was criticized. He replied that, until he was bishop of Québec, he could not lawfully create new parishes for curates.

Louis XIV's aggressiveness towards the papacy made Rome delay creation of the Québec diocese. Laval left Canada in 1671 determined not to return except as Québec's bishop; his wish was granted in 1674. Although his faith was austere and self-denying, it was charitable and practical. It resulted in new churches, schools and good works. He resisted any multiplication of religious orders as a burden on the colonists and a threat to the centralized church structure. The king financed Laval's work while containing the bishop's ambitions. The bishop and the Jesuits were counterbalanced by royal protection for the Sulpicians and the reintroduction of the Franciscans, loyal crown agents.

In 1685 infirmity and advancing age made Laval offer his resignation as bishop in favour of Jean-Baptiste de La Croix de SAINT-VALLIER. Laval's church seemed firmly established. His headstrong, tactless and improvident successor was a disappointment. With pained and silent resignation, Laval watched the young bishop undo much of his work. In 1700 Saint-Vallier was detained in France and thereafter Laval acted as bishop of Québec until his own death.

Laval's episcopacy had 2 great consequences. His seminary for colonial priests facilitated the "Canadianization" of the clergy so that, after the British Conquest, the Roman Catholic Church was the national church of French Canada. By keeping his diocese independent of any French see, but linked to Rome, Laval prepared the way for the Ultramontane politics of 19th-century Québec (*see* CATHOLICISM; NEW FRANCE; ULTRAMONTANISM). PETER N. MOOGK

Lavallée, Calixa, composer, pianist (b at Verchères, LC 28 Dec 1842; d at Boston, Mass 21 Jan 1891). Author of the music for O CANADA which became the Canadian national anthem, Lavallée was a pioneer in music both in Canada and the US. Taught first by his father, he studied in Montréal, then left for the US in 1857 and toured S America, the West Indies and Mexico. After returning to Verchères in 1863, he gave concerts and taught. On 24 Jan 1864 he gave a concert in Montréal playing piano, violin and cornet. From 1865 to 1872 he again lived in the US and from 1873 to 1875 studied piano, harmony and composition in Paris; one of his piano studies composed at this time, *Le Papillon,* was particularly successful. He later opened a studio in Montréal with Frantz JEHIN-PRUME and Rosita del Vecchio, was twice president of the Académie de musique de Québec, and tried unsuccessfully to open a conservatory of music. In 1880 his comic opera *The Widow* was presented in New Orleans. HÉLÈNE PLOUFFE

Lavell, Jeannette Vivian, née Corbière, community worker (b at Wikwemikong, Ont 21 June 1942). From 1970, Jeannette Corbière-Lavell was at the centre of a controversy over inequities in federal Indian status law. In 1970 she married a non-Indian, thus losing her legal status as an Indian under the INDIAN ACT. Since Indian men do not lose status when they "marry out" (but gain status for their wives and children), Lavell appealed to the Federal Court of Canada, which in 1971 rejected her case. The Supreme Court of Canada in 1973 confirmed this ruling in a complex and much-questioned decision, stating that the 1960 Bill of Rights did not prohibit this particular kind of racial-sexual discrimination and did not invalidate the Indian Act. Controversy over the LAVELL CASE and similiar cases led to censure of Canada by international human rights groups, as well as to a split in the Indian community arising from differing views on intermarriage (*see* NATIVE PEOPLE, LAW). BENNETT MCCARDLE

Lavell Case (1973) In *A.G. (Can)* v *Lavell* the Supreme Court of Canada considered whether the Indian Act (s12), in providing that an Indian woman who marries a non-Indian lose her Indian status (while an Indian male not lose his status by marrying a non-Indian), is contrary to the principle of equality before the law found in the Canadian Bill of Rights of 1960. The Court ruled in a divided judgement of 5 and 4 that the measure was valid. In its controversial decision the court held that the concept of equality means equality in the administration or application of the law. Parliament could not exercise its jurisdiction over the Indians without passing legislation listing the characteristics required for a person to have the right to Indian status; according to the court, the Act could be enforced reasonably without infringing upon the rights of Indian women to equality before the law. GÉRALD-A. BEAUDOIN

Law, Andrew Bonar, statesman, prime minister of Great Britain (b at Kingston, NB 16 Sept 1858; d at London, Eng 30 Oct 1923). The only

colonial to become PM of Great Britain, Law grew up in simple surroundings, until at 12 he was sent to live with affluent relatives in Scotland. At 16 he joined the family banking firm and became a prominent iron merchant. He entered Parliament as a Conservative in 1900. Champion of the IMPERIAL PREFERENCE and an opponent of Irish Home Rule and socialism, Law was wartime chancellor. In Oct 1922 he became PM but served only 209 days before retiring because of poor health. He was a close friend of MAX AITKEN. DUNCAN McDOWALL

Law governs the relationship of society's individual members to each other and to society as a whole. Every human society has a legal system, because every society must attempt to resolve the basic conflict between the needs of the individual and those of the community. Law is not synonymous with justice, although it has been described as "part of Western man's dream of a life governed by reason."

The Structure of Canadian Law

Canada has inherited 2 of the world's basic law systems: common law (in the 9 provinces and the territories) and civil law (in Québec). Common law, which originated in England, is unenacted law, as opposed to statutes and ordinances. In theory it is traditional law — that which has always been and still is law, if it has not been overridden by legislation. Civil law, however, is based on ancient Roman law, which, together with laws derived from French custom and legislation, was codified by Napoleon. Most of continental Europe, Scotland, Central and S America, some of the W Indies and much of Africa now use the civil law system. The phrase "common law" has different meanings in different contexts. Sometimes it refers to a whole legal system (in contrast with "civil law" systems). Sometimes it refers to judge-made law, as opposed to statute. Sometimes it is contrasted with equity, discussed below, and sometimes with criminal law.

New France was the first region of Canada to adopt a system based on European law. In 1664 Louis XIV of France ordained that French law existing in the area surrounding Paris was to apply in the colony. This body of law was supplemented by portions of French law as it developed in France during the 18th century and by the laws and regulations developed by the colonial authorities.

In 1763 the sovereignty of the territory now identified as Canada was transferred from the French to the English Crown, and in 1774 the QUEBEC ACT guaranteed the place of French civil law (*le droit civil*) in Canada alongside English public or constitutional law and English parliamentary institutions. In 1857 the Province of Canada legislated the drafting of a CIVIL CODE and a Code of CIVIL PROCEDURE, major compilations of Québec private law on property and civil rights and the form and style of proceedings before Québec courts. These works were brought into force just prior to Confederation. Today theorists describe the Québec legal system as mixed. The relationships between and transactions among persons subject to Québec law are regulated by both the Civil Code and the Code of Civil Procedure. At the same time, and as a result of legislation passed in Québec since 1763 and later incorporated into the codes, portions of English law have also found their way into Québec private law.

The Civil Code governs the status of individual persons, the law of marriage and relations between married persons, the relations of parents and children, the law of property and the law of contracts and responsibility for civil (noncriminal) wrongs. Today the decisions of French courts and the writings of French legal commentators may be accorded respect when the provisions of French law remain similar to those in force in Québec, but they have no binding authority in Québec law. Law reform in Québec draws its inspiration as much from legal developments in N America and elsewhere as it does from continental Europe.

The other 9 provinces and the territories have adopted English common law. Each jurisdiction has a statute providing that from a certain date the law of England shall be the law of the jurisdiction unless changed by statute, an important qualification. Until 1949 the highest Canadian court was the Judicial Committee of the Privy Council, which sat in London and was composed largely of English judges; English common-law developments were incorporated more or less automatically into Canadian common law. Since 1949 English court decisions, though not binding on Canadian courts, have been treated with great respect, though the SUPREME COURT OF CANADA has sometimes rejected English authority. Canadian decisions are quite often cited in English cases and have influenced English law. The American states (except Louisiana) also adopted English common law in the 18th century and, although the links with modern English law are naturally weaker there than in Canada, American common law still retains the style of reasoning and argument found in all countries affected by English law. As Canada adopts more legislation based on American models the influence of American law will increase and is likely to be particularly strong in the interpretation of the CANADIAN CHARTER OF RIGHTS AND FREEDOMS incorporated into the Canadian CONSTITUTION, for its origins can be directly traced to the American Bill of Rights.

Sources of Law

The Constitution and Legislation are the most authoritative sources of law. The Constitution outlines the DISTRIBUTION OF POWERS and the legislative jurisdictions of Parliament and the provincial legislatures. Each is granted the right to enact statutes (and in Québec, codes), which are a major source of law, often referred to as primary legislation. Subordinate legislation is legislation (bylaws, ordinances, orders-in-council, regulations) enacted by an individual or group with the delegated power to do so. The courts, bound to give effect to validly enacted legislation, nevertheless retain important powers. First, in the case of a dispute it is up to the courts and ultimately the Supreme Court to determine whether the legislation is validly enacted. Disputes frequently arise over whether a provision is within the powers of the legislature that has enacted it. The rules dealing with the respective powers of the legislatures are a very important part of constitutional law. Secondly, the meaning of words is elusive, and disputes over interpretation of legislation must be resolved by the courts. In interpreting legislation the court must always ask itself, expressly or implicitly, what purpose the legislature had in mind and determine what meaning to give to the words used. By saying, for example, that it presumes the legislature does not intend to take away property from citizens without providing compensation and does not intend to take away other rights unless such a purpose is expressly stated, the court interprets legislation to provide some protection to interests it considers important.

The Canadian Charter of Rights and Freedoms, under which individual interests are more directly protected than in the Constitution, was influenced by British and American traditions. According to the former, protection of individual interests is best secured by Parliament itself, and parliamentary Acts bind the courts even if they are contrary to the court's conception of fundamental justice, though much can be done by the courts through interpretation. In the American tradition, by contrast, the courts, on the basis of the Bill of Rights, can strike down legislation contravening fundamental rights. As the language of any such charter of rights is very general, this gives the highest court the last word on many matters of social and political controversy. A compromise between these views, the Canadian Charter of Rights and Freedoms, was based on the American Bill of Rights, but the principle of legislative supremacy was preserved by including a power in any legislature to declare expressly in an Act that the Act or any provision of it shall operate notwithstanding certain provisions of the Charter. It remains to be seen how frequently this power will be used and how it will be interpreted by the courts.

Judicial Decisions The second most important source of law is judicial decisions, known also as case law. In deciding cases judges often record the relevant facts of a case, the issues of law involved and the reasons for the decision. In the common law, prior decisions of higher courts are binding on lower courts but trial judges are not bound by decisions of judges of the same rank, and it is now established that the Supreme Court of Canada is not bound by its own decisions. Some provincial courts of appeal consider themselves bound by their own prior decisions. Despite this, the doctrine of binding precedent is much less restrictive than it appears. Only the reason for the decision of the prior court is actually binding, and the subsequent court retains the power to define for itself the true reason. The circumstances of cases are never precisely similar, so it is usually possible for the later judge to find between the prior case and the case before him a distinction enabling him to come to a different conclusion. The words used in an earlier case are not construed like statutes but read in the context in which they were spoken. It is essential for the law to retain such flexibility, for a judge can never foresee the infinite varieties of human conduct that will give rise to subsequent disputes, and it would be unduly rigid to apply the words of an earlier judge to circumstances he could not have foreseen. The development of both common and civil law depends on the creation and refinement of distinctions in cases, and the final decision over whether to apply a rule in an earlier case always rests (subject to appeal) with the court called upon to decide the point in the later case.

Legal reasoning in common law is primarily reasoning by analogy. To avoid arbitrary decisions, like cases must be decided alike (*see* STARE DECISIS), but there is always room for argument about which facts of a previous case are relevant and which are not. In this system legal reasoning is an attempt to make persuasive arguments for, or to give a rational explanation for, distinctions between cases. This is a never-ending process, as other cases will always arise; as new decisions are made, the principles and exceptions enunciated as part of that case law form the basis of common law.

In Québec civil law — that is, the portions of Québec private law under the Civil Code — judicial decisions are viewed differently, at least in formal theory. In this system the courts will look to the Code to determine a given principle and then apply the principle to the facts of the case. The primary authority for Québec judges is the Code itself; therefore they are entitled to apply it without being bound by a prior decision, even that of a higher court. In practice, however, great reliance has traditionally been placed on previous judicial decisions (JURISPRUDENCE), as in the common-law tradition and for the same reasons — that it is unwise as a matter of public policy to revive uncertainty about a law once its sense and meaning have been established. Moreover the techniques adopted by Québec judges for making distinctions between

cases are similar to those of their counterparts in other provinces. The real status and weight of earlier decisions therefore depend on whether a jurisprudence has been established, and this itself depends upon a judge's interpretation. There is no rule about the number of such cases necessary to establish them as a truly authoritative source of law.

Although it is not as important as statutes or case law, royal prerogative (*see* PREROGATIVE POWERS) does constitute a source of law. In Canada these powers are vested constitutionally in the Crown, represented by the governor general and the provincial lieutenant-governors. The Crown has the prerogative to pardon those convicted of crime. Formerly the Crown could not be sued in tort, and some restrictions on its liability still survive.

Scholarly Writings have sometimes been considered a source of law. In the common law, writings were until quite recently considered of inferior weight, and it was said that writers could not be considered authorities until they were dead. Nevertheless, lawyers could always adopt the argument of a writer as their own. The courts now readily hear and cite arguments of contemporary legal scholars, although these are not true sources of law until the judges adopt them. In Québec, doctrinal writings (*la doctrine*) of scholars, living or dead, and whether in the form of books, articles or commentaries on individual judicial decisions, have always been freely consulted and cited by legal practitioners and judges, although they are no more a source of law or of binding authority than they are in the common-law tradition.

Equity, meaning fairness or justice, also describes a special body of rules sometimes considered a source of law. These rules developed in England alongside common law to permit enforcement of legal rights for which common law did not provide appropriate remedies. During the Middle Ages the king retained the power to override decisions of the courts on grounds of equity and began to refer petitions for the exercise of this discretion to the chancellor, who for this purpose established the Court of Chancery. By the 16th century this court was conducting a large volume of business, and, as reasons were given for decisions, an originally unfettered discretion became a body of principles and rules. As a result the English legal system contained the principles of both common law and equity, with 2 sets of courts; if the rules conflicted, equity prevailed because the chancellor's orders were enforced by threat of immediate imprisonment. Ironically, the rules of equity became even more rigid than the common law, so that by the 19th century the Court of Chancery was ridiculed by Charles Dickens. Although in England the 2 courts were united and a similar union has been effected in all Canadian common-law jurisdictions, the principles are not yet fully merged.

In Québec no separate body of rules or courts of equity developed. The legislature, in formulating a provision of law, will attribute a measure of discretion to judges, enabling them to bring into play considerations of fairness and equity, and to respond to changing notions of social justice. This equitable discretion may be more widely framed in areas such as family law than in others, eg, property law.

Fundamental Legal Concepts

Justice is an elusive word. To lawyers it incorporates the notions of rationality and due process. In any disputed case there are always arguments on both sides, and some lawyers would say that often there is no right answer. However, if disputes are determined by fair procedures before an impartial tribunal honestly trying to give rational and consistent reasons for its results, it can be said that justice has been done.

Rule of Law is another elusive phrase with several different meanings. It describes an ordered society, like the phrase "law and order," but it also describes judicial independence of the executive branch of government. According to this principle, the police must obey the law and actions of government officers must be authorized by statute. The phrase is also used to support the reasons given by courts for their decisions; in rational explanation lies the assurance to the losing party that the decision is not just a whimsical exercise of arbitrary power. Another aspect of the rule of law, often called the principle of legality, is the avoidance of retroactive lawmaking. The courts will lean in favour of construing penal statutes to apply only to conduct arising after a statute comes into force, a principle included in the Canadian Charter of Rights and Freedoms.

Divisions of the Law

Public Law The law may be conveniently divided into public and private law. The most important branch of the former is CONSTITUTIONAL LAW, which deals with the powers of governments and the division of powers among different levels of government. The second branch is CRIMINAL LAW, which governs the punishment and deterrence of offences regarded as wrongs against society. Criminal conduct often constitutes a civil wrong as well; eg, an assault is a crime for which the assailant can be punished by the state and a civil wrong for which the person assaulted can recover compensation in a civil court. The distinction is important; because of the consequences of a criminal conviction, greater protection is required for the accused in a criminal case than for the defendant in a civil case, the most important safeguard being the requirement of proof of guilt beyond a reasonable doubt. In contrast, a civil action for damages can succeed on the balance of probabilities. Plaintiffs in civil cases have a right to win if their case is more persuasive, but the complainant in a criminal case has no right to a conviction. The only right to a conviction belongs to the community, and although it is in the interests of the community to suppress crime, it is almost as important not to create a society whose members live in constant fear of wrongful conviction. ADMINISTRATIVE LAW, of increasing importance in a highly regulated society, is the third branch of public law. It governs, among other things, the exercise of government powers, which greatly affect most citizens.

Private law regulates the relations of citizens among themselves. The main divisions of the civil and common law governing the obligations of individuals to each other are contracts (the law of agreements and promises) and the law of civil wrongs (TORTS in the common law and DELICTS in the civil law). To these must be added the law of PROPERTY (governing the acquisition and transfer of rights in goods, land and intangible property) and the law providing for recovery to avoid unjust enrichment (restitution or quasi contract). There is no consensus on the proper arrangement of further divisions and subdivisions, although much of Québec law is structured in the Civil Code. FAMILY LAW is perhaps the most important branch of private law as far as its impact on ordinary persons is concerned. Another important branch, known as conflicts, or private international law, governs the effect of foreign (or extraprovincial) elements in a dispute. Other specialized branches of law include corporation law, sales, negotiable instruments, security for debt on property, agency or mandate, taxation, evidence, debtor and creditor, insurance, wills and trusts, patents, copyright, trademark law and transfer of land; some of these may be regarded as subbranches of contracts and property. *See also* SUBSTANTIVE LAW; PROCEDURAL LAW.

S. WADDAMS AND J. BRIERLEY

Law and Society One of the most historic ideas about the LAW is that it is based on human nature or reason, and therefore simply reflects what is natural or reasonable, enabling society to function in a just and effective manner. According to this conception, the law is also an expression of both the common good and the fundamental values of society. It is the same for everyone and protects everyone's interests. Lawmakers take into account the collective will and formulate the best laws possible. The common good, however, must be defined by certain criteria and interests and does not always correspond to the interests of everyone; it is first and foremost the "good" as seen and defined by certain groups. The law is not above or outside of society; it is the reflection of society at a given moment in its evolution, the result of the balance of power between social groups and one of a number of instruments or means used to impose ideas and defend interests. The law can sometimes be an instrument of discrimination or repression and sometimes an instrument of protection. Everything depends on the power or alliances a group has when legislation is prepared, passed by Parliament and implemented. In addition, there is a difference between what is stated or claimed about law and legislation, and what actually happens.

The profound changes society has undergone since the early 20th century have occurred at an increasingly faster pace since WWII. The law has been and still is the major means by which we attempt to cope with these changes, and, as a result, legislation and government regulations have proliferated. Canadians can now be liable for some 350 Criminal Code offences, about 20 000 federal and 20 000 provincial offences and all those created by municipal regulations. In Québec, for example, almost as many new offences or penalties were created between 1965 and 1975 as were created during the entire preceding century. After WWI, the federal government took its first major initiatives in health and welfare by creating the Department of Health (1919). Attempts to define precisely the limits of what is healthy and unhealthy, acceptable or not acceptable, normal or pathological have led to increased legislative intervention. The developments in science and technology have also created new problems, eg, those associated with genetic research and pollution, which the law must attempt to resolve. In 1917 individual and corporate income taxes were introduced to fund the expanding public sector, guaranteeing the bureaucracy the means it needed to grow. According to the LAW REFORM COMMISSION OF CANADA (LRCC), federally, the activities of the WELFARE STATE grew considerably after WWII. The FAMILY ALLOWANCE Plan (1944), OLD AGE PENSIONS (1952) and the CANADA PENSION PLAN (1965) were added to veterans' assistance programs and UNEMPLOYMENT benefits. Over 40% of the gross national product was allocated to government or related activities in 1980. The expansion of related legislation has been enormous.

Law as an Instrument of Discrimination The law has the effect of making official, repeating and giving concrete expression to social and economic inequalities. For example, for many years the law expressly deprived women of civil, political and economic rights. It was only toward the end of the 19th century that a woman could consider her salary her own property and not that of her husband, and not until the 1950s did most provincial legislatures recognize that women had the right to the same salary as men. For a long time women were barred from certain professions; eg, in Québec women were not allowed to practise law until 1941. Women could not vote in federal elections until 1918 (and in Québec provincial elections, until 1940). Only after WWII did most provinces al-

low women to serve on juries, Québec being the last province to give them this right, doing so in 1971.

Indians, the Inuit and other groups have also been victims of legal discrimination (*see* NATIVE PEOPLE, LAW). When the CHINESE came to BC to construct the railroad in the 19th century, the province withdrew their right to vote, enforced restrictive hiring practices and limited their business opportunities and right to own land. The law also discriminates against those who have been arrested and sentenced or imprisoned for a criminal offence. Many provincial or federal laws deprive them of the right to vote or to run for and hold public office; they also authorize the refusal or revocation of permits or licences and of the right to exercise certain professions.

It is probably in the application of law that inequalities of power and the manner in which law can be a de facto instrument of discrimination are more evident. Until recently, the poor, unable to afford lawyers, had little access to the law. It was only in 1967 that the Ontario government established the first provincially financed LEGAL AID service. In Québec there was no such service until 1973. Only since 1972 has the federal Department of Justice contributed to legal-aid expenditures in criminal matters, though all provinces and territories now provide legal assistance to anyone who might be sentenced to prison or might lose his livelihood, and all jurisdictions, excepting NB, also provide some assistance in civil issues. As late as 1974, however, observers were claiming that divorce was the prerogative of the rich, while the poor, unable to afford such a luxury, simply abandoned their families and lived common law, with all the legal problems such a situation entailed. In testimony before a special Senate committee on POVERTY (1971), the chairman of the Clinical Law Program at the Faculty of Law at Osgoode Hall stated that a study of the Family Allowances Act and other post-WWII legislation preceding it would reveal that these Acts have not been the subject of litigation until recently, that the poor, whose material life is regulated by financiers and whose life is conditioned by many difficulties, have never had the chance to have their rights interpreted or to make these same rights the subject of litigation.

Given the behaviour for which they are condemned, the criminal-law system most often and most severely affects the deprived, blacks, native peoples and disadvantaged groups. A few years ago the LRCC found that the prison population contained a disproportionately large number of poor or disadvantaged persons and native delinquents. In 1976, men with 10 years of schooling or less comprised 45% of Canada's male population 15 years of age and over, but 77% of those admitted to penitentiaries. Many economically disadvantaged people go to prison simply because they have not paid fines. In 1974, the LRCC found that the practice of imprisoning for default of payment had for a number of years been the reason for about 50% of admissions to provincial and local detention centres in certain parts of Canada. In some provinces, native people are particularly affected by this sentencing.

Law as an Instrument of Protection The law can also be an instrument of protection and advancement. In Canada, these advances have been fairly recent, and possible largely because of the socioeconomic situation and changes at political and economic levels. Only in the last 30 years have antidiscrimination provisions appeared in legislation, and not until 1947 did a province (Saskatchewan) pass the first act dealing with human rights. In 1960, Parliament adopted the Canadian Bill of Rights. All provinces have now adopted antidiscrimination legislation and established Human Rights commissions. The Constitution (1982) now contains an entrenched CANADIAN CHARTER OF RIGHTS AND FREEDOMS which applies to federal and provincial jurisdictions. Other Acts have been passed as well to protect the interests of some traditionally disadvantaged groups. In the 1970s legislation regarding health and safety at work (see SAFETY STANDARDS) was revised in most provinces to give workers more protection, and consumers successfully lobbied for laws to protect their interests. Elsewhere in Canada, legislation governing relations between LANDLORDS AND TENANTS was adopted, as was the Small Loans Act, which protects small borrowers, particularly the poor, from excessive interest rates, deceptive methods regarding credit costs and loan sharking.

However, the rights and interests of the disadvantaged are not automatically protected simply because new legislation has been passed. The first antidiscrimination laws were not very effective, because their enforcement depended largely on the initiative of the victims themselves. There was no way to publicize the laws or educate the public; therefore most people did not know the legislation existed. The creation of human-rights commissions to administer this legislation was a major step forward. Unfortunately, although in principle legislation can protect the rights and interests of the powerless, a very large percentage of this group cannot afford to take advantage of it. The Canadian Charter of Rights and Freedoms guarantees that any person arrested or detained is immediately entitled to the services of a lawyer, but no practical procedures have been established for this purpose. Although social legislation passed to reduce inequalities or their effects has undoubtedly helped the most disadvantaged Canadians, it is generally very difficult for them to have it changed, passed, challenged or even adequately enforced. Legislation in fields such as social assistance, the MINIMUM WAGE, social and health services and family allowances often leaves users at the mercy of impersonal decisions made within government BUREAUCRACIES. OMBUDSMEN, whose job it is to ensure that citizens' rights are not violated through injustice, error or negligence arising from administrative action, and whose positions have been created by legislation in several provinces, have helped to improve this situation. Another useful mechanism is the SMALL CLAIM COURTS, established in a number of provinces in the 1970s. According to the Québec minister of justice, the purpose of these courts is to make justice accessible to citizens, strip it of its formal nature, procure a means of reconciliation that will provide social order, guarantee the coercive force of the law and ensure that justice is inexpensively and promptly meted out.

Conclusion Legislation and its enforcement, even if designed to protect the interests of the most disadvantaged groups, are always subject to shifts in the power relationships of a society at a given time. Thus legislation may be stripped of its content or rendered inoperative by subsequent legislative changes. Sometimes political decisions, or lack of them, will virtually paralyse enforcement mechanisms — this will happen, for example, if a chairman or members of a commission are not appointed, or if their budget is not adequate to enable them to operate effectively.

D. LABERGE AND P. LANDREVILLE

Law and the Press Operating in a libertarian climate, the Canadian media are mainly unhampered by licensing and little affected by prior CENSORSHIP. Instead, they are governed by laws dealing with contempt of court, civil defamation, criminal libel, OBSCENITY, COPYRIGHT, privacy and government secrecy. Journalists are more likely to commit constructive contempt than contempt "in the face of the court," except when court rules restricting photographing of trials are violated or when reporters appearing as witnesses refuse to disclose sources. Media reports may scandalize the courts or prejudice a fair trial. For a reporter to publish false "facts" about a case, to report evidence ruled inadmissible in a *voir dire* hearing, or to comment on *sub judice* matters invites legal penalties.

Section 470 of the Criminal Code forbids published mention of confessions considered at preliminary inquiries; Section 467, at the request of the defendant, empowers the court to forbid publication of any evidence given at a preliminary inquiry. Other sources of legal danger to journalists include reporting the amount of damages asked by plaintiffs during examination for discovery; publishing amounts of bail as determined in bail-bond hearings; publishing court documents not entered in evidence in open court; imputing improper motives to judges. In many cases the likelihood of legal punishment is determined by when the offence is committed in relation to the trial proper. Canadian journalists may be compelled to divulge sources of their news stories by courts, parliamentary bodies or properly constituted committees of inquiry. By contrast, no law forbids publication of the names of adults charged with crimes, as the law does in several European countries.

In Canada civil DEFAMATION law is more often resorted to than criminal libel. Civil defamation is based on provincial statutes and common law. In most jurisdictions broadcast defamation, though oral, is libel rather than slander. To maintain a libel action 3 conditions must be proved: defamation (the words complained of are capable of a defamatory meaning), publication and identification (of the claimed libelee). Defendants may plead truth, fair comment or privilege, or consent to defend themselves against defamation claims. Proved truth is an absolute defence in Canada's 9 common-law provinces but not in Québec, where public benefit must also be proved. Journalists are able to enjoy only qualified privilege (privilege which malice destroys) except in fair, accurate and contemporaneous reporting of trials. Defendant journalists may avoid paying general (but not special) damages by making apologies and retractions, provided the libelous statement does not impute a criminal conviction or criminal offence, is not actuated by malice or caused by undue carelessness on the journalists' part. Apologies and retractions must fulfil statutory requirements of prominence and timing.

Defamatory, seditious, blasphemous and obscene libel are all forms of criminal libel covered by the Criminal Code. Truth, fair comment and privilege provide defences against criminal libel charges as they do with civil libel claims, but, as with Québec civil law, public benefit must be proved if the truth plea is to succeed. Incitement to the use of force to bring about a change in government may be punished as seditious libel. However, qualifying stipulations in the Criminal Code are designed to permit political debate, discussion and argument without the incurring of criminal sanctions. In certain sensitive areas the Official Secrets Act inhibits the media in their investigative role.

The Criminal Code defines blasphemous libel only as intention to commit blasphemy, which it does not define. The code provides that the blasphemy law shall not be construed so as to prevent religious discussion conducted in good faith and in temperate language. Section 159(8) of the Criminal Code says that "Any publication a dominant characteristic of which is the undue exploitation of sex, or of sex, and one or more of the following subjects, namely crime, horror, cruelty and violence, shall be deemed to be obscene."

Journalists cannot copyright the news but they can copyright the language of news reports.

For signatories of the Berne Convention, except in the case of serial stories and tales, articles from one newspaper may be copied by another unless such borrowing has been specifically forbidden, but the borrower must indicate the source of those articles.

Privacy does not enjoy complete statutory protection in Canada. Section 178 of the Criminal Code deals almost exclusively with electronic surveillance. Passed in June 1977, in conjunction with the Canadian Human Rights Act but now joined with the Freedom of Information Act, the federal Privacy Act relates primarily to private information in government files and does not deal with the invasion of personal privacy by private persons. BC, Manitoba and Saskatchewan have privacy acts, but as of June 1982 these had produced no press-related case law. Canada's long-gestating Freedom of Information Act was passed in June 1982. It was criticized as being a toothless document, by comparison with the American Freedom of Information Act. Critics considered that there were too many exemptions from the government's requirement to disclose information it held. It is a start, however, in the direction of opening government operations to wider public scrutiny. *See also* HUMAN RIGHTS; JOURNALISM; NEWSPAPERS; POLITICS AND THE MEDIA. WILFRED H. KESTERTON

Reading: C.F. Beckton, *The Law and the Media in Canada* (1982); Kent Commission Research Studios, *Newspapers and the Law* (1981); Wilfred H. Kesterton, *The Law and the Press in Canada* (1976); S.M. Robertson, *Courts and the Media* (1981).

Law Enforcement refers to the application or threat of legally permitted sanctions to induce compliance with legal rules. Although the enforcement of the LAW may be undertaken by a wide variety of individuals and organizations, law enforcement is often popularly associated with the activities of specialized state agencies, especially the public POLICE forces. Indeed the public police are frequently described as a law-enforcement agency, as if they were the only group engaged in law enforcement and as if the enforcement of laws (especially CRIMINAL LAW) were their primary activity. In fact, the public police are only one of many agencies engaged in law enforcement (*see* POLICING). In addition, research suggests that only about 20% of police work is concerned with law enforcement as such. C.D. SHEARING AND P.C. STENNING

Law of Evidence, the body of regulations governing the proof of the existence of a fact before a court. It falls under federal and provincial legislation. In matters governed by the former, provisions of the Canada Evidence Act must be applied. Common law must also be applied. In criminal law, the rules of evidence are partially unwritten and derive from judgements in English and Canadian JURISPRUDENCE. One of the basic principles of Canadian criminal law is that the accused is presumed innocent until proven guilty beyond reasonable doubt; because no accused person may be forced to testify against himself, the prosecution must supply evidence of the crime. It may be supplied by witnesses, by documentary evidence, by the exhibition of objects or by circumstantial evidence — as long as the rule of relevancy, which determines the admissibility of evidence in criminal cases, is respected and there is no violation of the exclusionary rule. According to this rule, anything that might establish the guilt or innocence of the accused may be admitted as evidence, the most important exception being hearsay. Generally, oral or written statements made outside the court, unless they are made by the accused, are not admissible. As long as it was free and voluntary, any statement by the accused acknowledging commission of the crime may be introduced to establish guilt. Privileged communications between lawyers and clients are also excluded; no lawyers may be obliged to testify concerning matters confided to them in the exercise of their profession.

In provincial civil cases the rules of evidence derive from each provincial legislature. The rules governing how evidence is presented are largely the same in all provinces since Québec has adopted the English model, which is based on adversarial procedure, meaning that each party is responsible for proving the facts which it invokes; and in all provinces, witnesses must in principle be heard before an open court where they are first questioned by the lawyer of the party who has called them and then cross-examined by the lawyer of the opposing party. The distinction between the law of evidence in Québec and in the common-law provinces lies in the provisions governing the admissibility of evidence. In the latter, the basic principle is still the rule of relevancy, from which flows the principle of the freedom of means of obtaining evidence. In Québec law, however, evidence concerning contracts must be presented in writing, not orally, although oral testimony may be permitted in a limited number of cases, eg, commercial transactions. Another unique feature of Québec law is called "authentic writing," writing drawn up by a public officer, eg, a notary public. An advantage of an authentic writing is that nobody may prove it false without having first obtained permission from the court to do so and without thereby calling into question the public officer who received it.

In recent years, considerable concern has been expressed regarding the variation of the laws of evidence among provinces and between federal and provincial courts. In 1975 the Law Reform Commission of Canada presented a report to Parliament recommending an evidence code which would replace existing common law. The Ontario Law Reform Commission has also proposed changes in rules of evidence, though its recommendations differ significantly from those of the LRCC. The Uniform Law Conference of Canada, a recommending body of the legal profession, responded by recommending a task force to prepare a Uniform Evidence Act, which, presented in 1981, was adopted by the conference and proposed as a legislative model for Parliament and the provincial assemblies. Federal and provincial work is being done, but no evidence bills have as yet been passed.

LÉO DUCHARME

Law of the Sea, for about 300 years, was to a large extent determined by principles of customary law. Coastal states claimed sovereignty over a narrow belt of territorial sea; on the rest of the seas (the "high seas"), the basic principle of freedom of the seas reigned. This freedom was interpreted as freedom to navigate, fish, trade, travel, make war, conduct research, etc. In 1967, in response to a perceived need for change in the law of the seas, the UNITED NATIONS began complex and painstaking multilateral negotiations. This ambitious venture consisted of a conference (with several sessions) which spanned 15 years and produced a comprehensive set of laws dealing with the seas known as the United Nations Convention of the Law of the Sea (UNCLOS). Canada signed the Convention in Dec, 1982. With the second longest coastline in the world, Canada has a wide range of interests in the sea and a substantial stake in the proposed new law of the sea. It therefore played a leading role in shaping the convention. In recent years, Canada has focused its attention on issues concerning territorial sea, fisheries, mineral resources, marine environment, passage through international straits and control over the arctic waters. Between 1956 and 1977, Canada moved from claiming the traditional 3-mile territorial seas to claim a 12-mile territorial sea and exclusive jurisdiction over fisheries within 200 miles of its coast and over mineral resources of its continental shelf. Canada accepted the concept of a 200-mile exclusive economic zone (EEZ) that emerged from UNCLOS negotiations. The convention provides that coastal states will have sovereign rights over the exploitation of the resources of the 200-mile EEZ and certain rights in respect of the preservation of the marine environment and the conduct of marine scientific research. Canada was unsuccessful in its attempt to obtain preferential rights to harvest fish stocks beyond 200 miles but was successful in obtaining recognition of its primary interest in the conservation and management of anadromous species, eg, SALMON, throughout the limits of their migratory range.

Canada lent its support to the innovative UNCLOS idea that the international sea-bed be reserved for peaceful purposes and that the area be designated the "common heritage of mankind." The convention provides for international machinery both to control and to undertake exploitation of the international sea-bed. Throughout the UNCLOS negotiations, Canada had been particularly concerned about the possible adverse effects of deep-sea mining on Canadian land-based NICKEL production. Canadian mining interests are somewhat protected by a formula in the convention that sets limits to sea-bed production in relation to land production.

Canada has asserted that the waters of the ARCTIC ARCHIPELAGO, including the NORTHWEST PASSAGE, constitute internal waters. As a manifestation of this claim, in 1970 Canada passed the Arctic Water's Pollution Prevention Act. The Act gave the Canadian government rights over a 100-mile POLLUTION control zone around the arctic islands. Despite protests by the US, Canada has persevered in its claim over the arctic waters; during UNCLOS negotiations Canada was actively involved in a campaign to obtain coastal-state rights to prescribe and enforce pollution control standards. Although the convention recognizes only limited coastal-state environmental powers, it does include the so-called "arctic exception," which permits Canada to take antipollution measures in ice-covered areas. Canada attempted to project further its claim in the Arctic by ensuring that the Northwest Passage does not become subject to the rules that pertain to passages through international straits. Canada has consistently asserted that the Passage is not a strait and therefore that the right of "transit passage," ie, a right to navigate through the Passage freely, cannot be claimed.

When the Convention of the Law of the Sea is signed and ratified by the required number of states and comes into effect, it will be binding only upon those states that have signed it. However, many of its provisions, through the practice of states over a period of time, may become customary INTERNATIONAL LAW. EMILY F. CARASCO

Law Reform is the process of improving, modernizing or clarifying the law on a particular subject, not mere technical change, but a fundamental recasting. Law is "reformed" when it is organised more rationally, expressed more clearly and works more effectively. The 2 principal sources of law are legislation and case law, but it is through the former that most law reform has been achieved. In the 19th century, Jeremy Bentham (1748-1832) argued that the merits of legislation as a rational form of law were preferable to a bulky mass of unprincipled case decisions, and when the civil law of France was reformed in 1804, statutory codes were enacted to introduce consistent and uniform rules. However, judicial decisions are important, particularly concerning constitutional documents. The power of ultimate interpretation of the Canadian CONSTITUTION, including the CHARTER OF RIGHTS AND FREEDOMS, rests with the courts; judicial interpretations may materially alter the

content and enforcement of criminal law and the general rights and freedoms of individuals. Law reform by legislation is a public and political process. A proposal must be included in a government's legislative program and must therefore be politically acceptable. It may originally be suggested by a private group, eg, a consumers' association or the chiefs of police. It will be based on a study by a government department or on a report by a legislative committee or a royal commission. Professional associations such as provincial law societies, the Canadian Bar Association and academic lawyers also present law-reform proposals.

Law-reform commissions, usually independent bodies established by statute that report to the minister of justice or to the legislature, are relatively new organizations with a general responsibility to suggest reforms. A commission comprises a small number of distinguished judges, lawyers or academics, assisted by a research staff. The Law Reform Commission of Ontario was established in 1964. Most of the provinces have since created similar bodies. In Alberta it is the Institute of Law Research and Reform, which is associated with the University of Alberta. Besides preparing reports recommending reforms, the institute also conducts general legal research. The work of the provincial commissions is restricted to matters which fall within provincial jurisdiction. These include court administration, property law, the law of injury compensation and some aspects of family, commercial and administrative law.

The Law Reform Commission of Canada (LRCC) was established by statute in 1971. It reports to Parliament through the federal minister of justice and is responsible for working towards the modernization and improvement of federal law and the development of concepts in and approaches to law. It is particularly concerned that the methods of both the common-law and the civil-law traditions be reflected in national laws. It recognizes that the law-reform process requires more than statutory revisions and is of concern to all citizens. It has inquired philosophically into the values law should uphold and has relied on social-science research techniques and public consultation. Much of the LRCC's work has been educational. It recognizes that much genuine reform can be achieved through changes in administrative practices and attitudes, but it is also strongly committed to the need for statutory changes, has produced many studies and reports in the areas of family law, evidence law, criminal law, criminal procedure, administrative law and the protection of life and has recommended new legislation. Provincial law-reform commissions have concentrated on preparing recommendations for statutory changes and have had considerable success in having proposals adopted and enacted by their legislatures. Although the LRCC indirectly influences provincial law-reform commissions, only one statute recommended by the LRCC to Parliament has actually been passed by Parliament, reflecting the political and controversial character of much of the LRCC's work. It is, for example, difficult to satisfy all concerns and interests in fields such as criminal law or police powers. The slower pace also reflects differences in the federal commission's approach: it has chosen first to consider and clarify basic principles before proceeding to detailed recommendations. J. BARNES

Law Reform Commission of Canada began operation in 1971 as a permanent body to study and make a systematic review of Canadian LAW. The LRCC recommends improvement, modernization and reform of some federal laws and deletion of others, as well as providing a philosophical inquiry into legal issues. Although only one draft statute has been accepted by Parliament so far (*see* LAW REFORM), the LRCC's work influences the legal community and provincial commissions, exercising an indirect effect on administrative and legislative reform. The courts refer to positions adopted by the LRCC frequently when making judgements.

Law Society generally refers to incorporated bodies in each province and territory in Canada by which the legal profession regulates itself. In all but Nova Scotia, New Brunswick and Québec such societies are actually called law societies. In Nova Scotia and New Brunswick, they are called barristers' societies. In Québec the legal profession is divided into 2 branches, one composed of members of the Bar of the Province of Québec, ie, barristers and solicitors, and the other of the members of the Chamber of NOTARIES. Members of the chamber perform many legal services not involving matters in court and have the exclusive legal capacity to perform certain services such as making and keeping a register of a particular kind of will known as a notarial will. As is the case with barristers and solicitors, notaries in Québec are a self-regulating profession.

All law societies except that of the Yukon have been incorporated by statute. The first, the Law Society of Upper Canada, formed in 1797, was incorporated in 1822, that of Newfoundland was incorporated in 1834, of Manitoba in 1877, of BC in 1884, of Saskatchewan in 1907, of Alberta in 1907, of the NWT in 1978. The Barristers' Society of New Brunswick was incorporated in 1846 and that of Nova Scotia in 1858. The Barreau du Québec was incorporated in 1849 and the Chamber of Notaries in 1847.

The independence of lawyers from the state in the practice of their profession is essential to a free society. Lawyers, as a profession, have been self-regulating for centuries and provincial legislatures in Canada continue to recognize such self-regulation as the form of control most likely to protect the public interest.

Lawn Bowling, or "bowls," is a game played on a flat lawn or green at least 36.6 m^2. In a match, the object is to roll bowls, or "woods," so that as many as possible are nearer to the "jack" (a smaller white bowl) than the nearest opposing wood. Bowling can be traced back to ancient Egypt. The game spread to Greece and Rome and thence through medieval Europe to Britain, where it has been played since the 13th century. Scotland, where a code of rules was formulated in 1848, is considered the home of the modern sport.

Lawn bowling was brought to Canada by British garrison officers; the first bowling green in Canada was constructed on the garrison grounds at Annapolis Royal, NS. By 1888, a tournament was staged in Toronto, involving 7 clubs. The game's popularity grew during the latter part of the 19th century. The Dominion Lawn Bowling Tournament was inaugurated in 1892. The game flourished from the turn of the century into the 1930s. In 1901, the "points playing" system was introduced and electric lights were first used for late-evening play. The first Canadian touring team travelled to Britain in 1904, and 2 years later a British team toured Canada. The 1913 Canadian team to Britain was the most successful of such groups; it won 17 matches, lost 13 and tied one.

National organizations have been formed to promote the game. The Dominion Lawn Bowling Assn (later the Canadian Lawn Bowling Council) was founded in 1924; its first national championships were held in 1954. Until 1971, women lawn bowlers were associated with clubs affiliated with the CLBC, but in that year the Canadian Ladies' Lawn Bowling Council was organized, and since 1972 men's and women's national championships have been held jointly. Canadian men bowlers have participated in the British Empire and Commonwealth Games since 1930, winning silver medals in 1930, 1934 and 1954. Men's teams have also entered the world bowls championships since their inception in 1966. In 1980, after a long period of low rankings, the Canadian pairs team won the silver medal at the world championships. Women's teams have entered the women's world bowls championship since 1969, their best showing being a silver medal in the singles event, won by June Bell in 1977. Canada hosted the 1981 women's world bowls in Willowdale, Ont, with 18 countries represented. In 1982, the women's team entered the first women's Commonwealth Games event.
BARBARA SCHRODT

Lawrence, Charles, military officer, governor of NS (b in England *c*1709; d at Halifax 19 Oct 1760). Though he lacked the backing of any influential patron, Lawrence enjoyed a successful career. He entered the army in 1727, serving in the West Indies and in Belgium, and joined the 45th regiment at Louisbourg (Cape Breton I) as a major 1747. In 1753 he was put in charge of establishing the settlement of German Protestants at LUNENBURG, NS. He was named lt-gov of "Acadia or Nova Scotia" in 1754, and is chiefly remembered as the architect of the deportation of the Acadians from the colony in 1755. Though this event would likely never have taken place without Lawrence's influence, administrative talent and actions, final responsibility for this tragedy must be shared much more widely. Lawrence was promoted governor in 1756 and in 1758 he commanded a brigade in the successful expedition against LOUISBOURG. His last years as governor were concentrated on settling migrants, principally from New England, in the colony. On his death this controversial but respected governor was honoured by his associates with the erection of a monument in St Paul's Church, Halifax. N.E.S. GRIFFITHS

Lawson, George, botanist (b at Logan, Scot 12 Oct 1827; d at Halifax 10 Nov 1895). Lawson studied natural and physical sciences at U of Edinburgh. Assistant secretary and curator for the Botanical Soc of Edinburgh, he also worked in Britain's first biological laboratory. Lawson became professor of chemistry and natural history at Queen's in 1858. He founded the Botanical Soc of Canada in 1860 and published its *Annals* until 1863. That year he became professor of chemistry and mineralogy at Dalhousie. He was secretary of the NS Board of Agriculture 1864-85, secretary of agriculture for NS from 1885 to 1895 and a charter member of the RSC (1882). In 1891 he founded the Botanical Club of Canada under RSC auspices. As Canada's first professional botanist, Lawson greatly influenced the fields of study of amateur Canadian BOTANY, as well as agricultural and science education policy in NS. SUZANNE ZELLER

Layton, Irving Peter, né Israel Lazarovitch, poet, short-story writer, essayist, professor (b at Tirgu Neamt, Romania 12 Mar 1912). Since the early 1940s, Layton has been recognized in Canada and abroad as a prolific, versatile, revolutionary and controversial poet of the "modern" school. Layton was brought from Romania to Montréal before age one. He took his BSc in agriculture at Macdonald Coll in 1939. He served briefly in the Canadian Army 1942-43 and then did graduate work in political science at McGill. After graduation he tutored immigrants, taught high school and lectured part-time at Sir George Williams U, Montréal, where he later held a full-time position.

Layton was one of a nucleus of young Montréal poets who believed they were effecting a revolution against insipid romanticism and published their poems in *First Statement* (1942-45), a journal edited by John SUTHERLAND. Layton



Poet Irving Layton, whose work is proof of his theory that poetry must be intense, subtle and dramatic (*courtesy Public Archives of Canada/PA-127567/Gail Turnbull*).

remained on the editorial board of *Northern Review*, the journal that resulted when *First Statement* merged with *Preview* in 1945. In 1952 Layton assisted Louis DUDEK and Raymond SOUSTER in founding Contact Press, a co-operative publishing outlet for Canadian poets.

Of the poets that emerged in Montréal during this period, Layton was the most outspoken and flamboyant. His satire was generally directed against bourgeois dullness, and his famous love poems were erotically explicit. Layton's first collection was *Here and Now* (1945). He went on to publish numerous volumes of poems of unusual range and versatility and a few of prose. These include *Now Is the Place* (1948), *The Black Huntsman* (1951), *Cerberus* (with Louis Dudek and Raymond Souster, 1952), *Love the Conqueror Worm* (1953), *In the Midst of My Fever* (1954), *A Laughter in the Mind* (1958), *A Red Carpet for the Sun* (1959), which won the Gov Gen's Award, *Balls for a One-Armed Juggler* (1963), *The Laughing Rooster* (1964), *Periods of the Moon* (1967), *The Shattered Plinths* (1968), *Engagements: The Prose of Irving Layton* (1972), *Lovers and Lesser Men* (1973), *The Pole-Vaulter* (1974), *Seventy-Five Greek Poems* (1974), *For My Brother Jesus* (1976), *The Covenant* (1977), *Taking Sides: The Collected Social and Political Writings* (1977), *Droppings from Heaven* (1979), *The Gucci Bag* (1983). Layton has theorized that poetry should be "vital, intense, subtle and dramatic," and his work is ample proof of his description. He has also edited volumes of poems by other Canadians.

In 1967 Layton received a Canada Council award on which he travelled to Israel, Greece, India and Nepal. He has been poet-in-residence at a number of Canadian universities and was professor of English at York 1969-78. Layton was nominated by Italy and Korea for the Nobel Prize in 1981. Throughout his career, he has excelled as a dramatic reader of his own verses, and some of his public performances have been recorded. ELSPETH CAMERON

Le Ber, Pierre, painter (bap at Montréal 11 Aug 1669; d at Pointe-St-Charles, near Montréal 1 Oct 1707). It is not known where Le Ber studied painting, but his family's position and fortune enabled him to found the Hôpital Général of Montréal with François Charon in 1692 and set up his studio in this building. His best-known work is the portrait of Ste Marguerite BOURGEOYS (1700). From 1697 until his death, he worked on decorating the chapel of Ste-Anne at Pointe-St-Charles. Of his many paintings for churches, only the 3 of St Theresa, St Alphonsus Rodriguez and St Charles Borromeo are known. The inventory made of Le Ber's studio after his death suggests substantial artistic output since it lists a quantity of art supplies as well as 12 canvases. NICOLE CLOUTIER

Le Caine, Hugh, physicist, designer of electronic-music instruments, composer (b at Port Arthur [Thunder Bay], Ont 27 May 1914; d at Ottawa 3 July 1977). He was trained as a physicist at Queen's and later at Birmingham (Eng) U. From his youth he also maintained an active interest in music and electronic instruments. In 1939 he joined the NATIONAL RESEARCH COUNCIL (NRC) in Ottawa, working in RADAR development and nuclear physics. In his home studio by 1945 he had begun work on the sackbut, an electronic keyboard instrument now recognized to have been the first "synthesizer." The NRC opened a project in 1954, directed by Le Caine, to design new equipment for electronic music. By his retirement in 1974, he had designed 15 new instruments. He carefully considered their musical expressivity, designing them to accommodate the needs of performers, composers and listeners rather than the demands of the technology. He composed a series of studies at the NRC lab, one of which, *Dripsody* (1955), now a classic of electronic music, uses only the sound of the fall of a single drop of water, transformed by tape-speed changes. The first electronic music studio in Canada, the second in N America, was opened at U of T in 1959. Its unique equipment, designed by Le Caine, used innovative methods of sound production, extending the possibilities available to composers, and attracting many from across Canada and abroad. Le Caine published many articles on his work, primarily in technical journals. Recognized internationally for his contribution to the development of electronic music, he was awarded 3 honorary doctorates in Canada. *See* ELECTROACOUSTIC MUSIC. GAYLE YOUNG

Le Jeune, Paul, Jesuit missionary and superior at Québec, author (b at Vitry-le-François, France July 1591; d at Paris, France 7 Aug 1664). Converted to Catholicism at 16, Le Jeune was named superior of the Jesuits at Québec in 1632. He advocated language study for missionaries and the settling of nomadic tribes on agricultural reserves. In 1634-35 he accompanied Algonquins on a winter hunt. From 1639 to 1649 he served as missionary priest at Sillery, Tadoussac, Trois-Rivières and Ville-Marie (Montréal), lobbying for military support against the Iroquois and supporting the Ville-Marie settlement project. His annual report of 1632, published by the Jesuit provincial in Paris, inaugurated the series of JESUIT RELATIONS published until 1673 to attract recruits and encourage financial support for missionary work. Procurator of Canadian missions 1649-62, Le Jeune was author of 15 of the *Relations* and 2 devotional books. CORNELIUS J. JAENEN

Le Loutre, Jean-Louis, priest, missionary (b at Morlaix, France 26 Sept 1709; d at Nantes, France 30 Sept 1772). Some historians regard Le Loutre as a political agent for France, others as the consummate missionary, using every means to keep the French Catholic ACADIANS from British Protestant domination. After studies in Paris at the Séminaire du St-Esprit and ordination at the Séminaire des missions étrangères, Le Loutre travelled to LOUISBOURG in 1737. Appointed to the parish of Annapolis Royal — in British territory — he worked among the MICMACS at the Shubenacadie mission near Truro, NS.

In 1744, after war was declared between England and France, he helped François DuPont Duvivier in his siege of Annapolis Royal. When the British took Louisbourg in 1745, Le Loutre went to Québec City to consult the governor of NEW FRANCE, who delegated him to meet the duc d'Anville's fleet, which was to arrive to recapture Acadia. Le Loutre thus became the link between the French authorities and the colonists. After the failure of d'Anville's fleet, Le Loutre arrived in France on *La Sirène*. In 1749, after 2 attempts that ended in English prisons, Le Loutre returned to Acadia. From his new mission at Fort Beauséjour (near Sackville, NB), Le Loutre encouraged the Micmacs to harass the British and urged the Acadians to abandon their lands and take refuge in areas claimed by France. He returned to France in 1752 but came back the following year still determined to oppose the British. After the fall of Beauséjour in 1755, Le Loutre, who knew a price had been put on his head some years earlier, escaped to Québec City. Captured by the British on his way to France, he was imprisoned until 1763. After his release, he worked for the deported Acadians who wished to live in France. GÉRARD FINN

Le Moyne, Jean, writer (b at Montréal 17 Feb 1913). Le Moyne was a founding member in 1934 of *La Relève*, a magazine produced by a group of young French Canadian Catholic intellectuals. He pursued a career in journalism 1941-59 and then went to the National Film Board. In 1961 he published a collection of essays, *Convergences*, which appeared in English in 1966 as *Convergence*. For these he won first prize in the Québec Literary Competition in 1962 and the Gov Gen's Award in 1967. In 1968 he received the Molson Prize. In 1969 he moved to the Prime Minister's Office, where he was an assistant and adviser until retiring in 1978. In 1982 he was made an officer of the Order of Canada and appointed to the Senate.

Lea, Walter Maxfield, politician, premier of PEI (b at Tryon, PEI 10 Feb 1874; d at Charlottetown, PEI 10 Jan 1936). A successful farmer and livestock breeder, Lea was the first agriculturalist to lead PEI. Elected to the Assembly in 1915 as a Liberal, he became commissioner (minister) of agriculture in 1919. On 30 May 1930 Lea became premier, attending the Dominion-Provincial Conference (1930), but resigned 29 Aug 1931. Illness during the 1935 general election forced him to direct a campaign from his bed, which resulted in the first sweep of seats in a parliamentary democracy. His second term as premier lasted until his death. PETER E. RIDER

Leacock, Stephen, humorist, essayist, teacher, political economist, historian (b at Swanmore, Eng 30 Dec 1869; d at Toronto 28 Mar 1944). The recipient of numerous honorary degrees, awards and distinctions (the Lorne Pierce Medal, the Gov Gen's Award, a postage stamp issued in his honour, the Leacock Medal for Humour established in his honour), Leacock was the English-



Stephen Leacock was the English-speaking world's best-known humorist, as well as an accomplished economist (*courtesy Public Archives of Canada/© Karsh, Ottawa/Miller Services Ltd.*)

speaking world's best-known humorist 1915 to 1925.

He grew up on a farm near Lk Simcoe, Ont, and was educated at Upper Canada College (where he taught for 9 years), U of T and University of Chicago, where he studied economics and political science (PhD 1903). He joined McGill's dept of economics and political science in 1908, rose quickly to become department head, and remained there until retirement in 1936. A prolific magazine supplier of humorous fiction, literary essays and articles on social issues, politics, economics, science and history, Leacock claimed near the end of his life: "I can write up anything now at a hundred yards." Most of his books are collections of these magazine pieces.

His first book, *Elements of Political Science* (1906), a workmanlike treatment of its subject, was his bestselling book in his lifetime. Although he was not an original or particularly incisive political economist, Leacock's professional opinions on matters such as the need for a GOLD STANDARD have proved prophetic in their commonsense approach to what he considered a jungle of statistics. His writings on the theoretical and technical aspects of humour are similarly refreshing for their accessibility, as are his views on education.

He was politically active in the Conservative Party in both his home riding of Orillia and nationally. In the 1911 general election, his propagandist writings and public addresses on the issue of RECIPROCITY helped defeat Sir Wilfrid LAURIER's Liberal government. Although Leacock is a man of many seeming contradictions, generally his stance is traditionally conservative. A Tory in the precapitalist sense, he valued the community over the individual, organic growth over radical change, the middle way over extreme deviation. Such values form the basis of Leacock's satiric norm, the authorial position from which he attacked rampant individualism, materialism and worship of technology. Although frequently unfaithful to his credo that humour be kindly — he was at times racist, anti-feminist and downright ornery — the unique alchemy of compassion and caustic wit remain the elements which accord his humour a timelessness few Canadian writers have achieved.

His 2 masterpieces are SUNSHINE SKETCHES OF A LITTLE TOWN (1912) and *Arcadian Adventures with the Idle Rich* (1914). The first humorously anatomizes business, social life, religion, romance and politics in the typical small Canadian town of Mariposa, whose name has attained mythic significance in the Canadian psyche. Perhaps the greatest creation of *Sunshine Sketches* is the narrator himself, who, in his affection for and bemusement at the community of Mariposa that he so admirably represents, reveals the essential Leacock. *Arcadian Adventures* dissects life in an American city with sharper satire, less qualified by the author's affection and pathos. Taken together, these 2 books reveal the imaginative range of Leacock's vision — the nostalgic concern for what is being lost with the passing of human communities and his fear for what may issue. However, Leacock believed that the best humour resides at the highest reaches of literature. Any list of his own best works, both fiction and nonfiction, would have to include the following selection from some 60-odd books: *Nonsense Novels* (1911), *Moonbeams from the Larger Lunacy* (1915), *Further Foolishness* (1916), *Essays and Literary Studies* (1916), *Frenzied Fiction* (1918), *The Unsolved Riddle of Social Justice* (1920), *My Discovery of England* (1922), *The Garden of Folly* (1924), *Winnowed Wisdom* (1926), *Short Circuits* (1928), *Lincoln Frees the Slaves* (1934), *Humor: Its Theory and Technique* (1935), *Humour and Humanity* (1937), *My Discovery of the West* (1937), *Too Much College* (1939), *My Remarkable Uncle* (1942), *Our Heritage of Liberty* (1942), *Happy Stories* (1943), *How to Write* (1943), *Last Leaves* (1945) and his unfinished autobiography, *The Boy I Left Behind Me* (1946).

GERALD LYNCH

Reading: Donald Cameron, *Faces of Leacock* (1967); Robertson Davies, *Stephen Leacock* (1970).

Lead (Pb), silver-grey metal commonly found with zinc and copper sulphides as the MINERAL galena. Properties such as a low melting point (327.4°C), high density and malleability, corrosion resistance and a good ability to attenuate gamma radiation and sound vibration have led to a wide variety of uses. Lead oxide was used for pottery glazing as early as 7000 to 5000 BC, and lead was one of the earliest smelted metals. It was used for coinage in China and Greece, and about 100 BC the Romans began using it for plumbing and solder. Roofing and ammunition applications developed during the Middle Ages. Lead-acid batteries, the largest use of lead today, were introduced in 1911. Lead is also used as an additive in gasoline and for solders, chemicals and alloys, plumbing and cable sheathing, and as protective sheathing against X rays and nuclear radiation. Lead is easily recycled; scrap accounts for nearly one-third of Canada's supply. Canada mines about 300 000 t of lead annually, ranking 3rd in the world (after the US and Australia). Leading producers are the YT, BC, the NWT and NB. Lead ore is mined, crushed and ground, and the lead-containing mineral is separated by flotation to produce a concentrate. At the smelter, concentrate is roasted to drive off the sulphur and then smelted, usually in a blast furnace, to produce impure lead bullion. Refining by electrolytic or pyrometallurgical means purifies the lead and allows recovery of by-products including silver, antimony and bismuth (*see* METALLURGY). Smelters at TRAIL, BC, and near BATHURST, NB, convert concentrates to refined metal. About 50% of this metal as well as the remaining mine production is exported to the US, Europe, Japan and elsewhere. The lead industry accounts for about 0.1% of Canada's GNP. Lead is toxic at high levels of exposure and lead poisoning was formerly an occupational hazard. Its present use, eg, in paints, is regulated and the lead content of gasoline has gradually been reduced. The "lead" of lead pencils is not lead but a mixture of graphite and clay. *See* POLLUTION.

J. BIGAUSKAS

Leader of the Opposition, the leader of the political party with the second-largest number of seats in the HOUSE OF COMMONS. (If the party leader, usually elected at a national LEADERSHIP CONVENTION, does not have a seat, the party HOUSE LEADER temporarily substitutes for the leader.) The leader of the Opposition was first recognized by statute in 1905 and given the same salary and allowances as CABINET ministers. The leader of the Opposition is a parliamentarian hoping to become PRIME MINISTER and is the leading critic of government programs and policies. He directs the party in PARLIAMENT and appoints leading members of the caucus as "shadow ministers" to monitor the work of the ministries. He is usually consulted by the prime minister on the appointment of the SPEAKER and sometimes on the appointment of the GOVERNOR GENERAL. If the government is defeated in the Commons, the leader of the Opposition may be asked to form a government if the prime minister chooses to resign rather than to request a dissolution. Provincial legislatures have leaders of the Opposition with similar responsibilities.

JOHN SAYWELL

Leadership Convention, meeting of party members to select a parliamentary leader. Of the countries deriving their parliamentary system from the Westminster model, Canada alone has adopted and modified the American national party convention as the means for choosing its party leaders. For more than 50 years after CONFEDERATION the parliamentary parties (caucuses) chose their leaders from amongst their own members — senators and MPs — but in 1919 that system came to an end when Sir Wilfrid LAURIER called a national party convention to discuss policy and organization. Between the time the call went out to the 1135 delegates and the time they assembled some months later in Ottawa, Laurier died. The party executive seized the opportunity to convert the meeting into a forum for selecting the new leader.

The convention came at an ideal time for the Liberals. The 1917 "Conscription Election" had split the party, and its forces in Parliament were small and drawn overwhelmingly from Québec. A truly "national" convention presented the party with the opportunity to widen considerably the number of participants in its leadership-selection process. It was decided that an equal number of delegates was to be sent by each federal constituency association. At the same time the party executive accepted as a second principle the notion that a clear majority of delegates should come from the constituencies — the minority being made up of party officials, MPs, senators and provincial legislators.

Both principles have been applied by the LIBERAL PARTY and the Progressive CONSERVATIVE PARTY (though not the CO-OPERATIVE COMMONWEALTH FEDERATION, now the NEW DEMOCRATIC PARTY, which has based its constituency representation on the size of party membership lists at the local level) in every national leadership convention since 1919. They have lent support to the common claim of Canadian politicians that leadership conventions are more democratic and representative than any alternative method of choosing party leaders. That the delegates (usually between 2000 and 3500 in number) vote secretly and individually, that no additional names may be placed in nomination once the voting has begun, and that the candidate with the fewest votes is dropped after each ballot until one candidate has won a clear majority of the votes — all of these rules stand in marked contrast to those of an American convention and contribute to the rhetoric about the uniqueness of Canadian leadership conventions.

While leadership conventions have compensated to some degree for the regional imbalances of the parliamentary parties, they have at the same time effectively ended the caucus's monopoly over the selection of a party leader, with a curious result. "Outsiders" (those with little or no prior parliamentary experience) stand a greater chance of being chosen party leader than those who have devoted many years to a parliamentary career and who, in many cases, have served for a long period of time on the Government or Opposition frontbenches. The first 5 leaders of the Liberal Party chosen by national leadership conventions, W.L. Mackenzie KING (1919), Louis ST. LAURENT (1948), Lester B. PEARSON (1958), Pierre Elliott TRUDEAU (1968) and John TURNER (1984), fall into this category. For its part, the Conservative Party has selected 3 provincial premiers as national leaders. Not one had stood for election to Parliament before his selection: John BRACKEN (1942), George DREW (1948) and Robert L. STANFIELD (1967). After only 3½ years in Parliament, Joe CLARK defeated 10 other candidates (some of whom had had lengthy political careers) to become, at the age of 36, Canada's youngest national party leader. Clark was succeeded as Conservative leader in 1983 by Brian MULRONEY, a man who had never previously been nominated for or elected to public office at any level of government. Of the Conservative leaders chosen by convention, only R.B. BENNETT (1927) and John G. DIEFENBAKER (1956) had had extensive prior parliamentary experience.

It seems that convention delegates look for qualities other than parliamentary and Cabinet

experience when choosing their party's leader. Success in previous provincial elections, reputations earned in administrative, industrial and extrapolitical spheres, and potential electoral attractiveness count for more than lengthy service in Parliament. It is debatable whether the openness and freedom inherent in the leadership-convention system, with its challenge to established career patterns and recruitment practices, is necessarily beneficial to the larger political system.

Canadian leadership conventions are not held at regular, stated intervals. Thirty years passed between the first and second Liberal leadership conventions — an unrivalled hiatus that would no longer be tolerated by the press, public and politicians. Leadership conventions are now typically called every 8 to 10 years when, for example, the leader no longer feels equal to the task (St. Laurent and Drew); when he is convinced there is little likelihood of the party gaining office under his leadership (Bracken and Stanfield); or when, as prime minister, he is satisfied that the time has arrived for handing over the reigns of power (King, Pearson and Trudeau).

Another reason for calling a leadership convention has so far been peculiar to the Conservative Party. It stems from the party's internecine battles from the mid-1960s to the early 1980s over its leadership. By his party's approval of a motion to hold a leadership convention within a year, John Diefenbaker, who was unwilling to step down, was forced to choose between retiring from the position and seeking re-election in a convention open to other contenders. He chose the latter and was defeated. At the Conservatives' biennial meeting early in 1983, when Joe Clark was party leader, 66% of the delegates voted against holding a leadership convention (as they were entitled to do under the leadership review provisions of the party's constitution). Despite the support, Clark interpreted the vote as insufficient endorsement of his leadership and he resigned his office, announcing he would be a candidate at the next convention. At that convention (held June 1983) there were 8 leadership candidates. Although Clark led on the first 3 ballots, he was overtaken on the fourth by Brian Mulroney, who won by a vote of 1585 to 1323. The candidate with the least parliamentary experience defeated the former leader, who, among all the candidates, enjoyed the greatest support of his parliamentary colleagues.Mulroney's sweeping victory in the 1984 federal election has almost assuredly guaranteed party support for some time to come. JOHN C. COURTNEY

Reading: John C. Courtney, *The Selection of National Party Leaders in Canada* (1973).

League for Social Reconstruction, organization of left-wing intellectuals, fd 1931-32 in Montréal and Toronto, largely in response to the GREAT DEPRESSION. Although it soon had almost 20 branches elsewhere in Ontario and the West, the founding branches proved the longest lived and most active in political education. Led by historian Frank UNDERHILL and law professor F.R. SCOTT, the LSR was critical of monopoly capitalism and demanded economic change by parliamentary means. Never formally linked with a political party, it made its sympathies clear with the annual re-election of J.S. WOODSWORTH as its honorary president. The Regina Manifesto (1933) of the CO-OPERATIVE COMMONWEALTH FEDERATION was largely written by LSR members. The league's ideas found fullest expression in the books *Social Planning for Canada* (1935) and *Democracy Needs Socialism* (1938), and in the CANADIAN FORUM, acquired in 1936. Disillusionment with SOCIALISM in the late 1930s weakened the LSR. WWII and the increased organizational demands of the CCF led to the LSR's quiet demise in 1942. Its influence on the CCF was great; its influence on Canada is still a matter for speculation. MICHIEL HORN

Reading: Michiel Horn, *The League for Social Reconstruction* (1980).

League of Nations, international organization established at the Paris Peace Conference (1919) at the end of WWI. It was founded on the principles of collective security and preservation of peace through arbitration of international disputes. American Pres Woodrow Wilson had taken an important part in founding the league, but the US never joined. Sixty-three states were eventually members. With headquarters in Geneva, Switz, it lasted until the founding of its successor, the UNITED NATIONS, in 1946. Canada was a member throughout the league's existence, and served 1927-30 on the council.

The Covenant (the treaty provisions creating the league) established a council, assembly and secretariat. The council met quarterly and comprised the major powers as permanent members, plus non-permanent members elected by the assembly. The assembly consisted of representatives of all member states, and met annually. Under a secretary-general, the secretariat provided the permanent staff. A Canadian, Sir Herbert AMES, was financial director 1919-26, a high administrative position in the secretariat. The league provided opportunities for international discussion of political and legal questions, disarmament, economic relations, the protection of minorities, communications and transit, and health and social questions. Members were required by Article 10 of the Covenant to respect and preserve each other's territory and independence. Aggression against any member would be considered aggression against all, and would lead to collective economic, and possibly military, measures. The purpose of collective security was to avert war, and in the 1920s the league participated in the attempted reconciliation of Germany with France and Great Britain. However, it proved incapable of effective action in the face of territorial aggression in the 1930s by Italy, Germany and Japan. The league ceased to function as a collective-security organization, although its social and economic activities continued until WWII.

From 1920 to 1923 the Canadian government actively but unsuccessfully sought removal of the collective-security guarantees, fearing involvement in European wars. More positively, in 1929, Raoul Dandurand, Canadian representative on the council, successfully proposed strengthening league procedures in overseeing the treatment of linguistic and religious minorities in E Europe. In 1935, when Canada supported the league's sanctions against Italy, Canadian delegate Walter A. RIDDELL proposed stopping all exports of oil, coal and steel to Italy. This action, unauthorized by the new Mackenzie King government, was publicly repudiated. Subsequently, Canada kept a low profile at league meetings.

The League of Nations, even though ultimately unsuccessful in achieving collective security, established a new pattern of international organizational activity. League membership brought Canada its first official contact with foreign governments, helped establish its position as a sovereign state and confronted it with both the opportunities and the dilemmas associated with problems of international cooperation and attempts to prevent war.

RICHARD VEATCH

League of Nations Society in Canada, fd 1921 to promote international peace by developing public knowledge of and support for the LEAGUE OF NATIONS. With headquarters in Ottawa, it operated until 1942. Its presidents included such public figures as Sir Robert Borden, Sir George Foster and Ernest Lapointe; John W. Dafoe, Newton W. Rowell and J.S. Woodsworth served on its national council. The society's activities were primarily promotional and educational. It distributed league publications and its own monthly, *Interdependence*, and sponsored speaking tours and radio broadcasts by supporters. It was the first Canadian organization to encourage public interest in and understanding of international affairs. RICHARD VEATCH

Leamington, Ont, Town, pop 12 528 (1981c), inc 1890, located on the N shore of Lk Erie, 54 km SE of WINDSOR. Named after a town in Warwickshire, Eng, it developed in the 19th century as a lake port and market-gardening centre. Tobacco growing was a major industry in the surrounding area, along with canning and food processing. Today it is the site of a large H.J. Heinz Co food-processing plant. It is also the gateway to POINT PELEE NATIONAL PARK, the most southerly point in Canada. DANIEL FRANCIS

Learned Societies, a term applied in Canada to the large group of scholarly organizations that hold conferences annually from late May to mid-June at a different university location each year. Society members come not only to hear and discuss scholarly papers on the latest work in their fields, but also to renew contacts and share common concerns.

The gathering of these associations in one place over one period is distinctively Canadian and owes more to practical evolution than to planning power. Selecting one site with suitable university accommodation was an answer to Canadian distance that allowed scholars more economical joint arrangements, let them attend meetings of societies besides their own, and encouraged them to visit varied geographical areas. The older ROYAL SOCIETY opened the way by moving from its Ottawa base to annual conferences at Montréal, Kingston or Toronto. Younger, more specialized associations — such as those in history, political science and economics — joined in, holding their own meetings along with, or just following, the senior scholarly society. By the 1930s the practice of an annual learned-conference period at a different site each year was well established, though such sites were usually in central Canada, where most larger universities were located. But in 1949 "the Learneds" went to Halifax, and soon afterwards to Winnipeg, Edmonton and Vancouver. Since then the growth of large universities across the country and the multiplication of learned societies — from the Assn of Canadian Archivists to the Canadian Linguistic Assn, the Canadian Institute of International Affairs to the Assn for Canadian Theatre History — have provided still more locations and a greater range of meetings for the organizations of Canadian scholarship. In 1984 about 60 associations congregated in Guelph, Ont. J.M.S. CARELESS

Leatherworking in NEW FRANCE began in the 17th century when the first groups of colonists began farming around Québec City and Ville-Marie [Montréal]. In the young colony, trades were not governed by the statutes and regulations of French guilds, despite repeated attempts by Intendant Jean TALON to establish such regulation (*see* APPRENTICESHIP IN EARLY CANADA). New France was unlike the mother country, where trades were highly compartmentalized (eg, skinners, tawers, tawers using Hungarian techniques, strap makers, glovers, belt makers, harness makers, cobblers, trunk makers, last makers, heel makers). For example, tanners used methods which, in France, were reserved for other artisans; cobblers and harness makers ventured beyond the tasks originally assigned to them by guild statutes.

Tanning At first, Québec leatherworkers were supplied with skins processed in the royal factories of France and by local private tanners; the

first tannery in the colony was established at Pointe-Lévy in 1668. Headed by a master tanner from France, the company quickly achieved success and sparked enthusiasm among other master tanners and merchants, including Johan, Thibierge, Larchevêque, Perthuis, Fornel and Bégon. The Québec government's 68 tanners and merchants obtained their raw materials on contract mainly from butchers, the principal suppliers of sheepskin and cattle hides. Hunting and fishing supplied other types of skins, eg, walrus, seal, moose, deer, bear. Tanning operations were modelled on methods used in France, with local modifications. Tanning mills were driven by wind, water or animal power. Tanners prepared the skins in the traditional manner by washing the leather, soaking or softening it, placing it in a lime pit, and then graining, scraping and trimming it. The tanners of New France prepared their tannin using the bark of hemlock or spruce, rather than oak or chestnut as in France. Most production was of tough leather for the local manufacture of shoes, work boots and harnesses. The tanneries grew and prospered in New France. Despite the owners' high operating costs, the pressing local need for leather goods and the availability of various skins helped the tanneries survive. Originally established and run by master craftsmen from France, tanneries quickly became the preserve of merchants and dealers who could assume the extremely high investment costs.

Between the arrival of British craftsmen after the Conquest, 1759-60, and the end of the 18th century, the art and techniques of the leather trade underwent little change. The 19th century saw developments in tanneries, including innovations in the forms of energy used, technology and work organization, as well as a concentration of capital. During the 1880s, American tanneries broke new ground by abandoning vegetable tannin in favour of the chrome-tanning process. This process reduced the tanning period from 9 months to 5 or 6 weeks, thereby saving time, lowering production costs and even improving product quality. The tanneries of Ontario quickly adopted the new method, but those of Québec did not begin to do so until 1910. This situation may have been a factor in the decline of Québec's tanneries which, until then, had been the leading Canadian producers of leather goods.

In Ontario, the Davis tanneries in the Kingston and Toronto areas exemplify the evolution of this industry. In the mid-19th century, Andrew Davis operated a tannery where craftsmen produced leather goods for local farmers and independent cobblers. Around 1860 he and his son became interested in mechanization. In the next decade, the family installed steam power and began introducing machines. Then, as the shoe industry began to expand in Ontario, the market grew to the point where mass production and the wholesale trade became viable propositions. New machinery helped accelerate production, reduce costs and provide variety in the colour and types of leather of the finished products. At the end of the 19th century, the Davis family experimented successfully with chrome tanning; in the first decade of the 20th century, running water and electricity were installed. Finally, direct access to the CANADIAN NATIONAL RAILWAY resulted in lower transportation costs. The Davis tanneries continued to prosper, entering American and world markets in the 1930s.

The tanning industry originated in Québec but did not develop to its fullest extent in that province. In 1949, Canada had 70 tanneries, 33 in Québec and 28 in Ontario. Québec's tanneries employed 606 workers and supplied 11% of Canada's leather production; Ontario's 3852 workers supplied 86%. Today, Ontario tanneries have production capacities 4 times greater than those of Québec. The stagnation of Québec's tanneries is seen as one of the factors in the decline of the FOOTWEAR INDUSTRY.

Cobbling and Footwear Production Between 1660 and 1760, 132 craftsmen were employed as cobblers or harness makers in Québec. Of that number, 55 independent craftsmen with their own shops were known as "masters." The rest were employed on a fixed-salary or contract basis in shops or tanneries, some of which had their own cobbler's workshop. The cobblers of New France made French shoes, MOCCASIN-style shoes and boots, mules and slippers; harness makers produced harnesses, backstraps, saddles, hame straps and collars for dogs and horses. Because of the severe climate, cobblers had to adopt styles that would offer their customers warm as well as hardy footwear. They thus adopted native moccasins and high, soft boots. The effectiveness of Indian footwear lay in the cut and assembly of the pieces: the upper and the sole formed a single piece joined on the upper part to a tightly sewn, rounded tongue, thereby preventing water from leaking in through seams underfoot. The moccasin boot was a variation of the shoe, with the addition of a knee-high, sewn upper. A lace held the boot snugly against the leg. Cobblers also made more delicate shoes by imitating the styles of French footwear brought to the colony by boat. After the Conquest, new models of army-style boots and shoes were introduced.

Cobblers remained shop craftsmen or eventually became employees of combined shoemaking and tanning factories because no large cobbling enterprises could compete with the firmly established, government-funded tanneries. Cobblers were subject to the requirements and decisions of tanneries, which were made on the basis of the availability and quality of leathers and contracts with the army. As cobblers changed from being employees to owners of small shops, tanners and merchants were establishing control over leatherworking. This situation developed despite the cobblers' complaints and their appearance before the Conseil souverain to try to eliminate the discriminatory power of tanneries over the free enterprise of independent cobblers.

In the first half of the 19th century, Canada's cobblers preserved the trade practices of their ancestors. However, such craftsmen were progressively replaced by cobbler-merchants, journeymen hired by factories and specialized workers in the large 20th-century footwear factories. From about 1810 to 1860, 2 types of shoe production coexisted in Québec: the traditional system, in which independent craftsmen produced the entire shoe to a client's order; and the system in which cobbler-merchants employed journeymen who each produced different parts of the shoe, thereby increasing production. Cobbler-merchants stocked both imported and locally produced shoes. During this period, workshops began to grow in size; fabrication was divided into a series of distinct tasks; journeymen worked as paid employees in workshops or at home; and a concentration of capital was organized to meet rising production costs. Hence, the introduction of a new approach to LABOUR RELATIONS (eg, the close master-journeyman-apprentice relationship was replaced by a hierarchical labour-management relationship), of piecework and of a shorter apprenticeship period. Journeymen faced competition from untrained, poorly paid workers and were financially unable to open their own workshops.

In the first half of the 19th century, the technological revolution, fed by discovery of new forms of energy and by mechanization, transformed the cobber's trade. Perfected in 1845, sewing machines were used to sew vamps and "Howe" uppers and thus replaced work previously performed by women working at home. By 1860 the capacity of these machines increased with the introduction of steam power. A few years later, a worker could sew 90 pairs of soles with the McKay "Soles Sewing Machine" in the time it took to sew one by hand. A favourable economy allied with technological progress led to a boom in the footwear industry. Proof of this rapid growth is the fact that Québec City had 9 shoe factories in 1861, 73 by 1871.

With the exception of refinements of mechanization and greater division of labour, the physical organization of factories at the turn of the 20th century remained essentially unchanged. The ground floor of a three- or four-storey building would house several departments: the assembly room, where pins or nails would be used to attach the upper to a false sole on a form; the fitting area, where the sole was joined to the upper; the heel-cutting division; and the finishing and shipping department. The second floor housed the administration, management and sales departments; the third floor was reserved for cutting the leather into uppers, machine assembly of the handcut parts of the upper, and storage of rolls of fine leather and cutting patterns.

The INDUSTRIALIZATION of shoe production produced major changes in organization and labour relations and required a concentration of capital and cost-effective production methods. Owners had to instill a team spirit among managers, production heads and foremen in order to have workers produce at full capacity. This hierarchical structure was motivated by profit. Employees worked in difficult conditions: unsanitary workshops, long days and fatigue induced by the need to earn a decent income from piecework. They also had to face the danger of accidents, the lack of job security at a time of chronic unemployment and the loss of qualifications formerly required of members of a traditional trade. This last phenomenon, the result of increasingly specialized duties (150 manufacturing operations existed in 1910), required workers to accept low wages since they could no longer use their qualifications to compete with unskilled workers (particularly women and children).

Traditionally, Québec's leatherworkers were not members of trade guilds established to defend their rights. Trade unions, the offshoots of American unions, gained ground in the 1860s but were not legally recognized until the 1870s. Under the influence of Mgr Louis-Nazaire Begin, the first national Catholic unions appeared in 1901. The arbitration cases and strikes of that era reveal that workers were fighting mainly for the right to union membership, higher salaries and a slow-down in the introduction of machines. MARÎSE THIVIERGE AND NICOLE THIVIERGE

Leaver, Eric William, inventor, electronics engineer (b at Langham, Eng 11 Aug 1915). Leaver came to Saskatchewan as a child and after graduation from high school established himself in the 1930s as an inventor of automatic landing systems for aircraft. At the end of WWII he formed Electronic Associates Ltd with colleagues from Research Enterprises Ltd, the government's radar factory, and set out to develop robotic machine tools. Leaver's AMCRO system (Automatic Machine Control by Recorded Operation) was patented in 1947 and, for lack of risk capital in Canada, developed by American licensees. AMCRO was resisted by manufacturers of conventional machine tools and never fully developed.

Electronic Associates diversified to produce electronic instruments, such as portable Geiger counters for uranium prospectors, radar altimeters for accurate aerial surveys, and automatic process controls for industry, notably mines and paper mills. The firm was selling more than

$15 million worth of HIGH TECHNOLOGY products a year when Leaver lost personal control in 1974 and became an independent consultant. Renamed Sentrol Systems, the firm was acquired in 1981 by the CANADA DEVELOPMENT CORPORATION. Sentrol and a US subsidiary, now sold off, remain successful. DONALD J.C. PHILLIPSON

Lebensold, Fred David, architect, theatre design consultant (b at Warsaw, Poland 1917). Educated in Poland, he went to London, Eng, to study at the Regent Street Polytechnic (1939). He served as a staff captain in the Royal Engineers 1943-47 and then taught design in London. Immigrating to Canada 1949, he was associate professor of architecture at McGill 1949-55. In private practice, he was a founding member of Arcop Associates and emerged as a gifted theatre designer, responsible for the design development of many theatres, including the Queen Elizabeth, Vancouver; Place des Arts, Montréal; National Arts Centre, Ottawa; and City Center Theatre, New York City. Lebensold's practice also includes domestic architecture, public building developments and historic building rehabilitation. He was an initiator of restoration work in Vieux Montréal. NORBERT SCHOENAUER

Leblond, Charles Philippe, anatomist, cell biologist (b at Lille, France 5 Feb 1910). Considered a pioneer in cell biology, Leblond was among the first to use synthetic radioactive isotopes in the localization of labelled molecules within tissues. To achieve this he developed, in collaboration with L. Bélanger in 1946, the now universally used technique called radioautography. This consists of placing thin sections of tissues containing radioactive substances in contact with a photographic emulsion. The presence of developed black silver grains over cells or tissues, when examined with the microscope, reveals the source of radioactivity. Leblond exploited this method to investigate dynamic processes taking place in the body, such as the renewal of tissue components or the elaboration of various substances by the cells. Author of more than 350 scientific articles and professor of anatomy at McGill since 1948, he has received many honours, including membership in the Royal Soc, London (1965), and in the American Academy of Arts and Sciences (1970) YVES CLERMONT

Leckie, John Edwards, "Jack," soldier, mining engineer, explorer (b at Acton Vale, Qué, 19 Feb 1872; d at Port Hope, Ont 7 Aug 1950). He was best known for engineering and research work around Hudson Bay. Leckie was educated at Bishop's, RMC, and King's College. He saw service in S Africa and France, and was "Malamute Force" commander in the Russian civil war. He developed mines in Northern BC and in the Zeballos fields of Vancouver I, explored in Mexico and Venezuela and led a major, though unsuccessful, search for Spanish gold on Cocos I. He was a press censor in WWII. Made a Fellow of the Royal Geographical Soc in 1928, he received the DSO and French Croix de Guerre among other decorations. ALLAN LEVINE

Leckie, Robert, air marshal (b at Glasgow, Scot 16 Apr 1890; d at Ottawa 31 Mar 1975). A much-decorated, flying-boat pilot in WWI, Leckie was the only airman to be credited with downing 2 Zeppelins. He then joined the newly formed RAF and was seconded to Canada as director of civil flying operations, 1919-22. He played a leading role in the first trans-Canada flight in 1920. Returning to Canada after a series of RAF appointments, Leckie was air member for training, 1940-44, the officer in charge of the BRITISH COMMONWEALTH AIR TRAINING PLAN. He transferred to the RCAF in 1942 and was chief of the air staff, 1944-47. Intelligent, sensitive and forceful, Leckie was the most impressive of Canada's senior air officers in WWII. NORMAN HILLMER

Leclerc, Félix, singer-songwriter, composer, poet, novelist, playwright, actor (b at La Tuque, Qué 2 Aug 1914). He was a radio announcer in Québec City, and was encouraged by Mgr Albert Tessier to publish several radio scripts he had written. In 1939 he made his début as a singer for Radio-Canada and then, with 2 colleagues, in 1948 founded the VLM troupe, which presented his own plays throughout Québec. Thereafter, he continued to make himself known throughout Europe, particularly in France, as well as Canada. Some of his most popular songs are "Notre sentier," "Moi, mes souliers," "Bozo" and "Le Train du nord." Recurring themes are love of nature, his homeland and mankind. His poetic work takes its strength from its simplicity. Among other awards he has received the Grand Prix du disque (1951, 1958, 1973). HÉLÈNE PLOUFFE

Leduc, Alta, City, pop 12 471 (1981c), inc 1906 (town) and 1983 (city), is located 30 km S of EDMONTON. Originally a telegraph terminus and stop on the Calgary and Edmonton Ry, the town grew as an agricultural centre. On 13 Feb 1947, the Leduc No 1 well successfully tapped the huge Leduc oil field. By the end of 1947, some 30 wells in the field were producing 3500 barrels of oil a day. Today, most of the field is depleted, though Leduc is still a storage and pumping station. It is a farm distribution centre with some light industry connected with oil production, although not as much as formerly. Leduc is a dormitory community for many people who commute to Edmonton or who work at the nearby Edmonton International Airport. It has a hospital, school, churches, public library, parks and other recreational facilities. The newspaper is the *Leduc Representative*. Leduc is named for Rev Hippolyte Leduc, OMI, a pioneer priest in the area. ERIC J. HOLMGREN

Leduc, Fernand, painter (b at Montréal 4 July 1916). Leduc studied at the Ecole des beaux-arts in Montréal 1938-42. In 1941 he met Paul-Émile BORDUAS and became a leading member of the AUTOMATISTES, exhibiting with them and signing Borduas's REFUS GLOBAL in 1948. He spent the years 1947-53 in Paris and then returned to Montréal, becoming the founding president of the Association des artistes non-figuratifs de Montréal in 1956. He returned to France in 1959 and has lived there since, except for the years 1970-74 when he taught at UQAM and Laval. Leduc's work moved from the abstract surrealism of the automatiste movement to the rigorous, hard-edge colour abstraction found in the PLASTICIENS and others. With Guido MOLINARI and Claude TOUSIGNANT, he gave force to the direction Montréal painting took through the 1960s. In 1970 he began his *Microchromie* paintings, subtle layerings of colour concerned with the character of coloured light. DAVID BURNETT

Reading: Jean-Pierre Duquette, *Fernand Leduc* (1980).

Leduc, Jacques, film director, cameraman (b at Montréal 25 Nov 1941). A writer for the magazine *Objectif* 1961-67, Leduc joined the NFB during that period. He worked as a cameraman until 1967 when he began directing. His first major film, *On est loin du soleil* (1970), was based on the spirit of Brother ANDRÉ and established Leduc's style. In the 5 years after *Tendresse ordinaire* (1973), he directed *Chronique de la vie quotidienne*, a series of 8 films that draw upon daily life, recombining its elements into a work of fiction. This was a change from the traditional direct cinema approach used in Canadian feature filmmaking. His *Albédo* (1982) develops and transforms this duality: the aesthetic qualities of an episodic film are highlighted in a work in which documentary and fictional elements intertwine. PIERRE VÉRONNEAU

Leduc, Ozias, painter (b at St-Hilaire, Qué 8 Oct 1864; d at St-Hyacinthe, Qué 16 June 1955). Leduc's interest in drawing was encouraged by a local teacher. Around 1883 he joined a Montréal statue-making firm, then became assistant to Adolphe Rho and Luigi Cappello, who introduced him to mural painting as a profession. He began exhibiting his works at the Art Assn of Montréal's annual spring exhibition in 1891, and in 1892 won a prize for his painting, *Nature morte, livres*. Until the early 1920s his works were periodically displayed at the AAM and at annual expositions of the Royal Canadian Academy.

After working on the decorative interior of the church of St-Paul-l'Ermite (1892), he landed his first important contract, with Joliette cathedral, where he completed a group of 23 religious paintings. During his career he decorated 31 churches and chapels in Québec, NS and the eastern US. His most important work includes the churches of St-Hilaire (1894-99); St-Ninian's Cathedral, Antigonish (1902-03); St-Romuald, Farnham (1905); St-Enfant-Jésus du Mile-End, Montréal (1916-19); the chapel of the Sherbrooke bishopric (1922-32); the baptistry in Notre-Dame, Montréal (1927-28); Sts-Anges-Gardiens, Lachine (1930-31); and Notre-Dame-de-la-Présentation, south Shawinigan (1943-55). His religious works are closely linked to his still-life paintings and landscapes inspired by the St-Hilaire region. His paintings of daily life and nature have both a symbolic and spiritual dimension achieved through flowing but concise, meticulous lines, warm and subdued colours and soft light. In this vein his 1913-21 landscapes *Cumulus bleu, Fin de jour, Effet gris (neige), Pommes vertes, Neige dorée* and *L'Heure mauve*, along with drawings from the series *Imaginations* (1936-42), are among the most outstanding of his career.

As a painter of portraits and allegorical and historical figures, Leduc instilled his small works with great suggestive power. His interest in symbolism probably dated back to his brief stay in London and Paris in 1897. His writer friends, Arsène Bessette, Guy Delahaye, Olivier Maurault, Marcel Dugas, Paul MORIN and Robert de Roquebrune, as well as musician Léo-Pol MORIN, encouraged him in this direction. He collaborated with some of them to establish an art appreciation and criticism magazine, *Le Nigog*, published in 1918. He also illustrated several books, including *Claude Paysan* (1899) by Ernest Choquette, *Mignonne allons voir si la rose. . . est sans épines* (1912) by Guy Delahaye and *La Campagne canadienne* (1927) by Adélard Dugré.

Leduc was not influenced by contemporary Canadian artistic currents and trends. He held only one important exposition at the St-Sulpice Library in 1916. By helping to promote the career of Paul-Émile BORDUAS, he became quite popular late in his career. He also left many texts, poems and short reflections on art. His feelings about modern painting are expressed in the mystical thought that man lives searching for the paradise he hopes to regain through a knowledge of nature and the beauty of art.

LAURIER LACROIX

Reading: J.R. Ostiguy, *Ozias Leduc* (1974).

Lee, Dennis, teacher, editor, critic, poet (b at Toronto 31 Aug 1939). A graduate in English from U of T (BA 1962, MA 1965), Lee has taught or served as writer-in-residence for various universities. A founder and highly praised editor (1967-72) of House of Anansi, he later worked as consulting editor for Macmillan (1974-79) and McClelland and Stewart (1981-), as well as writing songs, with Phillip Balsam, for the TV program "Fraggle Rock" (1983-). Lee's prose books include *The University Game* (ed with Howard Adelman, 1968), in which he calls for freedom from inhibiting educational institutions, and *Savage Fields: An Essay in Literature and Cosmology* (1977). The latter explores the interrelationship



Poet Dennis Lee has become as well known for his children's writing as for his fine serious poetry (*courtesy Canapress*).

between "earth" and "world" — ie nature and civilization, or instinct and consciousness — all with particular application to a critical analysis of works by Michael ONDAATJE and Leonard COHEN.

Lee disavows much of *Kingdom of Absence* (1967), a sequence of 43 sonnet variations, but some of its concerns — modern ills, alienations, emptiness, colonialism, and their effects on the imagination and even on language — are developed in later books, *Civil Elegies* (1968, rev 1972; Gov Gen's Award) is a free-verse lament for Canada's colonized condition and a meditation on the need to become a full citizen: to occupy, imaginatively and in integrity, one's own life and land. Reclaiming language and liberating imagination, key parts of this process, are best begun in childhood; accordingly, Lee tries to free Canadian children from a colonial mentality by creating poems rooted in the words and activities of their everyday lives, poems which encourage free imaginative play. His 2 best children's books appeared in 1974; *Alligator Pie*, for preschoolers, and *Nickolas Knock and Other People* for older children. On the adult level, roots and play (including lovemaking) are further explored in part 1 of *The Gods* (1979). Part 2, *The Death of Harold Ladoo* (1976), is an elegy for Lee's friend, a writer murdered in 1973 during a visit to his native Trinidad. The poem also meditates on the roles of mystical epiphanies and of artistic creation in its attempt to come to terms with the problems of the contemporary world. JOHN R. SORFLEET

Lee, James Matthew, businessman, politician, premier of PEI (b at Charlottetown 26 Mar 1937). After setting up his own real-estate and development company in 1970, Lee ran unsuccessfully as a PC candidate in 1974. In a by-election on 17 Feb 1975, he was elected to the assembly. He held various portfolios and, after winning the 1981 leadership convention, was sworn in as premier in 1982. In 1983 Lee succeeded in securing Maritime and federal agreement for the establishment of a school of veterinary medicine at UPEI. DAVID A. MILNE

Leech (class Hirudinea), segmented ANNELID worm with 34 segments, many external rings and no setae (bristles). Suckers at each end are used in looping movements. Many aquatic leeches can also swim. Some leeches eat detritus; others, soft-bodied animals with red blood (eg, snails, worms). Most are external parasites on VERTEBRATES. Some may invade the bladder or body parts near the exterior, eg, nostrils. About 300 species are known worldwide, most from freshwater habitats; some are marine or terrestrial, especially in tropical areas. There are some 45 Canadian species, if those known from bordering US are included. The traditional medicinal use of leeches to draw blood continues, eg, in draining blood from reattached, severed fingers before natural circulation is fully restored. The leech's gut has a large storage area to hold massive blood meals needed for balanced diet; the intestine is simple, as blood is easily digested and absorbed. R.O. BRINKHURST

Leeson, Thomas Sydney, anatomist, electron microscopist (b at Halifax, Eng 26 Jan 1926). Having received his arts and medical degrees from Cambridge (1946-50), he later obtained an MD (1959) and a PhD (1971) there. He arrived in Canada in 1957 as assistant professor of anatomy at U of T. In 1963 he became professor in the anatomy dept at U of A, also serving as chairman until 1982. His research on the ultrastructure of tissues has gained him international recognition; he is especially well known for his textbook *Histology* (1966, 4th ed 1981), which he coauthored with his twin brother Charles Roland Leeson. K.D. MCFADDEN

Lefebvre, Jean-Pierre, filmmaker (b at Montréal 17 Aug 1941). Lefebvre's remarkable films, most made on low budgets, present a singularly personal body of work. His first 3 features, including the magnificent *Il ne faut pas mourir pour ça* (1967), were made independently, and his work began to attract international attention. In 1967 he joined the NFB, where he made 2 features as well as producing the films of a number of young Québec filmmakers. He soon left and formed his own company, Cinak. Working consistently with his wife, Marguerite Duparc, who edited and produced almost all his work, Lefebvre advanced his humanitarian view of the world in films such as *Les Maudits Sauvages* (1971), *Les Dernières Fiançailles* (1973), *Le Vieux Pays où Rimbaud est mort* (1977) and *Les Fleurs sauvages* (1982). PIERS HANDLING

Legal Aid The availability of publicly funded legal services for poor clients in Canada has developed only in the latter half of the 20th century. Previously, lawyers were sometimes willing to provide free assistance to poor clients in meritorious cases, and judges would sometimes appoint lawyers to act for poor clients, but such legal services were essentially charitable. Modest arrangements to provide legal services for clients who could not afford them were begun in some provinces in the 1950s and early 1960s by means of municipal and provincial grants and with contributions from lawyers, but it was not until 1966 that Ontario enacted legislation establishing the first comprehensive provincial legal-aid scheme. This legislation represented a major change in the philosophy of legal-aid services — that legal aid was no longer a charity but a right.

The Impact of Cost-Sharing on Services Legal-aid programs had been adopted by all other provinces and territories by the mid-1970s. Although legal-aid services fall within the provinces' constitutional responsibility for "the administration of justice," the federal Department of Justice became involved in these programs with federal-provincial cost-sharing agreements for legal-aid services in criminal law, a matter within federal constitutional responsibility. These cost-sharing agreements significantly affected the uniform development of provincial legal-aid plans because they specified both minimum standards of services to be provided and financial eligibility requirements for clients. For instance, an indigent client anywhere in Canada must be granted legal aid if that client is charged with an indictable offence, and the client is entitled to choose a lawyer in all serious cases where life imprisonment may result.

By contrast, federal funding has been far less available for legal-aid services in noncriminal cases, and provincial programs usually provide only restricted services or none at all. Notwithstanding the idea of legal aid as a right, provincial legislation creating legal-aid programs generally provides for discretion in granting legal aid to clients who are charged with less serious offences, or who must appear in lower courts in family law disputes, or where the client's case is heard in a small-claims court or before a tribunal. In addition, the provision of legal advice, the preparation of documents, and negotiation on behalf of a client are all usually discretionary matters under legal-aid legislation. Thus, legal aid as a right in Canada exists primarily for those poor clients charged with serious criminal offences.

Financial Eligibility The cost-sharing agreements require provinces to administer a flexible means test to determine whether a client can retain a lawyer without contracting major debts or having to sell modest assets that are necessary for livelihood. Provincial programs generally require an examination of income, of disposable assets, indebtedness, maintenance obligations, etc, to determine eligibility. Clients receiving social assistance will usually qualify for legal aid anywhere in Canada, but there is some variation from province to province in the application of financial eligibility guidelines for other clients. In addition, clients may sometimes be asked to make a contribution to or to repay legal-aid expenses.

Salaried or Fee-for-Service Lawyers? The development of publicly funded legal-aid services in Canada coincided with the expansion of legal aid elsewhere and with the adoption of international commitments to legal aid as expressed, for example, in the International Covenant on Civil and Political Rights that was adopted by the UN General Assembly in 1966. Yet even with broad agreement on the basic objectives of legal-aid services, considerable diversity occurred in their implementation. The US pattern of salaried public defenders in storefront offices contrasted with the delivery model adopted initially in England, where solicitors in private practice provided legal aid to clients and received reimbursement from government. From the inception of modern legal-aid programs in Canada, the issue of the appropriate delivery model — salaried lawyers or private practice lawyers paid on a fee-for-service basis — has been controversial. Several provinces, including Saskatchewan, Manitoba, Québec and Nova Scotia, initially opted for salaried lawyers in storefront locations, while Alberta and New Brunswick adopted the fee-for-service model. BC developed a more "mixed delivery" model, using a combination of salaried lawyers and paralegal workers in storefront clinics, as well as fee-for-service lawyers. The mixed delivery model also developed in Ontario, where the early fee-for-service model was expanded in 1976 and now includes approximately 45 independent community clinics staffed both by lawyers and paralegal workers. Clinics in Ontario provide complementary legal-aid services, particularly for those legal problems excluded from "entitlement" under the fee-for-service program (tenant problems, welfare, workers' compensation, immigration).

By 1980 most provincial legal-aid programs were based, in varying degrees, on this "mixed delivery" model. In addition, many provinces had adopted duty counsel arrangements in courts, and, in the North a duty counsel regularly travelled on circuit. Many programs had

experimented, often quite successfully, with legal-education projects and with arrangements designed to create better access to the law for poor clients. Such projects often used the expertise of paralegal or community legal workers and sometimes resulted in successful legal actions on behalf of groups of poor people.

Costs, Control and the Charter By 1980 the strength of the Canadian legal-aid system lay in the combination of its diversity and the maintenance of minimum standards that were effected by the federal cost-sharing agreements. The main issue for legal aid is its cost; total expenditures in 1978-79 reached $90 million. Even in provinces where responsibility has been vested in independent legal-aid corporations (BC, Manitoba, Saskatchewan, Québec, Nova Scotia and Newfoundland), fiscal restraint has dramatically affected legal-aid resources. Thus, the issue of access to justice through independent legal-aid services in Canada remains unsolved. Ironically, the fiscal restraint responsible for dismantling legal-aid programs coincided with the CHARTER OF RIGHTS AND FREEDOMS which enshrined the "right to retain counsel" as well as "equality before and under the law," "equal protection" and "equal benefit" of the law. The challenge to create an effective right to legal aid and equal access to justice still lies ahead.

MARY JANE MOSSMAN

Legal Education Because all provinces but Québec inherited the English COMMON LAW, legal education in Canada — training for the practice of law — was in the beginning modelled on that in England. In England, however, the profession was and is divided into 2 mutually exclusive branches — BARRISTERS and SOLICITORS. Solicitors deal with clients, but if there is to be a trial in the High Court a barrister must be retained to act as counsel. Barristers, who have the exclusive right to represent a party at a trial or on appeal, are the "senior" branch of the profession, but until very recently the educational qualifications were very low. Although most barristers have a university degree (not necessarily in law) it is not obligatory, and students can still become barristers without having ever been in court. Solicitors, however, must be articled clerks to practising solicitors and must pass examinations. The basic period was recently changed from 5 years to 4, which can be reduced to as little as 2 if the candidate passes certain qualifying examinations and has a university degree.

In Canada (except Québec) the division of the profession into 2 mutually exclusive branches has not occurred; today a legal practitioner in the common law provinces is invariably both a solicitor and a barrister, though in practice many act in the capacity of one or the other.

Before the establishment of the modern law school, the typical provincial Act governing the legal profession provided that applicants had to spend 5 years under articles and to write periodic examinations, though if they held a university degree the period was reduced to 3 years. When modern law schools were established, the articling period was usually reduced to one year after graduation. In Ontario and Manitoba it was once possible to combine part-time law school with part-time articles, but now these provinces have the same system as the others.

In Canada, as in the US and unlike England, students do not come directly from high school to law school. The usual minimum is 2 years of university education and most successful applicants have a degree.

The story of the common-law schools can be divided into 2 periods — from the founding of the Dalhousie Law School in 1883 to 1945, and from 1945 to the present. Dalhousie established a full-time 3-year course soon after the school was founded. It had always had links to Harvard Law School and at the end of WWI its curriculum resembled that of Harvard. Following the recommendations of the Canadian Bar Association in 1920, this curriculum was widely accepted by other common-law schools.

In Ontario the Law Society created its own law school, Osgoode Hall, in 1889. Later the universities of New Brunswick, Manitoba, Saskatchewan, Alberta and BC established law schools.

Shortly after WWII the Law Society made Osgoode a full-time school, but it did not give complete recognition to other schools in Ontario until 1957. In 1966 the society gave up its school and Osgoode Hall became a part of York University. By that time there were 6 faculties in Ontario — at the universities of Ottawa, Toronto, Western Ontario, Windsor, Queen's and York — and in other provinces law schools were also established at the universities of Victoria, Calgary and Moncton, and a common-law course was begun at McGill. By 1984 the number of full-time teachers had risen from about 20 to 600 and student enrolment is now in the thousands. Most law schools impose a quota on admissions. One notable postwar trend has been the marked increases in women students and in women law teachers.

The standard curriculum of 1920 remained virtually unchanged until 1945. In 1957 the Law Society of Upper Canada prescribed the courses it would require of "approved" schools, making amendments in 1969. As all the common-law schools are approved, it is clear that the Ontario prescription has influenced the curriculum in all common-law schools. There are 25 subject areas, with 6 compulsory "core subjects." The object is to provide a general education that permits a degree of specialization. In some law schools there is special emphasis on specific topics, eg, taxation or oil and gas law.

The teaching method in common-law schools was originally based on the "case method" created in the 1870s by Dean Langdell at Harvard Law School, who believed that law was a science composed of principles that could be learned from reading decisions of appellate courts. Formal lectures were replaced by discussions in class of assigned cases and by questioning of the Socratic type. By the 1920s, all common-law schools in Canada employed one or other variation of the case method.

Since WWII, the use of the case method, at least after the first year of law school, has been criticized on the grounds that it is unproductive and gives a misleading view of law in action. Legislation tends to be ignored in the reading of cases, although its pre-eminent place is now being recognized. There has been emphasis as well on problem solving and legal writing, and on public law as compared to private. Courses in CONSTITUTIONAL LAW were always fundamental, but now courses on ADMINISTRATIVE LAW, taxation and LABOUR LAW are also important. Another trend is the linking of law with other disciplines, eg, economics, history, psychology and sociology; and to answer the criticism that law school study ignores pressing social needs, there are courses in PROPERTY LAW, WOMEN AND THE LAW, and CIVIL LIBERTIES. There has been an effort to strengthen courses on legal theory, the philosophy of law and sociology of law, usually under the rubric of JURISPRUDENCE. Efforts have been made as well to teach ethics and professional responsibility.

The development of these new subjects is not always strong and has to face competition with other subjects. As a result of criticism that law schools fail to teach skills necessary in legal practice — drafting documents, writing opinions, preparing for trial and cross-examination, interviewing and negotiating — there has been increasing emphasis on clinical training. Considerable effort has been made to meet this demand, usually with the help of practitioners and judges. Like every innovation, however, its place in the law school has been debated.

The production of legal journals has conspicuously increased. These journals usefully provide scholarly articles and a forum for criticism and for proposals for reform. In addition, the use of computers is constantly increasing and may soon be indispensable in both law teaching and practice.

The recent report of the Arthurs Committee on Legal Education, *Law and Learning*, states that law schools are "eclectic" and still overemphasize training for the professional rather than the academic. The report advocates research at a high level to help the development of a "scholarly" discipline that will not be shunted aside from professional training. The report specifically recommends an expansion and intensification of graduate study (a number of schools give a master's degree and a few offer a doctorate) with a view to the education of future law teachers and researchers, and recommends that these programs should concentrate on those subjects in which the school is strong. Support for graduate research is hampered, however, by the shortage of funds for scholarships.

The advent of the law school did not mean an end to the system of articles. The purpose of articling is to provide "practical" training, ie, an introduction to practice which the law school has not provided. The success of articles depends on the "principal" and the student. The principal is under a duty to see that the student receives instruction in the basics of practice, but there is little or no supervision to this end. For many years after WWII, the business expansion created a demand for students and good articles were comparatively easy to obtain. In recent years, the number of graduates has been more than the market can easily absorb and the adequacy of the articling system has come into question. To supplement articles, most law societies have established a Bar Admission Course. The most notable is that of Ontario, begun in 1957. When students have finished the year of articles they are required to attend a 6-month course in matters such as rules of procedure, forming companies, handling estates, and real-estate transactions. This course is described in a handbook published by the Law Society of Upper Canada. The other provinces, except for PEI, have each provided in legislation for a bar admission course. However, these courses are less ambitious than Ontario's and vary a great deal. Some are given throughout the period of articles while others are offered near the end of the articling period, the length of the course varying from one week to 6.

In the US, the requirement of articles is virtually nonexistent. In theory, admission to practice is a matter for the state supreme court. The court in fact delegates its function to bar examiners who set comprehensive exams for those seeking to practice, and who conduct character checks. Another difference between the 2 countries is that the American Bar Association publishes a list of approved law schools, though some unapproved schools still exist; the Canadian Bar Association has no such role and there is no category of unauthorized law schools. Finally, the Canadian type of provincial law society, with statutory control over admission and discipline, is quite different from the type of law society in the US.

Once an individual has been admitted to practice it is important to keep up to date. Legal journals and special lectures and meetings of bar associations are helpful but provide uneven coverage and do not always reach those most in need. In recent years there has been a call for a greater and more systematic program of continuing legal education. In 1978 the Federation of Law Societies of Canada held a Conference on

Quality of Legal Services and in 1980 held a workshop on the same subject. It concluded that continuing legal education should be fostered but it was not prepared to recommend mandatory continuing legal education. Organized efforts at programs of continuing legal education are in fact increasing in most provinces.

The legal profession (outside Québec) has never recognized specialties, as does medicine, though in some province practitioners may now announce a preferred area of practice. The significant fact is that the "practice of law" is not homogenous, and the variations go far beyond the differences between barrister and solicitor. In addition, lawyers work not only in private practice but also in government and business.

In Québec the legal profession is divided. Advocates form the Barreau de Québec while notaries, governed by their own statute, are somewhat like solicitors. An individual cannot belong to both branches. The course leading to a degree in law in Québec takes 3 years, and the prelegal requirement is a diploma equivalent to an arts degree. If law students wish to become notaries, they must declare so by 1 Dec of their third year. Up to that point, the courses are the same for both branches, with emphasis on the CIVIL CODE. In many other ways the Québec schools have gone through the same experiences and problems as the common law schools. The first faculty of law was established in 1848 at McGill, which now gives a common law as well as a civil law degree (just as does U of O). Laval's law faculty was founded in 1852 and that of U de M is over 100 years old. Other law schools exist at Sherbrooke and U de Québec at Montréal.

Practical training occurs after graduation. For advocates there is an 8-month "formation professionelle" (similar to a bar admission course), followed by a "stagiaire" (similar to articles) of 6 months, and finally a bar exam. Graduates who wish to be notaries must attend an additional year in notarial practice at a civil law school; finally, they take a notarial examination.

W.F. BOWKER

Légaré, Joseph, painter, art collector, politician (b at Québec City 10 Mar 1795; d there 21 June 1855). Originally a painter and glazier, Légaré became a fine-arts painter around 1819. Self-taught, he never went to Europe for training and learned by copying the work of others. His first efforts to diversify his work were crowned with success when Québec's Société pour l'encouragement des sciences et des arts en Canada gave him a medal of honour (1828) for his painting *Le Massacre des Hurons par les Iroquois*. In all he painted more than 250 oils on canvas or paper, including some hundred religious copies, occasional portraits, some rural scenes and contemporary events (Québec's 1832 cholera epidemic and 1845 fires), some remarkable historical tableaux (*La Bataille de Sainte-Foy* 1854) and native Indian subjects. Légaré, who taught Antoine PLAMONDON, was the first Canadian-born painter to devote himself to landscapes. He also opened Canada's first art gallery (in 1833), featuring his personal collection of canvases and European engravings; it closed in 1835. From 1838 to 1840 and 1852 to 1855 he again offered Québec City art amateurs access to his ever-growing collection. Since 1874 the former Légaré collection has been held in the Musée du Séminaire de Québec, which also holds the most important body of the artist's own output. Légaré worked ceaselessly to promote fine arts in Lower Canada, and after 1845 was one of the greatest supporters of the creation of a national gallery. A Lower Canadian nationalist, he tirelessly promoted humanitarian, social and political goals. His activities included a stint as member of the first Québec C municipal council (1833-36). A faithful follower of Louis-Joseph PAPINEAU, he was arrested for his part in the



Joseph Légaré painted over 250 oils, among which were a number of fine portraits, such as *Portrait of Josephte Ourné* (*c* 1840) (*courtesy National Gallery of Canada*).

REBELLIONS OF 1837, 5 years before becoming one of the founding members of the ST-JEAN BAPTISTE SOCIETY of Québec. Defeated as a candidate in the by-elections of 1848 and 1850, he was appointed to the Legislative Council in Feb 1855, a few months before his death.

JOHN R. PORTER

Legault, Émile, director, dramatist, critic (b at Ville St-Laurent, Qué 29 Mar 1906; d at Montréal 28 Aug 1983). Ordained a Catholic priest in 1930, he became a teacher and founded, in 1937, a troupe of young actors at Montréal's Collège de Saint-Laurent. This troupe, the Compagnons de Saint-Laurent, would last 15 years and prove to be the most influential theatrical company in the history of Québec. With Legault's guidance and dedication it moved from an early emphasis on religious theatre to classical and contemporary plays, a tendency heightened after his year of drama studies in Paris. Former members of the Compagnons went on to provide leadership in all aspects of the performing arts in Québec for the next 3 decades. After the troupe disbanded in 1952 Legault turned to composing dramatic texts on religious themes, such as *Premiers gestes* (1954), *Le Grand Attentif* (1956) and *Kermesse des anges et des hommes* (1960). A perceptive critic, he is the author of many articles on stage arts in Canada and of a volume of memoirs, *Confidences* (1955).

L.E. DOUCETTE

Léger, Jean-Marc, journalist, social theorist, public servant (b at Montréal North 1927). After graduate studies at U de M in law, history and social sciences (1949), he attended the Institut d'études politiques, Paris, and returned to Montréal to become a journalist for *La Presse* until 1956 and with Le DEVOIR until the late 1960s. At U de M, with several other colleagues, he had set up the Équipe de recherches sociales to explore the socioeconomic problems of post-war Québec. They concluded that traditional FRENCH CANADIAN NATIONALISM, thanks to spokesmen like Maurice DUPLESSIS, was synonymous with the exploitation of the working class and the prevention of Québec's modernization. Throughout the 1950s Léger, through his writings in *L'Action nationale* and *Le Devoir* helped redefine this nationalism in terms of economic, social and political liberation for Québec's francophone majority. He was, thus, one of the ideological founders of the QUIET REVOLUTION. He worked for the "revolution" on the international scene as secretary general of the Assn des universités de langue française, 1961-78, and of the Agence de coopération culturelle et technique, 1969-74. Québec's delégué général in Brussels 1978-81, he was in 1984 an associate deputy minister with the Québec Ministry of Education.

M.D. BEHIELS

Léger, Jules, governor general of Canada, 1974-79 (b at St-Anicet, Qué 4 Apr 1913; d at Ottawa 22 Nov 1980), brother of Paul-Émile LÉGER. After studies at U de M and the Sorbonne, and working as a journalist, he joined the Dept of External Affairs in 1940 and began a brilliant diplomatic career that would lead him to ambassadorships in Mexico, Rome, Paris and Brussels. In France between 1964 and 1968, he won admiration for his sensitive handling of General de Gaulle's policy towards Québec. As undersecretary of state 1968-72, he provided the administrative underpinning for Prime Minister L.B. PEARSON's foreign policy and the TRUDEAU government's policy on bilingualism and multiculturalism.

Jules Léger was installed as governor general on 14 Jan 1974 and served until Jan 1979. In June 1974 he suffered a stroke which impaired his speech and paralysed his left arm. Although he regained a degree of health, he was thereafter greatly aided by his wife, Gabrielle Carmel, who in 1976 and 1978 shared with him the long reading of the speech from the throne. In 1978 he became the first governor general to exercise all the powers delegated to the office by King George VI in 1947. During Léger's term the country was divided by many acrimonious disputes over Québec SEPARATISM and the alienation of other regions. Throughout he maintained an unshakable and serene confidence in the unity of Canada and inspired a renewed respect for his office by his dignity, kindness, prudence and courage.

JACQUES MONET, SJ



Jules Léger, governor general of Canada 1974-79 by J. de Lavoye (*courtesy Public Archives of Canada/C-98013*).

Léger, Paul-Émile, cardinal of the Roman Catholic Church (b at Valleyfield, Qué 25 Apr 1904), brother of Jules LÉGER. He was ordained a priest in Montréal in 1929, beginning an ecclesiastical career that took him first to France (1930-33) and then Japan (1933-39). He returned to Valleyfield during WWII (1940-47), was rector of the Pontifical Canadian College in Rome (1947-50) and was then named archbishop of Montréal (1950-67), succeeding Mgr Joseph Charbonneau. Mgr Léger regularly made headlines, thanks to his eloquent speeches, his presence in all the religious and social activities of a city still unable to handle the demands of rapid change, and his clear support for the disad-

vantaged. He won the affection of the city and a reputation that quickly went beyond the borders of Québec. He was a man of action, with an extraordinary ability to stir people's consciences and energies to participate in projects such as the Foyer de Charité, the Hôpital Saint-Charles-Borromée for the chronically ill. He will also be remembered for his independence from politicians during Maurice DUPLESSIS's premiership of Québec and for his willingness to increase the role of the laity by renouncing certain privileges until then reserved to the church. His nomination as a cardinal in 1953 increased his renown. A member of the preparatory commission leading to Vatican Council II (1962-65), Cardinal Léger played an important role as both a liberal and a progressive. Upon returning to his diocese, he worked to implement the decisions of the council and then, in 1967, decided to step down from the episcopal seat in Montréal to become a missionary among lepers and handicapped children in Cameroon, Africa. Though retired, he sees to the continuity of the missionary activities he helped to launch and continues his humanitarian work from Montréal. DENISE ROBILLARD

Legge, Francis, soldier, colonial governor (b *c*1719; d near London, Eng 15 May 1783). After an undistinguished military career spent largely in N America, Legge was appointed governor of NS (1773) by his kinsman the earl of Dartmouth. During his first year in office he studied NS and sought to improve its economic situation and administration, but he soon conflicted with the Halifax merchant oligarchy. An attempt to audit the provincial books and to recover missing funds in the courts completed the process of alienation. By 1775 both Assembly and Council had turned against him, and as open rebellion broke out to the south, NS's military position was weak. Legge was recalled to England and criticized by the Board of Trade in 1776 for want of "Gracious and Conciliating Deportment." Although not formally replaced until 1782, he was not permitted to resume residence in NS throughout the war. J.M. BUMSTED

Legget, Robert Ferguson, civil engineer (b at Liverpool, Eng 29 Sept 1904). After working in the Canadian construction industry, Legget taught at Queen's and U of T until 1947, when he joined the NATIONAL RESEARCH COUNCIL to establish and serve as director of its new Division of Building Research, a position he held until retirement in 1969. He is known internationally for contributions to engineering, geology and building research and standardization. He helped establish co-operation among geotechnical engineers, geologists and pedologists in Canada, and his achievements have been recognized by 13 honorary degrees and many fellowships. Legget has written or edited more than 12 well-known books, including *Canals of Canada* (1975), *Glacial Till* (1976) and *Handbook of Geology in Civil Engineering* with P.F. Karrow (1983) and many papers on soil mechanics.

Leif Ericsson, Norse mariner (d *c*1020). The son of ERIC THE RED, Leif was the first European to set foot on the mainland of N America. According to the Saga of the Greenlanders, he bought BJARNI's ship and retraced his course, sighting 3 areas which he called Helluland (likely Baffin I), Markland (likely Labrador) and Vinland (possibly Newfoundland). Archaeological evidence at L'ANSE AUX MEADOWS confirmed Viking presence in Newfoundland, but the ruins need not be from Leif's Vinland. Leif earned his nickname "the Lucky" by rescuing shipwrecked sailors. *See* NORSE VOYAGES. JAMES MARSH

Leliefontein During the SOUTH AFRICAN WAR 90 officers and men of the Royal Canadian Dragoons were assigned to cover the retreat of a British infantry column under attack by several hundred Boer horsemen near Leliefontein farm, E Transvaal. In the action on 7 Nov 1900, in which the Dragoons were supported by 2 guns of the Royal Canadian Field Artillery, 3 Dragoons won VICTORIA CROSSES, 3 were killed and 11 wounded. BRERETON GREENHOUS

Lemelin, Roger, novelist, script writer (b at Québec C 7 Apr 1919). He was born in the working-class St-Sauveur district of Québec C and is mostly self-taught. He has also been a journalist and a businessman with interests in advertising, food processing and lumbering, as well as publisher of the Montréal daily, La PRESSE. Lemelin has published 4 novels, a short-story collection and some nonfiction. Most successful have been his novels, *Au pied de la pente douce* (1944; tr *The Town Below*, 1948) and Les PLOUFFE (1948; tr *The Plouffe Family*, 1950). Critical comment was less favourable to *Pierre le magnifique* (1952; tr *In Quest of Splendour*, 1955) and especially to *Le Crime d'Ovide Plouffe* (1982; tr *The Crime of Ovide Plouffe*, 1984). Lemelin also wrote the long-lasting TV series based on *Les Plouffe*, a great success on CBC's English and French networks in the 1950s, and the scenarios for the popular screen and TV adaptations of the same novel, directed by Gilles CARLE. Director Denys ARCAND's film, *Le Crime d'Ovide Plouffe* (1984), based on Lemelin's screenplay, reduced some of the original melodrama — the author's major flaw. A pioneer of social realism in French Canada, Lemelin's best writing is characterized by keen observation of his compatriots, with the main targets of his satire being clericalism, traditional nationalism, conventional Québec family, sexual taboos and ignorance. BEN-Z. SHEK

Lemieux, Jean-Paul, painter (b at Québec C 18 Nov 1904). Lemieux's artistic universe is often classified as one of northern landscapes, flat, barren and infinite, but this preoccupation is only one characteristic of his work. He studied at the École des beaux-arts in Montréal (1926-34), interrupted by a trip to Paris. After teaching at the École du meuble, he moved to the École des beaux-arts in Québec in 1937, remaining there until 1965. His work draws inspiration from Québec C and from Île aux COUDRES, Charlevoix County, which he holds in particular affection. His first paintings reflected daily life, portraits of relatives and familiar landscapes. In the 1940s, his canvases (*Lazare*, 1941; *La Fête-Dieu à Québec*, 1944) in fresco style summarize the attitudes of people. His organization of subject and space was then influenced by the Italian primitivist school and early Québec folk art, which he collects avidly. Gradually his subjects became simplified and his style more geometric. It is not, however, a stiff geometry, for the lines still vibrate, and colours are either transparent or pastel. Space opens up (*Le train de midi*, 1956), and against a line of horizon appear figures (*L'été*, 1959). Part of and yet distinct from the background, his figures evoke a world of dream and



Roger Lemelin, publisher of *La Presse*, at Québec City, Oct 1976 (*courtesy Public Archives of Canada/PA-129660/ Morris Edwards/Montreal Star*).



J.-P. Lemieux, photographed in a physical setting not unlike those of his paintings (*photo by John deVisser*).

memory. Often meditative and serious, Lemieux's art can sometimes be humorous and lyrical, as in his illustrations of Gabrielle ROY's books. His work is regularly exhibited in Canada and internationally, and he has been commissioned to paint portraits of a number of public figures. LAURIER LACROIX

Lemieux, Raymond Urgel, professor of chemistry (b at Lac la Biche, Alta 16 June 1920). Internationally recognized for his fundamental and innovative contributions to organic chemistry, especially in the area of carbohydrates, Lemieux obtained his doctorate from McGill (1946). He briefly held research positions at Ohio State U and U of Sask before moving, in 1949, to NRC Prairie Regional Laboratory in Saskatoon as senior research officer. Here he completed the first chemical synthesis of sucrose. He moved to U of Ottawa in 1954, where he pioneered the application of nuclear magnetic resonance SPECTROSCOPY to the structure elucidation of natural products. In 1961 he went to U of A, where his research focused on the special bonding properties termed "anomeric effects" and how these controlled the chemical reactions and shapes of carbohydrate molecules. This work led to the first chemical syntheses of the complex carbohydrates found on human cell surfaces and to an understanding of how the shapes of these molecules control their function. In addition to producing more than 200 scientific publications Lemieux holds over 30 patents, mostly on antibiotics and semisynthetic blood-group antigens, and is the founder of 3 chemical companies. O. HINDSGAUL

Lemming, stocky northern RODENT related to VOLES and MUSKRATS. About 16 species occur worldwide; best known of the 7 Canadian species are brown and collared lemmings (*Lemmus sibiricus* and the *Dicrostonyx groenlandicus complex*, respectively) from the arctic islands and mainland tundra W of Hudson Bay, and Labrador collared lemmings (*D. hudsonius*) from Ungava and Labrador. The northern and southern bog lemmings (*Synaptomys borealis* and *S. cooperi*) are uncommon. Lemmings rarely exceed 90 g and 15 cm in length. Their extremities are hidden by, or barely extend beyond, their long brown or grey fur. Collared lemmings are the only rodents that molt to a camouflaging white for winter. Lemmings eat willows and herbs. They are intermittently active day and night, and during winter forage beneath insulating snow. They breed rapidly and every 3-5 years reach peak densities of 60-125 per hectare. Subsequent population declines involve cessation of breeding and massive die-offs, but are not caused by predators, disease, starvation or stress from overcrowding. Lemming populations are self-regulating: genetically determined behaviours (aggressiveness and tendency to disperse) change with population density and influence the cycle. Although some Canadian lemmings emigrate from crowded areas and some accidentally

drown, they do not make spectacular suicide marches to the sea, as related in folklore. Lemmings are the main food for arctic carnivores, including valuable, fur-bearing arctic foxes and ermines. DONALD A. SMITH

Lend-Lease, an Act of the US Congress passed Mar 1941, providing for the transfer of American war materials to Britain and its allies in return for theoretical deferred payment. Canada's involvement in WORLD WAR II had caused serious deterioration in the BALANCE OF PAYMENTS vis-à-vis the US, and the Lend-Lease Act threatened to divert all British war orders from Canada to the US. To avert a crisis, on Apr 20 PM Mackenzie King and Pres F.D. Roosevelt issued the Hyde Park Declaration, named for the latter's Hyde Park estate, where they met, providing for American war purchases in Canada. American-produced components of war materiel manufactured in Canada for Britain were to be included in the Lend-Lease scheme, an arrangement which alleviated Canada's trade deficit and made it easier for Canada to fill British orders and guarantee financing for them. Lend-Lease, terminated 21 Aug 1945, greatly helped the war efforts of Britain, the USSR and some other Allied powers; it benefited Canada only indirectly. N.F. DREISZIGER

Lennoxville, Qué, Town, pop 3922 (1981c), inc 1871, is located in the Appalachians on the Rivière SAINT-FRANÇOIS, near the junctions of 4 rivers (Massawippi, Coaticook, au Saumon and Ascot), 5 km SE of SHERBROOKE. It was named in honour of the then governor general, the duke of RICHMOND (1818-19). The Abenaki and French missionaries often used the site because it was a focal point for canoes and small boats using the tributaries of the St-François. A sawmill and forest-products plant (lumber and potash) preceded the founding of the first village by LOYALISTS around 1794. From 1860 to 1950, there was some copper mining in the region. Development of road and rail networks 1810-84 brought copper manufacturing (1903), asbestos (1935) and, more recently, maple syrup industries. Located here are BISHOP'S UNIVERSITY (est 1843) and Bishop's Coll School (est 1836), which attract students from across Canada and the US. There are as well federal agricultural research facilities. The town is the centre of activities for the anglophone community in the EASTERN TOWNSHIPS.
JEAN-MARIE DUBOIS AND PIERRE MAILHOT

Lentil (*Lens esculenta*), herbaceous, cool-season annual belonging to the legume family. Lentils were one of the first plants domesticated (about 4000 BC). They originated in Asia and spread quickly throughout the Middle East and Europe and, later, the New World. The plants have several ascending branches, varying in height from 15 to 45 cm. The leaves are alternate, with 6 pairs of leaflets per leaf. Each leaf axil bears 2-4 white or pale blue flowers. The slightly inflated pods are 1.5-2.0 cm long and contain 2 doubly convex lens-shaped seeds. Lentils require 80-130 days to mature and need 15-75 cm of precipitation during the growing season. They are cultivated in Asia, N Africa, Europe and N America. Lentils are a high-protein foodstuff used in soups or dhal. Canada produces 20 000 t of lentils annually, primarily in Saskatchewan. P. MCVETTY

Leonard, Stan, golfer (b at Vancouver, BC 2 Feb 1915). Leonard turned professional in 1938. He won the Canadian Professional Golfers' Assn championship 8 times 1940-61, was low Canadian in the Canadian Open 9 times 1945-61, won the BC Open 5 times, the Alberta Open 9, and the Saskatchewan Open twice. Until 1955 Leonard's competitive golf was restricted to Canada. Then over 40, he began to compete on the US tour. In 1957 he won the Greater Greensboro (NC) Open, in 1958 the Tournament of Champions and in 1960 the Western Open. LORNE RUBENSTEIN

Leonowens, Anna Harriette, née Crawford, author, teacher, feminist, lecturer (b at Caernarvon, Wales 5 Nov 1834; d at Montréal 19 Jan 1915). After her officer husband died in Singapore in 1858, she established a school there for officers' children and then became a teacher at the Siamese court (1862-67). Her experiences there were the inspiration for 2 of her books, *The English Governess at the Siamese Court* (1870) and *The Romance of the Harem* (1872), which dealt with the exploitation of women in this exotic environment. These later became the basis for *Anna and the King of Siam* by Margaret Landon (1943) and the play *The King and I* (1951). Moving to Halifax in 1876, Leonowens organized a book club and a Shakespearean society, was active in a suffrage assocation, and was founding secretary of the Halifax Council of Women. She helped found the Victoria School of Art and Design in Halifax in 1888, before leaving there in 1897. She then lived in Germany for some years before settling in Montréal. ERNIE FORBES

Lepage, Ernest, priest and botanist (b near Rimouski, Qué 1 June 1905; d there 4 Jan 1981). Lepage was an assistant parish priest until 1933 and then taught at the Ecole moyenne d'agriculture in Rimouski 1936-61. In 1943 he began his professional association with a fellow Oblate, Arthème Dutilly, and his long concentration on arctic and subarctic flora. Their annual trips, 1945-64, which focused for the most part on the James Bay region, were documented in extensive publications, while their personal herbariums grew constantly. Despite health problems, Lepage continued his regional botanizing and his writing until he suffered partial paralysis from a thrombosis in 1976. He left his herbarium and botanical library to Laval. Although Lepage left no individual disciples the herbaria, writings and archives of Dutilly and Lepage contributed enormously to botanical knowledge in Canada. BERNARD BOIVIN

LePan, Douglas Valentine, public servant, educator (b at Toronto 25 May 1914). LePan taught English literature at U of T and Harvard 1937-41, was a personal education adviser to Gen A.G.L. MCNAUGHTON 1942-43, and fought in the Italian campaign with the Canadian Army. He was a member of the Dept of External Affairs 1945-59, developing an expertise in economics and serving in Washington as minister-counsellor, as secretary and director of research for the Royal Commission on Canada's Economic Prospects, and briefly as assistant undersecretary of state. A volume of memoirs, *Bright Glass of Memory* (1979), recalls LePan's early experiences. After teaching at Queen's 1959 to 1964, he returned to U of T as principal of University College 1964-70 and university professor 1970-79. He won the Governor General's Award for his second volume of poetry, *The Net and the Sword* (1953) and for his novel *The Deserter* (1964), both of which are concerned with the experience of war. NORMAN HILLMER

Leprohon, Rosanna Eleanor, née Mullins, novelist, poet (b at Montréal 12 Jan 1829; d there 20 Sept 1879). Of Irish-Catholic descent and a convent-school education, Leprohon published her first poetry, at age 17, in the *Literary Garland*, followed by serialized novels of manners set in England, published annually from 1848 to 1851. In June 1851 she married a French Canadian, Dr J.L. Leprohon; they had 13 children. Subsequently Leprohon's focus shifted to Québec society. "The Manor House of de Villerai" (serialized in *The Family Herald* 1859-60) is set in New France during the Seven Years' War; *Antoinette de Mirecourt* (1864) in Montréal just after that war; and *Armand Durand* (1868) in early 19th-century Lower Canada. Soon translated, these novels became part of both Canadian literatures; indeed *Le Manoir de Villerai* (tr 1861) precedes P.J. Aubert de Gaspé's *Les Anciens Canadiens* (1863) as the immediate literary descendant of Garneau's *Histoire du Canada.* Leprohon's posthumous *Poetical Works* (1881) treat historical and religious subjects, nature and family life.
JOHN R. SORFLEET

LeRoy, Donald James, physical chemist, science adviser (b at Detroit, Mich 5 Mar 1913). After gaining his PhD at U of T (1939), he joined E.W.R. STEACIE at the NATIONAL RESEARCH COUNCIL, where he carried out important research on molecular fragments called free radicals, which determine the course of many chemical reactions. In 1944 he joined U of T's chemistry department, becoming chairman in 1960. Through his efforts, the department developed a worldwide reputation in fundamental chemical research. Sharing Steacie's conviction that Canada must increase its scientific stature to survive, LeRoy returned to the NRC in 1969 as VP (scientific). In that office (1969-74) and as science adviser at the Science Council (1974-84), he strongly influenced the building of Canada's research capabilities. HARRY EMMET GUNNING

Lesage, Jean, lawyer, premier of Québec (b at Montréal 10 June 1912; d at Québec C 12 Dec 1980). Known as the father of the QUIET REVOLUTION, he led the government of Québec during that period of profound change to the organization of the collective life of Québecois. Elected federal MP for Montmagny-L'Islet in 1945, he became, in 1953, minister of resources and development and then of northern affairs and national resources. Upon the defeat of the Louis ST. LAURENT government in 1957, he left federal politics to become leader of the Québec Liberal Party in May 1958. He completely reformed the party by attracting dynamic people and by preparing a program of social and political reform. His party came to power in 1960 and introduced many reforms, including the elimination of patronage and corruption, the creation of ministries of education and of cultural affairs, and the establishment of the Société générale de financement. In 1962 he held an election on the issue of nationalizing the electricity companies and won easily under the slogan of "Maître chez nous," which became the byword of his government. Though his government was defeated in 1966, he remained leader of the Liberal Party until his retirement from political life in 1970.
DANIEL LATOUCHE

Lescarbot, Marc, lawyer, author (b at Vervins, France *c*1570; d in France 1642). A Paris lawyer, Lescarbot sailed for ACADIA in May 1606 at the invitation of one of his clients, colonizer Jean de BIENCOURT DE POUTRINCOURT. He remained there until the summer of 1607, when the colony was abandoned after the revocation of its trading monopoly. Based at PORT-ROYAL (Annapolis Royal, NS), Lescarbot travelled widely in Acadia and took a keen interest in the problems and opportunities of N American colonization as well as the way of life of the region's native peoples. His insights were set down in several published works, most notably his *Histoire de la Nouvelle-France* (1609). Besides being a vivid account of early colonizing attempts in Acadia, the *Histoire* is a remarkable plea for realism in harvesting the colony's natural resources, as against a futile search for quick profits. Also a poet and playwright, Lescarbot presented his *Théâtre de Neptune* at Port-Royal in 1606, reputedly the first theatrical production in N America. After returning to France in 1607, Lescarbot resumed his law practice, but his interest in the progress of Acadian colonization was lifelong. JOHN G. REID

Reading: Marc Lescarbot, *The History of New France*, ed W.L. Grant (1907-14); John G. Reid, *Acadia, Maine, and New Scotland* (1981).

Lessard, François-Louis, army officer (b at Québec C 9 Dec 1860; d at Meadowvale, Ont 7 Aug 1927). He served in local militia units before joining the Quebec Garrison Artillery (1880). As a lieutenant in the Cavalry School Corps he served during the NORTH-WEST REBELLION. Promoted lieutenant-colonel to command the Corps (1899), he volunteered for service in the SOUTH AFRICAN WAR, and eventually commanded the 1st Battalion, Canadian Mounted Rifles (Royal Canadian Dragoons). Though promoted major-general in 1912, he was prevented by Sam HUGHES, minister of militia and defence, from getting command overseas at the outbreak of WWI. Appointed inspector general for eastern Canada, Dec 1914, he commanded the Halifax Fortress. In Mar 1918 he was called upon to restore order in Québec City following anticonscription riots. After retiring (1919) near Toronto, he often served as judge at horse shows in Canada and the US. JEAN PARISEAU

Lesser Slave Lake, 1168 km², elev 577 m, located in central Alberta, about 200 km NW of Edmonton. It is fed by numerous small rivers, including the Swan, Driftpile and E and W Prairie, and discharges E via the Lesser Slave R to the ATHABASCA R. It was named for the Slavey Indians, and "Lesser" was added to distinguish it from its namesake in the NWT. The oldest settlement in the area is Grouard (pop 20), once a bustling stopover on the Klondike trail. The site of Slave Lake (pop 4500) was a gathering place for Indian hunting and war parties. By 1900 the town was a steamboat centre, until the arrival of the railway in 1915. Sandy beaches on the S and NE shore have raised talk of tourism, but it is oil that has given the area new importance. There are several Indian reservations along the S shore and Lesser Slave Lake Provincial Park is on the NE. JAMES MARSH

LeSueur, William Dawson, critic, historian, civil servant (b at Québec City 19 Feb 1840; d at Ottawa 23 Sept 1917). Of French Huguenot and English parentage, LeSueur became the most important Canadian-born man of letters of his generation, introducing a spirit of critical inquiry into journalism and historical writing. An Ottawa civil servant from 1856, LeSueur rose to prominence in 1871 with the publication of an essay on the French critic, Sainte-Beuve, in the *Westminster Review*. This was followed by articles on science, social philosophy and religion in Canadian, American and British periodicals in the 1870s and 1880s. A convinced Comtean positivist, LeSueur became notorious for the heterodoxy of his religious views. From the 1890s on, however, his attention turning to historical writing and political criticism, he came ironically to be seen as a man harbouring a "Tory" bias. His 1908 biography of William Lyon MACKENZIE for the Makers of Canada series was critical of the "patron saint" of Canada's liberal tradition, and protracted litigation prevented it from being published; it finally appeared in 1979. A.B. MCKILLOP

Letendre, Rita, painter, printmaker (b at Drummondville, Qué 1 Nov 1928). After study at the Ecole des beaux-arts de Montréal, Letendre was influenced by Paul-Émile BORDUAS and the AUTOMATISTES. In 1962 she travelled in western Europe and Israel. Her new interest in more structured composition and simpler shapes is seen in her outdoor mural commission in Long Beach, Calif, where she lived with her sculptor-husband Kosso ELOUL (1965-70) before moving to Toronto. There her painting became more austere, with large geometric forms and vibrant colour. Letendre is well known for her monumental interior and exterior murals.
SANDRA PAIKOWSKY

Lethbridge, Alta, City, pop 54 072 (1981c), inc 1906, is located 215 km by road SE of CALGARY on the steep, coulee-scarred banks of the OLDMAN R. It is a pleasant, tree-lined service centre for the surrounding agricultural communities. An elected mayor and 8 councilors govern the city with the assistance of an appointed city manager.

History Some 500 generations of Blackfoot Indians inhabited the Lethbridge area before recorded history. In 1869 Montana traders built Fort WHOOP-UP, one of the notorious whisky forts dotting the region. The North-West Mounted Police stopped the liquor trade in 1874. Soon coal mining became the primary economic activity. Although coal had been mined from the banks of the Belly (Oldman) R as early as 1872, large-scale mining did not begin until 1885, when the North Western Coal and Navigation Co, directed by Sir Alexander and Elliott Galt, completed a railway from its mines to Dunmore on the CP main line. The colliery created an instant town, soon called Lethbridge (after North Western Coal's president, William Lethbridge), whose population reached 1478 in 1890 when the company completed a rail link with Montana. Railways continued to play an important part in Lethbridge's history. In 1897 the CPR assumed control over the Lethbridge-Dunmore line and extended it through the CROWSNEST PASS. In 1905 the transcontinental made Lethbridge a divisional point on its line, expanded the railyards and constructed a station and maintenance facilities. The move firmly established Lethbridge as the region's marketing and distribution centre.

Irrigation has also played a major role in the evolution of Lethbridge. In 1900 the Canadian North-West Irrigation Co, managed by Elliott Galt, completed the first large-scale irrigation system in Alberta. Between the 2 world wars, the Taber and Lethbridge Northern schemes were implemented, and in the postwar period the St Mary R development was realized. Today, pivot irrigation has increased the potential of the area's semiarid lands even more, particularly for market gardening.

Economy Lethbridge has always had several manufacturing plants that carried out flour milling, sugar refining, brewing and ironworking. More recently, such corporations as Catelli, General Foods, BC Telephones, Palliser Distillers and Dresser Clark have established their western Canadian plants in the city. The relocation of the CPR outside the city is already in progress and the vacated area will be ready for development by 1985.

Cityscape In direct challenge to its dry prairie environment, Lethbridge has built wide, tree-shaded streets, and several wooded parks, which include Henderson Lake and Nikka Yuko Centennial Garden. A spacious sportsplex, several arenas and small parks offer a wide variety of sports facilities. Cultural events are regularly staged at the Yates Memorial Centre, the Bowman Arts Centre and the Performing Arts Centre at UNIVERSITY OF LETHBRIDGE (built 1967 as a Centennial project). Lethbridge also supports a community college. A.A. DEN OTTER

Lett, Stephen, psychiatrist (b at Callan, Ire 4 Apr 1847; d at Kingston, Ont Oct 1905). Having served as assistant medical superintendent of the insane asylums in Malden and London, Ont, 1870-77, he lost out to R.M. BUCKE for the post of London's medical superintendent. A lasting antipathy developed between the 2 imperious men and resulted in Lett's transfer to a post at the Toronto asylum. In 1883 he briefly administered the Hamilton asylum until named first superintendent of the Homewood Retreat in Guelph, Ont. He was a specialist in the early treatment of addiction and his gradual withdrawal therapy for "opium neurosis" proved popular with his upper-crust clientele; however, his late-blooming success was cut short by a neurological disorder contracted in youth. CHERYL L. KRASNICK

Lettuce (*Lactuca sativa*), annual VEGETABLE belonging to the Compositae family. Several species of wild lettuce occur in Canada, including prickly lettuce, a common WEED that is a probable parent species of garden lettuce. Native to Asia Minor, lettuce was introduced to Haiti by Christopher Columbus. Of the 4 major varieties, head lettuce, which is firm and keeps well, is the most widely grown. The other varieties — small, tender-headed Bibb lettuce, long-headed Romaine lettuce and high-quality leaf lettuce — all lack the firmness required for most marketing purposes. Lettuce thrives in cool climates and is well suited to Canada's organic soils. Being frost resistant, it is usually sown in early spring. Less firm varieties are often grown in GREENHOUSES in autumn. SLUGS, APHIDS and leaf rot are its principal pests. Lettuce provides average food value (head lettuce being the least nutritious) and because of its freshness is a basic salad ingredient. Over 2000 ha of lettuce are cultivated in Canada, mainly in Ontario and Québec. ROGER DOUCET

Léveillée, Claude, singer-songwriter, actor (b at Montréal 16 Oct 1932). His works, interpreted notably by Edith Piaf and André GAGNON, are marked by the depth and sincerity of the feelings they express. Léveillée was cofounder of the group Les Bozos (1959) and was the first Québec *chansonnier* to present a one-man show at Montréal's Place des Arts (1964). He has toured Canada, France, the USSR, Poland, Belgium, Switzerland, central Asia and Japan. His musical drama, *Concerto pour Hélène*, was played by the Québec Symphony in 1978. HÉLÈNE PLOUFFE

Lévesque, Georges-Henri, priest, sociologist, administrator (b at Roberval, Qué 16 Feb 1903). After studying at the Dominican College in Ottawa and U de Lille, France, he taught at the College as well as at U de M and Laval. In 1938 he organized the school of social sciences at Laval, which became a full-fledged faculty in 1943, and was its dean until 1955. A fervent liberal Catholic deeply committed to democratic norms and values, he used his position, as well as the faculty of social sciences, to create new socioeconomic institutions such as the Conseil supérieur de la coopération and the Société d'éducation des adultes, and to initiate the modernization of Québec's church-controlled social welfare organizations. The faculty was also responsible for producing the first generation of university-educated labour organizers. During the 1950s and 1960s this group contributed immensely to the modernization and democratization of organized labour as well as of Québec society in general. His liberal ideas and endeavours brought him into conflict with Québec's intensely conservative clerical and political elites, especially Premier Maurice DUPLESSIS. With the support of his Dominican order and his numerous friends inside and outside the university, he was able to weather several attempts to undermine his career and destroy the faculty.

In the early 1950s he was a member of the Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, chaired by Vincent MASSEY, which recommended federal grants to universities and the creation of the CANADA COUNCIL. He served as VP of the Canada Council (1957-62), the Association canadienne-francaise pour l'avancement des sciences and the Royal Society of Canada (1962-63). Between 1954 and 1963 he acted as the director of Maison Montmorency near Québec C, a centre of social, cultural and religious debate and activism. He helped create a faculty of social sciences at Salamanque, Spain, and was the founder and first rector of the National University of Rwanda in Central Africa (1963-72). He has been a life-long member of numerous international organizations and has been awarded honorary degrees from over a dozen universities. He received the prestigious

Canada Council MOLSON PRIZE in 1966 as well as the Pearson medal for peace in 1983, and was made a companion of the Order of Canada in 1979. His contribution to a more humane, more democratic Canadian society has been immeasurable. M.D. BEHIELS

Lévesque, Jean-Louis, financier (b at Nouvelle, Qué 13 Apr 1911). After graduating from St Dunstan's U, in PEI, and Laval, Lévesque worked for the Banque provinciale du Canada in Moncton, NB. In 1937 he became a salesman for a securities firm and in 1941 founded Crédit Interprovincial Ltée. He then began buying, reorganizing and selling companies, including Fashion-Craft Manufacturers 1945, Slater Shoe 1951 and Dupuis Frères 1952. Later he merged his securities firm with L.G. Beaubien et Cie to form Lévesque, Beaubien Inc, the largest francophone brokerage house in Canada, specializing in government bonds. A former director of the Banque provinciale du Canada and General Trust of Canada, he still sits on the boards of several companies, including L'Équitable, Compagnie d'Assurances générales, and Hilton Canada. In 1978-79 he sold the companies he controlled and retired. In the 1950s Lévesque became involved in thoroughbred racing and breeding; his most successful racehorse, L'Enjoleur, won the QUEEN'S PLATE 1975. In 1952 he received an honorary doctorate from UNB; he has received many other honours. JORGE NIOSI

Lévesque, René, journalist, premier of Québec (b at New-Carlisle, Qué 24 Aug 1922). A minister on Jean LESAGE's Liberal team, he resigned in 1968 and founded the PARTI QUÉBÉCOIS, whose main objective became Québec sovereignty and the creation of a new form of association with Canada.

A liaison officer and European war correspondent for the American armed forces in WWII, Lévesque joined Radio-Canada International in 1946 and became head of the radio-television news service in 1952. From 1956 he hosted the TV series "Point de Mire" and became one of Québec's most influential TV commentators. After taking part in the 1959 CBC producers' strike, he joined the Québec Liberal Party and was elected MNA for Montréal-Laurier in 1960. He was minister of water resources and of public works 1960-61, minister of natural resources 1961-66 and then minister of family and social welfare. One of the most popular and energetic members of the Lesage government, he was responsible for that government's decision to nationalize private electric utilities and for its efforts at cleaning up political mores.

Increasingly critical of his party's stand on constitutional issues and of its relations with the federal government, Lévesque sat as an independent MNA in 1967 and quit the party for good in Nov 1967 to found the Mouvement souveraineté-association, which in Oct 1968 became the Parti Québécois. Having managed to unite the various groups promoting independence and a new political status for Québec, Lévesque's party won 24 percent of the vote in the 1970 elections. In 1973 the PQ became the official opposition. Lévesque was twice defeated (1970 and 1973) in Laurier and Dorion, but on 15 Nov 1976 he won in Taillon. Campaigning successfully in this election against the unpopular government of Robert BOURASSA, the PQ promised a REFERENDUM ON SOVEREIGNTY-ASSOCIATION. The PQ won a majority of 71 seats, a result that dismayed the rest of Canada.

During its first term the new government passed several progressive measures concerning automobile insurance, rezoning of agricultural lands and the abolition of secret electoral funding. One of the most important pieces of legislation was BILL 101, which formalized the status of French as the official language of Québec. On 20 May 1980 the long-awaited referendum took



René Lévesque was one of Québec's most influential television journalists before joining the Cabinet of Jean Lesage. He left the Liberals to found what in 1968 became the Parti Québécois and led the party to power in Nov 1976 (*photo by Jim Merrithew*).

place after an emotional campaign led on the *Non* side by Liberal Opposition leader Claude RYAN and federal Cabinet minister Jean CHRÉTIEN (with key support from PM TRUDEAU) and on the *Oui*, by Lévesque and his ministers. Lévesque suffered a major personal defeat when the sovereignty-association proposal won only 40 percent of the vote. Against all expectations the PQ was re-elected in 1981 but it suffered another defeat during the 1981-82 constitutional negotiations (see CONSTITUTION, PATRIATION OF), when the other 9 provinces accepted terms rejected by all parties in the Québec National Assembly. In 1982 and 1983 Lévesque's government met with considerable opposition and public disapproval when it attempted to reduce public spending to solve its grave financial problems.

In Nov 1984 a serious crisis affected the PQ government when Lévesque announced his intention of not fighting the next election on the issue of independence while maintaining sovereignty-association as the party's official *raison d'être*. Several ministers resigned in protest but the party reaffirmed Lévesque's leadership at a special convention in Jan 1985. DANIEL LATOUCHE

Reading: P. Desbarats, *René: A Canadian in Search of a Country* (1976); J. Provencher, *René Lévesque* (1977).

Lévis, Qué, City, pop 17 895 (1981c), inc 1861, is located on the rocky cliffs opposite QUÉBEC CITY, to which it is linked by ferry. Lévis is characterized by steep streets lined with picturesque old homes. Formerly called Aubigny, it was renamed in 1861 to honour Henri de Lévis, duke de Ventadour and protector of Samuel de Champlain, and François-Gaston, duc de LÉVIS, victor in the 1760 BATTLE OF STE-FOY. In the 19th century it was a major station on the GRAND TRUNK RY line and served Québec City, which had no line until 1879. Today, Lévis's economic activity is largely integrated with that of Lauzon, a major industrial centre. Davie Shipbuilding of Lauzon, founded in 1828, is the oldest and largest SHIPBUILDING company in Canada. In Lévis the Mouvements Coopératif Desjardins is a major employer, as is Baribeau et Fils, a manufacturer of wood items. Its deepwater port can handle 100 000 t tankers. CLAUDINE PIERRE-DESCHÊNES

Lévis, François-Gaston de, Duc de Lévis, French army officer (b at Château d'Ajac near Limoux, France 20 Aug 1719; d at Arras, France 26 Nov 1787). Lévis, probably the most capable officer sent to Canada during the SEVEN YEARS' WAR, was appointed brigadier and made second in command of the French regular army in Canada in 1756. Remarkably fair-minded, he avoided the bitter disputes between his commander, MONTCALM, and Governor VAUDREUIL. During the campaigns of 1756, 1757 and 1758, Lévis directed the defence of the Lk Champlain invasion route, joined Montcalm in the successful attack on Ft William Henry (Lk George, NY), and, in July 1758, helped Montcalm repel the British assault on Ft Carillon (Ticonderoga, NY). He played a leading role in the defence of Québec until Aug when he was sent to protect Montréal from a British advance.

On learning that Montcalm was dead and Québec had fallen, Lévis assumed command. In his bid to retake Québec in April-May 1760, Lévis dealt James MURRAY a severe blow in the BATTLE OF STE-FOY, but lacked the cannon for an effective siege and had to retreat when British ships relieved the defenders. Besieged in Montréal, Lévis hoped to make a last stand but was overruled by Vaudreuil, and the town capitulated Sept 8. After the fall of New France, he rose to *maréchal*, the highest rank obtainable in France, in 1783 and was created a duke in 1784. IAN CASSELMAN

Lewis, David, né Losh, socialist politician, labour lawyer, university professor (b in Svisloch, Russia 23 June 1909; d at Ottawa 23 May 1981). As a child he lived through the German invasion of Russia in WWI and the Russian Revolution. In 1921 his family moved to Montréal, where Lewis soon mastered English. Active in municipal socialist politics, he attended McGill (1927-31) and won a Rhodes scholarship to attend Oxford (1932-35), where he established extensive contacts with socialists in the British Labour Party. Upon returning to Canada, Lewis practised law in Ottawa, but in 1936 he commenced work as national secretary for the CO-OPERATIVE COMMONWEALTH FEDERATION. During these years he became a key CCF theorist and member of the LEAGUE FOR SOCIAL RECONSTRUCTION. In 1943 he coauthored with F.R. SCOTT *Make This Your Canada*. Efforts to gain election to Parliament in 1940, 1943 (by-election), 1945 and 1949 were unsuccessful. From 1943 to 1945 Lewis was the primary target of a vicious anti socialist campaign.

In 1950, with CCF prospects dwindling, Lewis practised labour law, though his involvement with the CCF continued. He held a variety of executive positions and helped draft the Winnipeg Declaration of 1956. Lewis consistently worked to rid the labour movement of communist infiltration and to forge a link between the Canadian socialist and labour movements. He was the key architect in the formation of the NEW DEMOCRATIC PARTY in 1961. Through his efforts the primarily western farm-based CCF was transformed into the more urban, labour-oriented and successful NDP.



David Lewis had a long involvement with the CCF and NDP parties. As leader of the NDP, he led the party to its most influential position (*courtesy Sophie Lewis*).

Lewis ran for Parliament in York S in 1962, 1963, 1965, 1968, 1972 and 1974, losing only in 1963 and 1974. He quickly became one of Parliament's most devastating debaters. Lewis continued to serve in a variety of NDP executive posts culminating in his election as leader at a long and polarized 1971 NDP convention in which he defeated Jim Laxer, representing the WAFFLE, a left-wing NDP faction. Lewis, campaigning on the theme of "corporate welfare bums," achieved greatest political prominence in 1972 when he held the balance of power in the Liberal MINORITY GOVERNMENT of 1972 to 1974. This Parliament enacted a new Elections Expenses Act, pension indexing, PETRO-CANADA and the FOREIGN INVESTMENT REVIEW AGENCY.

After his defeat in the federal election of 1974, Lewis stepped down as NDP leader in 1975 and ended his career as a professor at Carleton U. The first volume of his memoirs, *The Good Fight*, was published posthumously (1981). Lewis was sometimes a controversial figure, but few doubted his intellect, energy and sacrifices on behalf of Canadian socialism.

ALAN WHITEHORN

Lewis, Stephen Henry, politician, journalist, labour arbitrator (b at Ottawa 11 Nov 1937), son of David LEWIS. After teaching English in Africa, Lewis worked as director of organization for the federal NEW DEMOCRATIC PARTY 1961-62. He was a member of the Ontario legislature for Scarborough W 1963-78 and became leader of the Ontario NDP in 1970. He was active in demanding the 1972 disbandment of the WAFFLE, a left-wing NDP faction. He achieved greatest success in 1975 when the NDP became the official Opposition. A year after the NDP's electoral setback in 1977, Lewis resigned as leader and became a newspaper columnist, radio and TV broadcaster, lecturer and labour arbitrator. In 1984 external affairs minister Joe CLARK named the articulate Lewis Canada's ambassador to the UNITED NATIONS.

ALAN WHITEHORN

Lewis, Wilfrid Bennett, physicist, chief scientist for 26 years of Chalk R Nuclear Laboratories (b at London, Eng 24 June 1908). Lewis trained under Lord RUTHERFORD and worked in atomic physics throughout the 1930s. Like most of his Cambridge colleagues, he worked on radar during WWII, becoming in 1945 superintendent of the main British airborne radar laboratory. His prewar colleague J.D. Cockcroft, earlier superintendent of army radar, was in 1944-45 scientific director of the Canadian-Anglo-French atomic project. Unexpectedly the British government ordered Cockcroft's return, to refound atomic research in Britain. The existence of the Canadian project hung in the balance, since the Canadian government was unwilling to continue it unless a qualified research director could be found. Lewis's name was eventually suggested. He came to Canada in 1946 as director of the Atomic Energy Division of the NATIONAL RESEARCH COUNCIL and served as the government's chief nuclear scientist until retirement in 1973 as senior VP (science) of ATOMIC ENERGY OF CANADA LTD.

Lewis's career had 2 main facets, scientific and political. When he came to Canada, the ZEEP reactor was already in operation and the NRX reactor under construction (completed 1947). Lewis had to find staff and orchestrate their work into an efficient research program, deal with unforeseen problems (notably the NRX accident of 1952), and at the same time plan ahead for new reactors appropriate to new investigations. By 1949 he decided in principle on a large heavy-water reactor, the specialty of the original wartime Canadian project, that could use Canadian-produced uranium fuel, supply especially high quantities of neutrons for research, and produce plutonium that could be sold to defray costs. This was the NRU reactor, completed in 1957. Its success led to the CANDU reactor program of the 1970s, to generate electricity at competitive rates. Other ventures under Lewis's direction ranged from the Theratron machine for medical radiation to the 1966 proposal to build an Intense Neutron Generator, vetoed by the government as too expensive.

Until the late 1950s, Canada was the only "atomic power" in the world dedicated to exclusively nonmilitary uses of nuclear technology. Thus, when the first "Atoms for Peace" conference was held at Geneva (1955), Canada was in a unique political position, especially attractive to the "unaligned" countries that wanted to develop scientifically without joining the American or Russian camps, such as India and Pakistan, both of which later built Canadian-designed research reactors. Lewis led the Canadian delegation at this and subsequent UN conferences until 1971 and exercised considerable influence. He received numerous honours and awards for his scientific and diplomatic work, including the Atoms for Peace Award in 1967, worth $50 000, which he donated to McGill to buy scientific apparatus.

DONALD J.C. PHILLIPSON

Lewisporte, Nfld, Town, pop 3963 (1981c), inc 1946, is a deep-water port and shipping centre in NOTRE DAME BAY, N-central Newfoundland. Settled around 1876, it was formerly called (Big) Burnt Bay and later Marshallville. It was renamed Lewisport (later Lewisporte) in 1900 after lumber pioneer Lewis Miller, who used the excellent harbour, connected by rail with the interior, as a port for lumber mills at Glenwood and Millertown. A large shipping yard was built at Lewisporte by Newfoundland Timber Estates, which assumed ownership of Miller's holding by 1903. Thus the former fishing, farming and boat-building settlement became a shipping port and sawmilling centre. Today Lewisporte serves as a major distribution, shipping and supply point for the NE coast of Newfoundland and coastal Labrador. It also has large fuel-storage facilities for Gander International Airport.

JANET E.M. PITT AND ROBERT D. PITT

Leyrac, Monique, née Tremblay, singer, actress (b at Montréal 26 Feb 1928). Thanks to her happy combination of gifts for music and theatre, she has been able to give her shows a rare intensity of emotion. She studied with Jeanne Maubourg before starting her acting career on radio in 1943. She began singing a few years later. Slowly she developed an interest in Québec songs, having started her career performing French music (including that of Édith Piaf) and American songs. In 1965 she won the grand prizes at the International Festival of Song in Sopot, Poland (performing "Mon Pays" by Gilles VIGNEAULT), and at the Festival de la chanson at Ostende, Belgium. She received the 1978 Prix de musique Calixa-Lavallée. Leyrac has acted in several films, including Paul ALMOND's *Act of the Heart*.

HÉLÈNE PLOUFFE

L'Heureux, Jean-Baptiste (b at L'Acadie, LC 25 June 1831; d at Midnapore, Alta 19 Mar 1919). L'Heureux studied for the priesthood but was never ordained; a tradition maintains that he was expelled from the Séminaire de St-Hyacinthe for a criminal offence. He came west in the late 1850s and by the early 1860s was in the Montana goldfields, where he passed himself off to the Jesuits as a priest. A short time later, L'Heureux was apparently caught in the act of sodomy and was sent away. Exposed as a fraud, he joined the Blackfoot and in 1862 went to the Oblate fathers at St Albert mission near Ft Edmonton; a year later, Bishop A.A. TACHÉ commented that the man "wanted to pass for a priest, but he is known by all to be a robber and a liar." The same year, L'Heureux was accused of sending a false sample of gold dust to prospectors in Ft Benton, Mont, claiming he had found a lode and would show them where it was located. A party of men spent weeks searching fruitlessly for him. L'Heureux's name also has been associated with the legend of the LOST LEMON gold mine.

L'Heureux spent most of his time with the Blackfoot, performing marriages, baptisms, etc. In their language he called himself *na-okska-tapi*, Three Persons, after the Trinity. He prepared a census of the Blackfoot tribes, wrote a manuscript on stone effigies, described the land features in Blackfoot territory, prepared a Blackfoot-English dictionary and sketched Rocky Mountain House. In an 1871 manuscript, now in the PUBLIC ARCHIVES OF CANADA, he made what is probably the first reference to dinosaur remains in Alberta. He may also have named the St Mary R in southern Alberta and St Mary Lks in Montana. An official witness to Treaty No 7 in 1877, L'Heureux was engaged as interpreter for the Indian department on the Blackfoot Reserve about 1880. He remained there until 1891, when he was dismissed for giving religious instruction to preschool children. He became a recluse near Pincher Creek and in 1912 moved to Lacombe Home at Midnapore.

HUGH A. DEMPSEY

Liard River, 1115 km long, rises in the Pelly Mtns in the SE Yukon and flows SE into BC, through the Rocky Mtns, then NE through heavily forested land to the Mackenzie R at FT SIMPSON, NWT. Its major tributaries are the SOUTH NAHANNI, Petitot and Fort Nelson rivers. The river is navigable to Ft Liard, about 270 km from its mouth, though much of it is wild and perilous. Named for the liards (a species of poplar) found along its banks, it was called "Courant-Fort" in early days, and appears as Rivière aux Liards on early maps. For many years a fur-trade route, it was first surveyed by R.G. MCCONNELL of the Geological Survey (1887). Gold-hungry prospecters travelled it on the way to the Klondike in 1897-98.

JAMES MARSH

Liberal Party, which has dominated federal politics through the 20th century as the "government party," first developed its formula for political success under the leadership of Sir Wilfrid LAURIER who was prime minister from 1896 to 1911. In clear contrast to its enjoyment of power through the politics of pragmatism in this century, the party's 19th-century history is a record of long decades of opposition to the powerful through the pursuit of reform principles.

Opposition politics took organizational shape in the colonies of British N America with the establishment of repesentative institutions in Nova Scotia (1758), New Brunswick (1784) and Upper and Lower Canada (1791). Since power in these colonies was concentrated in a governing oligarchy of appointed governors and councils that was not held responsible to the elected assemblies, reformers appealed to the Whig principle of parliamentary supremacy in pressing for the adoption of RESPONSIBLE GOVERNMENT. In the Maritimes Joseph HOWE led a 10-year struggle for responsible government that was finally successful in 1848. In the same year, a Reform coalition led by Robert BALDWIN in Canada West and Louis-Hippolyte LAFONTAINE in Canada East achieved the same breakthrough.

In Canada West, the radical farmers of southwest Ontario, known as the Clear Grits, who had been inspired by the anti-British radicalism of William Lyon MACKENZIE, strongly attacked the CLERGY RESERVES as an institutionalization of the FAMILY COMPACT's domination and a denial of liberty to the Protestant denominations. With the vocal support of the Reform publisher, George BROWN, whose newspaper, *The Globe*, was the most influential organ in the colony, the Reformers succeeded in eliminating the reserves by 1850. Co-operation between the anti-Family-Compact Reformers in Upper Canada and the anti-English-oligarchy *Rouges* in Lower Canada

broke down in the 1850s over the question of state support for denominational schools (*see* SEPARATE SCHOOL). The liberalism of Protestant Reformers led them to believe that each church should be supported by the aid of its adherents, voluntarily offered. By extension, denominational schools should not receive public funds.

Another characteristic of pre-Confederation Reform politicians was also a product of their belief in the principles of English liberalism. Opposition to government intervention in the economy in the form of tariff protection (*see* PROTECTIONISM), which conservative administrations tended to favour, led mid-century Reformers to advocate free trade with their admired neighbour to the south. The crowning achievement of the Reform administration of Francis HINCKS and A.N. MORIN was the negotiation of a RECIPROCITY treaty with the US in 1854. This proclivity for CONTINENTALISM was to remain a theme of Liberal politics for the next century.

In the early years of Confederation, the Liberals, as the Reform remnants now called themselves, could do little against the political wiles of the Conservative PM Sir John A. MACDONALD and the breadth of his coalition in federal politics. The post-Confederation Liberals developed successful provincial organizations. As premier of Ontario from 1872 to 1896, Sir Oliver MOWAT led the provinces' assault on the power of the Dominion government in the name of provincial rights, a tenet of Liberal thought for several decades. Following the downfall of Macdonald's government over the PACIFIC SCANDAL, the dour stonemason Alexander MACKENZIE formed the federation's first Liberal administration in 1873, but a severe economic depression and Mackenzie's lack of political vision led to Macdonald's re-election in 1878 on a platform of protection. The resulting NATIONAL POLICY of tariff protection was vigorously opposed by Edward BLAKE, a Toronto lawyer and ex-premier of Ontario, who led the Liberal Party from 1880 to 1887. (Blake is the only federal Liberal leader never to become prime minister.) Blake and Mowat pressed for further reforms of the ELECTORAL SYSTEM and managed to wean their Ontario supporters from the fanatical anti-Catholicism they had retained from the Clear Grits and George Brown.

Meanwhile, in Québec, Wilfrid Laurier was turning the *Rouges* — the radical successors of Papineau's PATRIOTES from the 1837 uprising — from anticlericalism by preaching the principles of William Gladstone's English liberalism and the virtues of racial conciliation. Chosen party leader by the reluctant federal caucus upon Blake's advice in 1887, Laurier gradually broadened the Liberals' base in Québec and, on a platform of provincial rights, won the election of 1896 despite the hostility of the Catholic Church hierarchy and the embarrassment of Manitoba's discrimination against French-speaking Catholics (*see* MANITOBA SCHOOLS QUESTION).

Laurier went on to win the next 3 elections by copying Macdonald's formula for success — a nationwide coalition of forces, an expansionary role for government, and an accommodation between the French and the English — tempering the principles of Liberal reform with pragmatism and PATRONAGE. He built his electoral coalition in English Canada on the organizational backs of Liberal provincial premiers whom he brought into his Cabinet as power brokers for their regions. He endorsed the aggressive IMMIGRATION POLICY to settle the West of his Manitoba minister, Clifford SIFTON, and he entered the same kind of transcontinental railway-building collaboration with the Grand Trunk and Canadian Northern that his caucus had denounced in the 1880s when championed by Macdonald.

Nevertheless, differences of principle still distinguished the Laurier Liberals from their Conservative opponents. In foreign policy, the



THE WELDER

A 1930 election poster characterizing the Liberal Party as the forger of a national consensus (*courtesy Public Archives of Canada/C-85940*).

Liberals showed their affinity to Gladstone's anti-imperialism by their preference for an independent Canadian navy over Canadian contributions to the British navy. In commercial policy Laurier achieved the long-held Liberal goal of a reciprocity agreement with the US. It was a victory that proved his undoing: reciprocity alienated the protection-minded business community whose support he had cultivated, and the Liberals went down to defeat in the 1911 election in the face of the Conservative Party's anti-Americanism. Laurier soldiered on as leader, watching in despair as the WWI military CONSCRIPTION issue nearly destroyed his party by temporarily shaking the solidarity of its English-French alliance.

The political longevity of the Liberals' next, and probably greatest, leader, William Lyon Mackenzie KING, who began his career as a public servant and ended it as the most enduring prime minister in Canadian history (1921-48 except for 2 periods in opposition, in 1926 and 1930-35) has been ascribed to his uncanny capacity for blurring political issues to maintain support among such ideologically opposed groups as Western free-trade farmers and protectionist manufacturers of central Canada; his shrewd recognition of the importance of sustaining Québec support, especially during WWII; his talent for attracting to his Cabinet strong ministers with regional power bases and making the best use of their abilities and connections; and his success in presenting a progressive face to the electorate by gradually initiating social-welfare programs while propitiating the business community. King straddled the middle of the political road while leaning slightly left; his genius for obfuscation was epitomized by his vacuous 1935 campaign slogan "King or Chaos" and his delphic position, "conscription if necessary but not necessarily conscription," with which he walked the tightrope between English-Canadian militants and Québec pacifists during WWII.

King's hand-picked successor, Louis ST. LAURENT, was more admired among the bureaucratic and business elites than was King, but because of his disregard of party organization and his dependence on the Ottawa bureaucracy, his regime saw the collapse of King's great Liberal alliance and the beginning of the party's persistent alienation from western Canada. Since St. Laurent's narrow defeat by John DIEFENBAKER (1957), the Liberal Party has been struggling to regain its status as a truly national party.

It took Lester Bowles PEARSON, a Nobel-peace-prize winning former diplomat and secretary of state for external affairs who was elected party leader in early 1958, 3 elections before he won back power in 1963. It was largely thanks to the organizational skills and reformist convictions of his close adviser, Walter GORDON, that this most unpolitical of Liberal leaders managed to establish his control over the rebuilt party organization. One price of Gordon's reforms was the alienation of the western provincial organizations from what had become a Toronto-dominated party. Gordon received the credit for winning a minority victory in 1963 and then was blamed for recommending another election in 1965, which returned the Liberals as a MINORITY GOVERNMENT once more. Even when the extraordinary Pierre Elliott TRUDEAU succeeded Pearson in a hotly contested leadership campaign in 1968, the party continued to scramble unsuccessfully to remake its alliance with the West, managing to remain in office until 1979 and then again from 1980 to 1984 despite marked vacillations in its popularity on the basis of its strength in central Canada.

Party Size Liberal party officials in the early 1980s claimed 250 000 adherents. Although structured under its elaborate constitution as a mass democratic party whose leadership, in theory, is controlled by the grass-roots membership, it is in fact run along oligarchic lines. Real power is held by the party leader and his coterie. This top-down structure is modified slightly in periods of Opposition when its leadership is forced to appeal for greater rank-and-file participation in policymaking as an inducement to mobilize the grass roots in a collective struggle to regain power. The number of people belonging to the 282 federal constituency associations in the 1980s cannot easily be compared with its membership in the past, because historically the party was a federation of provincial parties whose membership varied greatly, depending on who was in power in individual provinces. In the mid-1980s the Liberals were without a single member in the 4 provincial legislatures west of Ontario, a situation that reflected their federal weakness in the West where they had fallen to third-party stature.

Splinter Groups As in any such broadly based party, there are always small but significant groups that oppose the dominant view of the Liberal leadership. In BC in the 1950s many provincial Liberals formed an electoral coalition with the right-wing Social Credit movement, to the dismay of the federal party. In the 1960s, Ross THATCHER, the Liberal premier of Saskatchewan, strongly opposed the welfare liberalism of PM Lester Pearson. Both conflicts helped destroy the federal party's credibility in the West. Throughout the party's history there has been tension between the forces of continentalism and NATIONALISM within Liberal ranks; it became most obvious during the 1960s when Walter Gordon led the effort to limit the growth of foreign control in the economy (*see* FOREIGN INVESTMENT). Gordon lost his preliminary battles but did not abandon the war, unlike other dissidents, such as James Richardson and Eric KIERANS, Trudeau Cabinet ministers who quit politics when their policy positions were rejected. In the late 1970s and early 1980s, there were again left-right tensions in the party, chiefly between Pierre Trudeau and John TURNER and their respective followers. Though Turner, Trudeau's former minister of finance, quit the Cabi-



Pierre Elliott Trudeau speaking at the 1978 Liberal convention at the Château Laurier, Ottawa *(courtesy National Film Board/Photothèque).*

net in 1975, he continued to play the role of Liberal dauphin-in-exile. Two weeks after Trudeau announced he would retire, Turner declared his candidacy for the succession, a goal he achieved on 16 June 1984 at the party's leadership convention. Sworn in as prime minister on 30 June, he quickly called a general election hoping to profit from the Liberals' brief surge of popularity in the public opinion polls. Without an adequate organization, platform or personal campaign style, he led the party to the worst electoral defeat in its history. The results were Progressive Conservatives 211, Liberals 40, New Democrats 30 and Independent, 1.

Electoral Appeal and Popular Support Since the 1930s the Liberals' electoral appeal has been based on projecting an image of competence and compromise. Ideologically the party has clung to the political centre, modulating its stance in each region and appealing to the upwardly mobile middle class of urban central Canada. In the Atlantic provinces, where the social democrats have traditionally had great difficulty in becoming a third political force, Liberals vie directly with Conservatives in a 2-party seesaw fight for votes. In Québec a strong plurality of the vote has generally translated into an overwhelming majority of seats, with the dramatic exceptions of the 1958 and 1984 elections. In Ontario, electoral support averaging 40% has been transformed into 60% of the seats since the 1930s. But the third-party status of the federal Liberal Party in the West has turned electoral returns of about 30% of the votes into a tiny number of actual Liberal seats.

Financial Support The Liberals traditionally raised election campaign money from big businessmen and to a lesser extent, small entrepreneurs (*see* PARTY FINANCING). Since the introduction of the ELECTION EXPENSES ACT (1974), reliance on business funding has dramatically declined in favour of tax-deductible member donations and direct subsidies from the public purse (*see* PARTY SYSTEM).

Current Issues and Significant Changes in the Party The most significant changes in recent decades in the Liberal Party were heralded by the accession to the party's leadership of Pierre Trudeau in 1968 and his resignation 16 years later. Under his aegis French Canadians achieved greater equity within the Liberal Party and the government of Canada than ever before. Trudeau's dedication to FEDERALISM and to combatting the separatist forces of Québec nationalism lay at the heart both of his early electrifying appeal to the public and of the strong animosities he later generated among English Canadian voters. His controversial personal style and the vacillations of his policies (eg, withdrawing, then reinforcing, Canadian troops in NATO; opposing economic nationalism, then endorsing the adoption of a dramatic National Energy Program) kept his personality the chief issue of the political scene, notwithstanding his significant achievement in generating a wide consensus for the "patriation" of the CONSTITUTION in 1982. As Trudeau's period in office ended and his successor was plagued by dramatic problems of ideological direction and party organization, some speculated, as they had in 1957 and again in 1979 when the party fell temporarily from power, that the Liberals were on the edge of disappearing from the country's political map. To others it seemed more likely that, with John Turner's commitments to rebuild the party it would ultimately be able to resuscitate itself. *See* PARTY ROUGE.

CHRISTINA MCCALL AND STEPHEN CLARKSON

Reading: Christina McCall-Newman, *Grits* (1982); J. Wearing, *The L-Shaped Party* (1980); R. Whitaker, *The Goverment Party* (1977).

Liberation of Holland, begun by American troops, who entered Maastricht on 13 Sept 1944; British troops also played a major part in liberating S Holland, along their axis of advance toward Berlin. The failure of an airborne assault on Arnhem (Sept 17) prevented the liberation of the rest of Holland in 1944. FIRST CANADIAN ARMY, under Gen H.D.G. CRERAR, on the N end of the Allied line, was to clear the Dutch approaches to the key Belgian port of Antwerp, along both banks of the Schelde estuary, a task completed in Nov. There were still more Allied than Canadian troops under Crerar, but in mid-Mar 1945 I Canadian Corps arrived from Italy to replace I British Corps. I Corps pushed N to the IJsselmeer (Apr 18), isolating German forces in W Netherlands, while II Corps drove NE to Groningen (Apr 13) and Leeuwarden (Apr 15), and then E into Germany.



Citizens of Leeuwarden, Netherlands, welcoming the Stormont, Dundas and Glengarry Highlanders, 16 Apr 1945 *(courtesy Public Archives of Canada/PA-131566).*

When hostilities ceased 5 May 1945, it fell to the Canadians to liberate W Holland, including the major cities of Amsterdam and Rotterdam and the Dutch capital, The Hague. The Dutch there had suffered through an extremely harsh winter, short of food and fuel, but relief supplies were quickly funnelled into the area. The Canadians were welcomed enthusiastically and the joyous "Canadian summer" that ensued forged deep and long-lasting bonds of friendship between the Dutch and Canadian peoples. *See* WORLD WAR II.

BRERETON GREENHOUS

Reading: D. Kaufman and M. Horn, *A Liberation Album* (1980).

Liberté, bimonthly journal fd 1959 in Montréal by poet Jean-Guy Pilon and other writers including Jacques GODBOUT, Fernand OUELLETTE, Paul-Marie LAPOINTE and Gilles Hénault. Managed in turn by Pilon, Godbout, Hubert AQUIN, again by Pilon and, since 1980, by François Ricard, it occupies a special place because of the quality and biting tone of its writing, its role as a critical forum for all contemporary cultural ideas, its avid interest in other literatures, the number and importance of its special issues and the international writers' conferences it has organized. *Liberté* has published such celebrated works as Lapointe's *Arbres,* Gaston MIRON's *La Vie agonique* (tr *The Agonized Life,* 1980), Aquin's "La fatigue culturelle du Canada français" (tr "The Cultural Fatigue of French Canada," 1979), Ouellette's "La lutte des langues et la dualité du langage" and the first collection by the future writers of PARTI PRIS.

Although most major Québec writers have written for *Liberté,* the journal has always welcomed contributions from foreign authors. Major authors and critics such as René Char, Pierre-Jean Jouve, Aimé Césaire, Milan Kundera, Julio Cortazar, Jean Starobinski and René Girard have all contributed. Since 1980, *Liberté* has become more polemical, but continues to diversify its involvement in the cultural field with such undertakings as TV specials, studies of the literary institution and studies of feminism. *See* LITERARY PERIODICALS IN FRENCH.

ANDRÉ BELLEAU

Libraries The earliest libraries in Canada were private collections belonging to immigrants from Europe. The first known library belonged to Marc LESCARBOT, a scholar and advocate who came to Port-Royal in 1606. Early religious orders accumulated libraries: volumes from the Canadian Jesuit Mission of 1632 and the Jesuit College in Québec City (est 1635) still exist. Libraries were maintained in the 18th century at military and fur-trade bases — at the Hudson's Bay Co post at YORK FACTORY, by John McKay on Vancouver I after 1786, and by Roderick MACKENZIE at Fort Chipewyan, Alta, after 1788. A garrison library was established in Halifax by Lord DALHOUSIE in 1816.

Public Libraries

In the 19th century mechanics' institutes and subscription, social, school-district, university and professional libraries assumed increasing importance. By mid-century, libraries were firmly established in British North America. The first free public libraries date from 1883 at Saint John, Guelph and Toronto, but most public libraries that existed before Confederation were supported by subscription fees: Governor Hal-

dimand established a library at Québec City in 1779, and a library began operation at Niagara in 1800. However, the development of the public library as it is known today was a slow evolution through a variety of forms, in response to the geographic, economic, cultural and demographic conditions of each province. Predecessors of the modern, tax-supported public library were school-district libraries, mechanics' institutes and association or social libraries.

School-District Libraries were initiated by Joseph HOWE in NS and Egerton RYERSON in Canada West [Ontario] in 1850. Both men felt that children and adults could be served by local school authorities, with some financial and organizational assistance from colonial legislatures. NB (1858) and PEI (1877) followed this example, but after Confederation school-district libraries disappeared owing to local disaffection with the centralizing tendencies of departments of education.

Mechanics' Institutes originated in Great Britain and in 1827 the first institute opened at St John's, Nfld. They quickly became popular in communities such as Halifax, Montréal, Toronto and Victoria because they offered the working class inexpensive access to books and newspapers. Interest began to wane after 1850, and many institutes eventually became part of a public library. In Ontario, for example, this process was facilitated when the 1882 Act to allow the establishment of free public libraries in cities, towns and villages permitted the assets of institutes to be transferred to free libraries. Grants were similarly transferred, with the result that the institutes ceased or were replaced by public libraries.

Association or Social Libraries dedicated to a variety of interests flourished in eastern Canada after 1800. The collection of the LITERARY AND HISTORICAL SOCIETY OF QUEBEC (est 1824) was particularly noteworthy. Like the mechanics' institutes, association libraries were public by virtue of serving a membership beyond class, ethnic or religious limitations; many eventually became free public libraries, though the type still exists in some areas, eg, BC.

Free Libraries In 1882 an Act of the Ontario legislature provided for the establishment of free libraries, supported financially by a levy of one-half mill to be assessed on the value of all real and personal property. A local board composed of 9 members appointed by the municipal council and school boards was to provide leadership. The Toronto Public Library, which opened in 1884, was the largest among the first libraries to choose free status. This Ontario pattern of legislating tax support for library services was followed in other provinces: BC (1891), Manitoba (1899), Saskatchewan (1906), Alberta (1907), NB (1929), Newfoundland (1935), PEI (1935, repealed 1936), NS (1937), Québec (1959), and the NWT (1966).

Travelling Libraries are collections of books which are taken from place to place, returning to headquarters to be checked or repaired. These libraries, initiated in Scotland in 1817, were introduced to BC, Ontario and Québec shortly before 1900. Similar libraries were operated by the universities of Manitoba, Dalhousie, McGill and Alberta, and by provincial authorities in Saskatchewan, Ontario and Newfoundland. By the 1980s they had mostly ceased or been replaced by books-by-mail or other services, but they had helped take books to areas without public libraries.

Modern Public Libraries The modern library selects, acquires and organizes books, periodicals, newspapers, government publications, reports, microforms, maps, audiovisual materials, computer tapes and other materials, and makes them available to users. Materials selected to meet user needs are acquired and processed for the shelves using a cataloguing and classification system to provide the user with access to the library collection. Reference service offers assistance to the user in determining what is needed and how to find it. Provision of additional services, eg, children's programs, audiovisual services, and selective dissemination of information, depends on the clientele of the library. Public libraries in Canada are governed by provincial statutes and are primarily financed by local tax revenues, with provincial grants supplementing local funding. Public libraries are normally the responsibility of a local library board with authority to appoint or dismiss employees, control library property, establish policies, and budget for library operations. Service has varied depending on the commitment of local communities and their library boards. The period in public library development immediately after 1900 was marked by construction of library buildings and expansion of collections and services. With an emphasis on broadening the membership base, open access was permitted, children's departments were introduced, standard cataloguing and classification systems were adopted, and library extension in rural areas was commenced. Although public library development was checked during the Depression and WWII, the expansion of service resumed after 1945.

Following the 1960s emphasis on education, more than 125 new or remodelled public library buildings were constructed in Canada, in part with Centennial grants, and public library service expanded. Library development has been adversely affected by the inflationary period of the 1970s and early 1980s, and libraries are caught between increasing demands from the public for enhanced services and pressures from municipal or regional jurisdictions to reduce or stabilize expenditures. Expansion of services has slackened, though the statistics are still impressive. In 1983 Statistics Canada reported that (in 1981) 991 public libraries held 51.3 million books, circulated 131.8 million items, spent $49.5 million on materials, and employed over 10 000 people at 3159 service points across Canada.

Regional Libraries Because of Canada's demographic composition, provincial legislatures and professional associations have encouraged the formation of larger units of service such as county, regional and provincial library systems. The first regional systems were demonstrated on a trial basis in the early 1930s in the Fraser Valley and in PEI. After WWII other provinces adopted the regional forms. Some, such as Saskatchewan, have found that a regional system is the best solution to serving small communities separated by great distances — the province's large municipal libraries serve as backup to the regionals. Administrative frameworks and financial support for regional systems differ in each province: some local units are branches in a provincial system whereas others remain autonomous; some provinces provide centralized processing and backup collections for the regional library systems, others do not.

University, College and School Libraries

University and college libraries are integral parts of the academic community in which they are located, and are supported with a percentage of normal operating funds (6-8%), with additional special grants from funding agencies or endowments. A university chief librarian usually reports to an academic official, such as the office of vice-president, academic, and is represented on senior academic decision-making bodies of the university. College libraries receive a smaller percentage of operating funds and the administrative structure varies greatly in and between provinces.

University Libraries The first academic library in Canada opened in 1789 with the establishment of King's College in Windsor, NS. Though libraries were included in many colleges and universities founded in the early 19th century in eastern Canada, academic collections remained relatively small until 1950, when Canadian academic libraries escalated rapidly in response to a new emphasis on education and research. According to Statistics Canada, by 1980/81 there were 104 reporting university libraries holding 41.3 million books, spending $56.0 million on materials and employing 6791 personnel.

Typical of this rapid growth was the establishment of 5 new universities in Ontario, which opened their doors with completely catalogued basic collections thanks to the Ontario New Universities Library Project of the early 1960s, one of the first large-scale uses of library automation in Canada. Other provinces, most notably BC, also funded university library development, and the CANADA COUNCIL and, subsequently, the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL, provided special grants for the enrichment of collections of national distinction.

In the late 1960s co-operative programs were introduced to allow the reorganization and sharing of collections. The Ontario Council of University Libraries developed a co-operative library network that included a transit system, a structured interlibrary loan system, automated union list systems for serials and government publications, and interuniversity and reciprocal borrowing agreements. In BC the Tri-University Libraries initiated a government-funded union catalogue project that included college libraries. Similar activities occurred in Québec under the library council for the universities. The most ambitious project, UNICAT/TELCAT (1974-79), based on the bibliographic utility UTLAS (University of Toronto Library Automated System), was a union catalogue and support system shared by 18 Ontario and Québec university and government libraries; it was disbanded when newer technologies made local integrated systems linked to each other via TELECOMMUNICATION networks more cost-effective.

College Libraries have developed rapidly in Canada since 1960 — in Québec in Collèges d'enseignement général et professionel, in Ontario in colleges of applied arts and technology, and in the other provinces in technical institutes or community colleges. These libraries are learning resource centres, emphasizing nonprint materials as much as traditional print collections. In 1978 Statistics Canada reported that 141 community college libraries in 8 provinces held 5.8 million books (an average of 40 900 per library), spent $6.9 million on materials annually and employed 1300 people.

School Libraries in Canada are learning-resource centres for students and teachers, and many have become an essential part of the teaching process. The role of the school library depends on the willingness of the individual school board and principal to provide space, personnel, funding and materials. In an effort to maintain quality, supervisors or consultants are employed by many provincial school-library agencies to help organize and oversee libraries. Provincial school-library associations as well as the Canadian School Library Assn have proposed standards for the size of collections, for staff and physical facilities, and for the role of the librarian in curriculum development.

In 1978 Statistics Canada reported that there were 8201 centralized school libraries holding 49.5 million books (an average of 6042 per library), spending $26.2 million on materials annually, and employing 5171 personnel in 9 Canadian provinces. No data were available for Québec, the Yukon and NWT.

Special Libraries

Special libraries serve the needs of a sponsoring organization, which may be federal, provin-

cial or municipal governments; companies, associations or industries; or public institutions such as hospitals or museums. Special libraries can also be distinguished by a subject such as law, finance, insurance or health science. The origin of special libraries in Canada dates from 1725, when the library of the general hospital in Québec City was opened. Most special libraries in Canada have been established since WWII. They are represented nationally by the Canadian Assn of Special Libraries and Information Services, and by subject-oriented associations such as the Canadian Health Libraries Assn and the Canadian Assn of Law Libraries.

Government Libraries The federal government funds the Library of Parliament, the NATIONAL LIBRARY OF CANADA, the Canada Institute for Scientific and Technical Information (CISTI), libraries of government departments and crown corporations, the public library service of the NWT and the Yukon Regional Library System, and contributes to the provision of library service for Indian bands. Federal libraries are responsible to their departments, but co-operate on matters of common interest through the Council of Federal Libraries, whose secretariat is provided by the National Library. The parliamentary librarian reports directly to Parliament; the national librarian, with the status of a deputy head, reports to Parliament through the minister of communications.

Legislative Libraries had their beginnings in 1773 with a legislative library in PEI; similar legislative libraries followed in other provinces. In 1867 the Library of Parliament was officially established in Ottawa, based on collections from the legislative libraries of Lower and Upper Canada (1791-1841) and the Province of Canada (1841-67). Until the creation of the National Library in 1953, the Library of Parliament received deposit copies of all books published in Canada. It serves as a reference library for MPs and senators.

Provincial Legislative Libraries are financed by provincial governments and serve MLAs and, sometimes, civil servants. Their holdings are an important resource for the history and development of their areas. The growth of government department libraries has been determined by factors influencing the development of their respective provinces, eg, since 1965 they have developed rapidly in Ontario, Québec and Alberta. In Québec the position of the Bibliothèque Nationale is unique; it acts as a depository for all Québec publications, co-ordinates Québec bibliographic projects, and through its mandate to promote literary activity, has entered into cultural agreements between Québec and France.

Professional, Business and Industrial Libraries Among the earliest professional libraries were law libraries — the library of the Law Society of Upper Canada was established in 1797 and that of the Barreau de Montréal in 1828. One of the earliest business libraries was organized by a newspaper in Halifax, the *Novascotian*, in 1824. Industrial libraries, eg, Esso Resources Canada Ltd library in Calgary, tend to be in major cities where there are strong concentrations of business and industry, as in Montréal and Toronto. In 1983 scientific and technical libraries formed the largest single group of special libraries.

Libraries in Nonprofit Organizations Important literary collections pertaining to fine art, science and technology exist in many libraries attached to nonprofit organizations such as museums and art galleries, in particular the Musée des beaux-arts de Montréal, the NATIONAL GALLERY in Ottawa, the ART GALLERY OF ONTARIO, the NATIONAL MUSEUMS OF CANADA and the ROYAL ONTARIO MUSEUM. Libraries associated with the CANADIAN BROADCASTING CORPORATION and the CANADIAN MUSIC CENTRE in Toronto serve as information centres for broadcasters and composers.

There are over 150 library associations in Canada, including national, provincial, regional, local, and ethnic associations, and groupings by library type such as public, academic, government, school and special libraries. The first was the Ontario Library Assn, established in 1900; other provincial associations followed: in BC (1911), Québec (1932), the Maritimes (1935), Manitoba (1936), Saskatchewan (1942), Alberta (1944) and the NWT (1981). The Yukon is still without a library association.

The Canadian Library Assn was formed in 1946 as a bilingual national association but became unilingual in 1973. The CLA is subdivided into 5 type-of-interest associations, eg, the Canadian Assn of College and University Libraries, and it also sponsors a number of co-ordinating groups and committees. Some of the major activities of the CLA have included microfilming of Canadian newspapers of historical importance; compiling and publishing the *Canadian Periodical Index;* encouraging publication of reference works; developing standards; maintaining liaison with national and international library associations and with the federal government; and providing opportunities for continuing education for library staff through conference programs.

Association pour l'avancement des sciences et des techniques de la documentation (ASTED) is the national association of francophone libraries. Like CLA, ASTED has a substructure of sections for academic and public libraries.

In the postwar decades all types of libraries in Canada responded to the increasing information requirements of users. Collections changed to encompass such new formats as microforms, audio and video cassettes, films, talking books, braille and kits. Programs for cultural or minority groups became an important part of public library service, and information retrieval, frequently from external computer-based bibliographic data bases, became a major component of reference service in public, academic and special libraries. Service to adult learners has become very important in college libraries and is gaining importance in university libraries as well.

These expanding services have been facilitated by local, regional, provincial and national co-operative agreements or resource-sharing networks and encouraged by support from the National Library and CISTI, both of which readily make their own collections available on loan or through photocopy to libraries across the country.

Although some public and university libraries had separate facilities before 1900, the Andrew Carnegie grants for public library buildings led to the construction of 125 Canadian libraries between 1901 and 1923. Influenced by the beaux-arts design common in public buildings of that period, classical columns and other elaborate ornamentation were features of even the smallest buildings (*see* ARCHITECTURE DEVELOPMENT; ARCHITECTURAL STYLES). Unfortunately, these early libraries, although functional for the services of that period, proved difficult to modify or expand to meet an increased user population, changing services and new technologies.

A second surge in public library construction in the 1960s and 1970s, with emphasis on internal rather than external monumentalism, led to aesthetically pleasing but not necessarily functional libraries. The Metropolitan Toronto Central Library, which opened in 1977, has attracted international attention for the dramatic access it provides to its collections. Academic library buildings experienced a renaissance during this same period, with new central or divisional libraries constructed on every major university campus in Canada.

Since 1960 the most dramatic influence on libraries of all types has been the introduction of new technologies with implications for services, staff, collections and buildings. At the end of the 1970s advances in mini- and micro-computer technology permitted the development of local systems at costs that most libraries could afford; and information networks, encouraged by the National Library and CISTI, provided mechanisms for resource sharing and data exchange.



Reading area of the Metropolitan Toronto Library, designed by architect Raymond Moriyama (*photo © 1984 Hartill Art Associates*).

Library services were changed and expanded with the introduction of computer-based systems which made available the very latest materials. CISTI made major data bases available through CAN/SDI (selective dissemination of information) and CAN/OLE (on-line enquiry), and encouraged electronic messaging for the transfer of interlibrary loan requests and for the delivery of documents (CAN/DOC). The National Library has made its extensive bibliographic data base (DOBIS) available to other Canadian libraries for on-line searching. Many libraries, both public and academic, have added videotex to their information resources, using the Canadian-designed TELIDON system. University of Toronto Library Automation System (UTLAS), founded in 1971, provides computerized library-related services, products and systems to about 200 libraries. UTLAS's services are based on its catalogue support system (CATSS) which enables libraries to build and control their own individual, shared or linked files by sharing cataloguing information.

Canadian library schools have responded to changed requirements for librarians by adding computer and telecommunication technologies to their curricula and by providing continuing-education programs in the new technologies. In 1984 there were 7 library schools in Canada, all at the graduate level: UBC, U of Alberta, Western, U of T, McGill, U de Montréal and Dalhousie. Library technician programs have been offered at several community colleges. Requirements for accommodating new and future information systems and resources have become major considerations in the design or renovation of library buildings.

The enhanced potential for gaining access to and sharing library collections, which has been made possible by the new technologies, has presented new challenges. The creation of library systems which combine the resources of all types of library in flexible administrative structures will need to be carefully considered. Support for the library and information networks of the 21st century will have to be coordinated at the national level if Canadian libraries are to succeed in meeting the increasing demands of an INFORMATION SOCIETY.

MARGARET BECKMAN, MOSHIE DAHMS, LORNE BRUCE

Reading: "Canada, Libraries in," E.L. Morton, *Encyclopedia of Library and Information Science* 4 (1970), 71-157; "Canada, Libraries in, 1970-1979," B.L. Anderson, ELIS 36(1983), 94-155; A. Drolet, *Les Bibliothèques canadiennes de 1604 à 1960* (1960); L.S. Garry and C. Garry, eds, *Canadian Libraries in Their Changing Environment* (1977); National Library of Canada, *The Future of the National Library* (1979).

Library Science, which encompasses all aspects of library operation, is an organized graduate course of studies taught at university level and producing practitioners with a recognized professional qualification. Until 60 years ago, most Canadian librarians acquired their knowledge from experience; those with formal training usually were graduates of library schools in the US. Beginning in 1904, when McGill U conducted a 3-week library summer school, instructional programs became available in Canada. These were mainly intermittent, short courses until 1927, when McGill offered a full-year professional course of studies at the undergraduate level. The U of T established a School of Library Science in 1928. In 1931 and 1936, respectively, the McGill and Toronto library schools established postgraduate programs and were accredited by the American Library Assn (ALA). In the 1930s other library schools were established at the U of Ottawa, the École de bibliothécaires in Montréal and Mt St Vincent in Halifax. These 3 schools were never accredited and eventually went out of existence.

McGill and Toronto continued to dominate Canadian library education, but in the period of expansion during the 1960s the need for librarians was greater than they could meet, and new graduate library schools were established at UBC (1961), U de Montréal (1961), U of Western Ontario (1967), U of Alberta (1968) and Dalhousie (1969). In general these institutions offered the Bachelor of Library Science (BLS), but since the BLS could be taken only by those already holding an undergraduate degree, it was equated with the Master of Library Science (MLS) awarded in the US. All the above Canadian schools were, and continue to be, accredited by the ALA.

In the early 1970s, Canadian library schools made a notable departure from the US pattern. Because of expanding professional knowledge, the growing need for specialization and the continuing need for generalist preparation, Canadian library schools doubled the length of their programs and awarded an MLS instead of the BLS. McGill had already instituted the 2-year MLS in 1964; by 1972, Toronto, Montréal, Western Ontario, UBC and Dalhousie followed suit, and U of A did so in 1976. Canadian library-education programs hence are significantly longer than those in the US and other countries. A number of American library schools have taken or are contemplating a similar measure. Other noteworthy developments of the 1970s were the inception of doctoral programs (U of T and UWO), the erection of impressive physical facilities (Toronto) and a rapid increase in enrolment. The U of Western Ontario and U of T are now among the largest on the continent. In 1975-76 the 7 graduate library schools awarded 495 degrees, of which Montréal, the only French-language school, accounted for 69. The number of MLS degrees awarded in 1981-82 was approximately 500.

Recently there have been considerable revisions in the graduate library-school programs and in the conceptions held about the nature and scope of library science. Traditionally, library science has been equated with the work done in and by libraries. The core elements have been materials selection and acquisition; cataloguing, classification and subject analysis of these materials; services to readers, and such necessary background aspects as the role of the library in society. Though these subjects remain important, the identification of library science with libraries (as institutions) is not nearly as close as it was. Library science is concerned with all aspects of library operation, and more broadly with the entire information-transfer process, whether the medium for such transfer be graphic records or electronically transmitted data. Library science thus conceived overlaps with such disciplines as documentation and information science. Two of the Canadian library schools include the term "information science" in their names, and all of the schools give considerable attention to information technology, electronic storage and retrieval, and information and communications theory. The graduates of Canadian library schools are therefore increasingly likely to see themselves as "information professionals" rather than as librarians. Though the majority will still work in public, academic or special libraries, other graduates may take jobs in such non-traditional settings as editing, publishing or research enterprises, law offices and records management, or even set up their own companies. In effect, any position that calls for high-level skills in the selection, organization or retrieval of information materials, knowledge of telecommunications and videotex technology and ability to create data bases is suitable for library- and information-science graduates.

In addition to the graduate library-school programs, undergraduate courses in librarianship are offered by the faculties of education of many Canadian universities. These courses are intended for the training of school librarians or teacher-librarians. The latter term reflects the view that the librarian in the school should be primarily an educator, a partner with the classroom instructor in the effective use of learning materials. If the Canadian School Library Association's *Recommended Curriculum for Education for School Librarianship* (1981) is generally implemented, school librarianship in Canada will become a postgraduate discipline.

On the non-professional level, library-technician-training programs are very well developed in Canada. Beginning in Winnipeg (1962), such programs are now offered in 22 institutions. In the 4 western provinces, the parent institutions are community colleges or technical institutes; in Ontario, colleges of applied arts and technology (CAATs) and Lakehead U, which has a 3-year library-technology program; in Québec, Collèges d'enseignement général et professionel (CEGEPs). There are no library-technician-training programs in the Atlantic provinces. In general, the library-technician-training programs are 2-year programs, and half of that period is given to courses in library work. Apart from Québec, most programs follow the well-designed *Guidelines for the Training of Library Technicians* (1982) issued by the Canadian Library Association. The CLA has also sponsored frequent surveys of the programs, which encourages the maintenance of high standards. Here too, Canada has taken a vanguard position in library education and library science.

SAMUEL ROTHSTEIN

Lichen, a dual organism composed of FUNGI living in close association with green ALGAE or BLUE-GREEN ALGAE. As composite organisms, they cannot be formally classified within a single kingdom. Names applied to lichens are actually those of the fungal component of the association because, with few exceptions, each recognizable lichen is the product of a different species of "lichen fungus." However, the algal species involved in the lichen consortium might be found in a number of different lichens. The more conspicuous lichens are foliose, lobed or leafy with distinct upper and lower surfaces; or fruticose, hanging like black or yellow hair from trees, or shrubby and erect on the ground. Crustose lichens form a thin crust over rocks or bark and are conspicuous only if brightly coloured. A typical foliose lichen has a complex organization. The algal cells form a layer within the fungal body, just below a protective cortex of thick-walled fungal cells and above a loosely organized layer of thin-walled cells (medulla). Below the medulla is another protective cortex from which rootlike attachments (rhizines) often arise. Crustose and fruticose lichens have slightly different tissue relationships.

Lichens grow extremely slowly (about 0.1 mm per year in some arctic species, 5-8 mm per year in temperate species). Estimating the growth rate of a lichen and measuring its diameter shows that some patches of rock-dwelling crustose lichens in the far North may be several thousand years old. Lichens are found from the tropics to the tundra and grow on many kinds of materials or substrates. There are approximately 18 000 species worldwide, with perhaps 2500 found in Canada. They are most conspicuous in cooler regions: on exposed mountaintops, in northern coniferous forests and on arctic tundra. In the subalpine forests of the western mountains and in some boreal forests, lichens often completely cover dead branches of spruce and fir. The caribou lichens blanket the ground over thousands of square hectares in Canada's subarctic woodland. Across the prairies and in the dry interior of BC, brilliantly coloured species invade exposed soil and cover erratic boulders. In eastern Canada, lichens are especially conspicuous on tree trunks, particularly those of roadside elms and maples. On thin or sandy soil, large mixed colonies of fruticose lichens often develop. Some lichens, restricted to coastal rocks, decorate the sea-splashed outcrops with orange, white and black belts reflecting the specificity of certain species to different tidal and splash zones.

Lichens are of great importance in Canada because of their relative abundance in the North. They make up the greater part of the winter diet of barren-ground caribou and are essential for the survival of the herds which form the most important element in the life of many Indian and Inuit groups. Lichens have little nutritive value and are generally used only as an emergency food, although some Indian peoples of interior BC include in their diet species such as the black, hairlike tree lichen. Bark- and twig-inhabiting lichens are extremely sensitive to AIR POLLUTION. Studies have been made in Canada and elsewhere of the relationship between specific levels of pollutants (especially sulphur dioxide) and the distribution and growth of lichens. Hence, lichens are frequently used in biological estimations of pollution levels and as early indicators of pollution problems.

IRWIN M. BRODO

Reading: D.H.S. Richardson, *The Vanishing Lichens* (1974).

Lieutenant-Governor combines the monarchical and the federal principle in provincial governments. Although the lieutenant-governor is appointed by the GOVERNOR GENERAL on the prime minister's advice, in the words of an 1892 decision by the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL, a lieutenant-governor "is as much the representative of Her Majesty, for all purposes of provincial government, as the Governor-General himself for all purposes of Dominion Government." The lieutenant-governor, therefore, possesses all the formal, prerogative and discretionary powers exercised by the monarch or the governor general. These include the duty to open, prorogue and dissolve the provincial Assembly; to assent to (or withhold assent from) provincial legislation and ORDERS-IN-COUNCIL; and to give prior approval to money bills. The lieutenant-governor also has the responsibility to select the provincial premier and, presumably as a last resort, to dismiss a government.

Although the discretionary powers may be obsolescent, they are not obsolete. Five governments have been dismissed, and dismissal has been seriously considered on several other occasions — the latest in Alberta in 1938 and Ontario in 1940. The task of selecting a premier has not always been easy, given the early looseness in party structures. But in the 20th century, lieutenant-governors have, with only one ex-

ception, asked the leader of the largest party to form a government or, if one leader died, waited until the party could make its choice known through either Cabinet or caucus.

Dissolution has usually been the result of an uncertain or unstable balance of power within the legislature. Since 1867 there have only been 3 clear cases in which a lieutenant-governor has refused to dissolve the Assembly, although on other occasions the knowledge that a request would be refused forestalled the request. However, the subject has been warmly debated. In 1952 in BC and 1971-72 in Newfoundland the existing government had been defeated, but the new government did not have a clear majority and defeat in the assembly seemed certain. The question was whether the new government could request and receive a dissolution before the House met (the answer in both instances was negative) or whether a newly defeated government could secure a dissolution rather than resign. In BC the lieutenant-governor granted a dissolution to the defeated government, and in Newfoundland he agreed to a dissolution on the first day of the session, before the government had been defeated.

Lieutenant-governors are also officers of the federal government: they are appointed and paid by, and are subject to instructions from, Ottawa, and can be dismissed for cause. The usual term of 5 years is often extended. By the CONSTITUTION ACT 1867 (formerly BRITISH NORTH AMERICA ACT), the lieutenant-governor has the power to reserve provincial Bills and is the instrument through which provincial Acts disallowed by Ottawa are proclaimed. One draft of the BNA Act used the word "superintendent," and at the QUEBEC CONFERENCE of 1864 it was proposed that the subordination of provincial governments be effected, in part, by keeping the power to nominate and dismiss the lieutenant-governor in the central government's hands. Sir John A. Macdonald regarded the lieutenant-governor as one who should serve the Dominion's interests to the greatest possible extent without infringing on the province's right to self-government.

But the principles of provincial autonomy and federal intervention proved to be incompatible. Lieutenant-governors in the early years supported federal interests — eg, during the REPEAL MOVEMENT in Nova Scotia in the late 1860s and the intense federal-provincial disputes in Manitoba — and reserved many provincial Bills on instructions from Ottawa, or because they encroached on federal power or seemed contrary to national policy. As late as 1937, the lieutenant-governor of Alberta reserved 3 Bills, 2 with the concurrence of the federal government. In 1938 the Supreme Court ruled that the power of reservation still existed, but during the constitutional debate of the 1970s there seemed to be unanimous federal-provincial agreement that the provision should be removed from the Constitution. Seventy Bills have been reserved since 1867, but only 4 in the last half century. The last Bill to be reserved was in Saskatchewan in 1961, when the lieutenant-governor believed it was of doubtful validity. The Dept of Justice quickly concluded that the Bill was within provincial jurisdiction and assent was given.

The Constitution Act 1867 protects the office of lieutenant-governor from any amendment by the provincial government. However, many provinces have scaled down the expenses of the office and some have closed official residences. Mitchell HEPBURN (Ontario) closed Chorley Park in 1937; William ABERHART (Alberta) closed Government House in 1938 during his conflict with Ottawa (although another residence was purchased in 1967), and the CCF government in Saskatchewan did likewise in 1944. Although the cost is modest, there have been frequent suggestions that the office be abolished and that the chief justice perform the routine ceremonial functions. But abolitionists have never received much support, even in the depths of the Depression.

The office has been seen as a form of political patronage. Retired Cabinet ministers, federal and provincial politicans whose day has passed, and party fund raisers have eagerly sought and been given the position. Among the 10 lieutenant-governors in 1982 were 2 who had been federal Cabinet ministers, one retired provincial Cabinet minister, and one who had resigned from the Senate. In 1929 the Judicial Committee of the Privy Council ruled that women could be senators, and in 1934 the Dept of Justice decided that women could be lieutenant-governors. However, it was not until the appointment of Pauline MCGIBBON in Ontario in 1974 that the first woman read the Speech from the Throne in a provincial legislature. In 1985 there were 2 women holding the office: Lt-Gov Pearl McGonigal of Manitoba (appointed in 1981, and the first since McGibbon) and Lt-Gov Helen Hunley of Alberta (appointed in 1984).

JOHN T. SAYWELL

Reading: John T. Saywell, *The Office of Lieutenant-Governor* (1957).

Life Expectancy, *see* POPULATION.

Lightfoot, Gordon, singer, songwriter (b at Orillia, Ont 17 Nov 1939). Canada's most popular male vocalist during the 1970s, Lightfoot first drew attention in 1965 as the composer of "Early Morning Rain" and "For Lovin' Me," recorded by folk artists IAN AND SYLVIA and Peter, Paul and Mary, among others. At heart a romantic, in voice a baritone balladeer, he moved easily from folk to pop and by 1970 had become a major concert and recording artist throughout the English-speaking world. Other Lightfoot songs, from more than 15 record albums 1966-82, include pop items "If You Could Read My Mind," "Sundown" and "Did She Mention My Name?" as well as the more traditional "Canadian Railroad Trilogy" and "The Wreck of the *Edmund Fitzgerald.*" Lightfoot has received many Juno awards (as folksinger, male vocalist and songwriter) and in 1971 was named an officer in the Order of Canada. MARK MILLER



Singer Gordon Lightfoot performing in a 1980 benefit for Canada's Olympic athletes (*courtesy Canapress*).

Lighthouses Functions of lighthouses vary greatly. The great landfall lights at Cape Race, Seal I, Sambro and Race rocks provide the first sight of land for Atlantic or Pacific travellers after days or weeks at sea. Coastal navigation is by a system of major and minor lights, and smaller lights are used on intricate waterways where numerous islands and channels need to be marked. Harbour lights and range lights mark the final approaches to safe haven.

Duties of lighthouse keepers include the traditional "keeping of the light," radio communications and beacons, fog alarms, rescue services and sanctuary. Certain stations provide regular weather observations as part of the national system, and the station at Langara in the Queen Charlotte Is provides part of the tidal-wave warning system in the Pacific Ocean.

The first documented lighthouse, built at LOUISBOURG in Cape Breton in 1734, was almost immediately destroyed by fire and rebuilt. It was levelled by British guns during the siege of 1758 and rebuilt several times. The oldest existing lighthouse was built on Sambro I at the mouth of Halifax harbour in 1758. The second-oldest surviving lighthouse was built in 1809 on Green I (Isle Verte) in the St Lawrence R, opposite the mouth of the Saguenay. In the early 19th century sea trade between Canada and Europe increased rapidly and so did wrecks and disasters at sea. By 1840 major lights had been placed on Seal I at the entrance to the Bay of Fundy, NS, at several places along the coast of Newfoundland and at the entry to the St Lawrence R. Lights were used on the Great Lakes at Mississauga (1804) and at Gibraltar Pt on Toronto I (1808). The upper Great Lakes remained in darkness until increasing trade forced the lighting of shore lamps throughout the region in the latter half of the 19th century.

On the Pacific Coast it was not until 1860 that the first 2 lighthouses, at Race Rocks and Fisgard, near what is now Victoria, came into service. In the latter half of the 19th century lights were used along the outer coast of Vancouver I and the entryways to Victoria, Vancouver and Prince Rupert. Inland waters, such as the Saint John R, Red R and Lake Winnipeg, were marked with lights and buoys by the early part of the 20th century. In arctic waters beacons were installed in the 1930s, with the opening of the port of Churchill.

The first lighthouses were bonfires on the ends of points at harbour entrances, later replaced by towers with similar beacons on top. Candles were used in the 18th and early 19th centuries, but it took many to make even a dim light. Oil lamps with wicks were used extensively by 1800. Whale oil and a variety of vegetable, fish and seal oils were used in different places, according to the availability of supplies and equipment.

The invention of kerosene by A. GESNER in NS in 1846 led to the production of good-quality kerosene lamps, used extensively in Canada from the 1860s because they were cheap, reliable and efficient. The invention of the mantle lamp and experimentation with various oils produced lighthouses of considerable brilliance by the beginning of the 20th century. Electric lights came to lighthouses in Canada about the end of the 19th century and gradually replaced other forms of illumination.

Parabolic reflectors of polished steel or silvered copper greatly increased the effectiveness of lighthouses in the early 19th century, and some of these reflectors are still in use in lights at Red I in the St Lawrence and East Pt, PEI. Reflecting systems are known as catoptric systems. Simple lens systems (dioptric) and combinations of refracting prisms and concentrating lenses (catadioptric) came into use in the mid and latter part of the 19th century. Many of these systems survive, and Canada's greatest lighthouse, at Cape Race, has such a system weighing many tons and casting its beam 48 km into the Atlantic. By 1800 along the coasts of Europe there were such numbers of lighthouses that it became necessary to invent a system of identifying them. An apparatus was attached to the light to produce a different pattern of flashes for each lighthouse. This sequence is noted in the *List of Lights* for each area. By 1890 the revolving light mechanisms were floated in mercury and



The Bonavista Bay lighthouse, built in 1843, guided Newfoundland mariners until 1966 when it was replaced by a steel tower with an automated beacon (*photo by David M. Baird*).

driven by clockwork with great weights, which were wound up by the keeper at 2- to 4-hour intervals.

In the 1970s electrification was virtually complete. Modern mercury-vapour and xenon bulbs are so powerful that simple optics of pressed glass or plastic have replaced the great revolving masses of glass and prisms. These new lamps revolve in the same way as airport beacons and lights on tall buildings. Automation has replaced the traditional lighthouse keeper in most stations. The man living with his family at a light station in a remote place has been replaced by the helicopter and the travelling technician who changes or charges the bulbs and batteries. Bulbs are changed automatically and remote lighthouse stations are fitted with automatic standby equipment in case something goes wrong.

Along Canadian coasts, where lighthouses must be seen against snow or rocks and where complicated coastlines result in many lighthouses within short distances along the shore, distinctive patterns are painted on the towers in order to distinguish them from one another. These daymarks have great variety, ranging from a red cross at Head Harbour, NB, to black and white horizontal stripes at Race Rocks in BC.

Construction materials vary with the time of building and local conditions. Wooden lighthouse towers are characteristic of the Canadian lighthouse service. Superb examples are to be found at East Pt, PEI, Pachena on the outside of Vancouver I, and at Gannet Rock on the entrance to the Bay of Fundy. The last, despite its exposed position, has stood for 150 years. Stone towers at Race Rocks, Cove I (near Collingwood, Ont) and on Anticosti I were built with what was available nearby and were as much as 30.5 m high. Lighthouses were sometimes built of brick, and for a period in the late 19th century cast-iron plates were hauled ashore from ships and bolted together to produce the lighthouses at Ferryland, Nfld, and Cape North, NS. The latter is now on the grounds of the National Museum of Science and Technology in Ottawa. Reinforced concrete towers have been built in many places in Canada this century, the most distinctive being built around 1910, with central towers up to 30.5 m high and flying buttresses; examples are the beautiful towers at Father Pt, Qué, Caribou I in Lk Superior and Estevan Pt on the outside of Vancouver I. Steel caissons are set into the riverbed at Prince Shoal and White I Reef in the St Lawrence R, and an open-steelwork tower is on Pigeon I in Lk Ontario. Even fibreglass towers have been tried on the Magdalen Is and in inland waterways. Canadian lighthouses are set in a great variety of environments — in the rain forests of the Pacific Coast; in the middle of a downtown park, such as Brockton Pt in Vancouver; and on the tops of high-rounded points of islands so thoroughly windswept that the lighthouses are held down by steel guy wires, as at Gull I. Although often starkly functional in setting and design, the lighthouse has become a romantic symbol both of the country's maritime greatness and of safe haven.

DAVID M. BAIRD

Lighting From earliest times it has been recognized that artificial light prolongs daytime activities. Relaxation and social interaction necessarily occurred after the day's work was done; therefore, indoor lighting has always had a special association with this aspect of living. The campfire moved indoors to become the fireplace, and from this main source of light a branch could be pulled out and placed in a wrought-iron holder to illuminate other areas, or carried outside to serve as a torch. Small pieces of wood held in a clamp or splint holder would burn for a short period of time. The open flame continued to be the only source of domestic lighting until the incandescent light bulb was introduced in the 1880s. Although the most primitive forms are still in everyday use in some areas, it is possible to view the evolution of lighting as having 3 distinct periods.

Early Period (to 1780) During the first period, which ended in about 1780, fats and oils from animal and vegetable sources were used with various types of wicking. In some cases, dried whole animals or fish fastened to a stick served as torches; for example, in BC, oily SMELTS, popularly known as candlefish, were used in this manner. The earliest lamps were simple covered or uncovered saucers with a wick lying along the bottom and extending to the rim; examples include Roman pottery lamps, European iron crusies, Inuit stone lamps and perhaps shells. Slight improvements, such as a channel or tube to elevate the wick, were incorporated in European spout lamps and in Betty, Kettle and cup-shaped lamps.

A peeled rush, dipped in melted fat, provided a primitive form of candle. Rushlights were rarely used in Canada, but candles were a part of Canadian life from the earliest times of European settlement. The self-supporting column containing a cotton wick was commonly made of tallow during pioneer times. Tallow was superseded by paraffin in the 1860s. Candle production has been maintained because of the visual and psychological association of warmth and romance with the flickering flame. Animal fats were readily available in most households and were used for lamp fuel and in soapmaking as well as for candles.



Fuel-burning lamps were invented around 1780 and remained in use well into the electric era. This bull's eye lamp of blue opal glass is from the Diamond Glass Co, Montréal, *c*1902 (*courtesy Royal Ontario Museum*).

Middle Period (1780-1880) The second period, beginning about 1780, was one of invention and discovery. Lamps and burners were created for new fuels, such as artificial gas, burning fluid, rosin oil and kerosene, as well as for old fuels such as WHALE oil and lard. GLASS was the most common material, although brass and other metals were popular. The Swiss scientist Aimé Argand is credited with the first significant invention of this period, the Argand lamp. His centre-draft burner, holding a tubular wick and using a glass chimney, is recognized as the beginning of modern lighting. Such chimneys, being fragile and requiring daily washing, were a staple product of the Canadian glasshouses.

Artificial gas, introduced about 1800, required special burners and, more importantly, a distribution and installation system. This innovation took many years to accomplish, and in N America artificial gas was available only in major cities and towns. In Montréal, Québec City and Toronto, distribution of artificial gas began in the late 1830s and the 1840s, primarily to supply public buildings and the homes of the affluent, as well as some street lighting (*see* COAL GASIFICATION).

During the entire second period, the shape of lamps reflected inventions tailored to the characteristics of the fuels used and to the manufacturing technology available, particularly in the glass industry, as well as to the influences of contemporary fashion. From 1830 to 1860, the most common illuminants used in N America were animal fats, burning fluid made from camphene (pine oil) and redistilled alcohol. Burning fluid (known as camphine in England), although inexpensive, was highly volatile and resulted in numerous fatal explosions.

Simple whale-oil burners usually had one or 2 vertical wick tubes extending into the fuel container (font). Burning-fluid burners, although similar, did not extend into the font and had single or multiple, divergent wick tubes, with removable wick caps used to extinguish the flame and to prevent evaporation. Whale oil was also used in more complicated lamps such as the Astral or Simumbra lamps, which had ring-shaped reservoirs that permitted unobstructed light to be cast downward. Lamps with offset fonts and separate reservoirs (the most popular being the kerosene student lamps) were used during the entire second period. Lard lamps featured various arrangements designed to force the fuel to the wick and to conduct heat from the flame to the fuel to keep it melted. In the 1850s the solar lamp, designed for lard or whale oil, was the most sophisticated lard lamp in operation and appearance.

Mechanical lamps employed a clockwork mechanism to force highly viscous fuels to the top of the lamp. These were popular in Europe where they were used with Colza (rapeseed) oil (*see* CANOLA). Another type of mechanical lamp popular during the kerosene period used a fan to maintain a continuous flow of air between the wick tube and the draft deflector of the burner. Chimneys were not required with these lamps. Wanzer mechanical lamps were made in Hamilton, Ont, for several decades beginning in the 1880s, by the Wanzer Sewing Machine Co.

In 1846 Abraham GESNER, a physician and geologist from NS, gave the first public demonstration of a revolutionary lighting fuel in Char-

lottetown, PEI. Kerosene was the name Gesner gave this product in his 1854 US PATENT. It was obtained initially from COAL and later from PETROLEUM. A similar product called Paraffine oil was patented in England in 1850 and in the US in 1852 by James Young from Scotland. These developments, as well as Samuel Kier's contemporary experiments in Pennsylvania, had little effect upon domestic lighting until the late 1850s. Kerosene provided, for the first time, an inexpensive and abundant supply of a safe fuel that could make good lighting available to the general public. It was this dream that sparked the rush to discover and market petroleum, and it was James Miller WILLIAMS of Hamilton who, in 1858, first shipped crude oil from hand-dug wells at Oil Springs, near Petrolia, Ont. American and Canadian patents for kerosene burners and lamps continued long after electric lighting was introduced. In the 1880s a mantle that dramatically increased the intensity of light and could be used with gas or kerosene burners was invented by Karl Auer von Welsbach, an Austrian chemist.

Late Period (1880 on) The Paris World Fair of 1878 had introduced the new mode of electric lighting to the world. Montréaler J.A.I. Craig, impressed by the demonstration, upon his return helped the Jesuits install the first electric light in the city (based on the arc lamp invention of Russian engineer Pavel Jablochkov) in front of the Jesuit college on Bleury St. American inventor Thomas Alva Edison produced the first successful incandescent electric light bulb in late 1879, and his activities in organizing ELECTRIC-POWER GENERATION and electric-power transmission systems ushered in the third period of lighting.

In Canada, although all cities, towns and villages are served by electric power, domestic lighting in remote areas is still provided by lamps using naphtha gas, propane or kerosene. As electric lights become available, all other illuminants will likely be discontinued. However, for those who still derive great pleasure and satisfaction from the psychological attraction, the magic of the open flame will endure.

Nondomestic Lighting Oil (vegetable or animal), gas and kerosene lamps were used extensively for street lighting in N America before electric lamps were introduced. The brilliant carbon-arc lamps invented by Sir Humphry Davy in 1808 were used primarily for large indoor areas and outdoors for streetlights, searchlights and lighthouses. Oil-fueled streetlights were used in Montréal, Québec City and Toronto until replaced by gaslights (1837-47), which were in turn replaced by electric lights.

Horse-drawn vehicles, trains, bicycles, motorcycles, cars and boats had special lighting requirements. To guide the traveller, candles, kerosene, whale oil and carbide lamps were used before battery-powered electric lights. In Ontario, Thomas Leopold WILLSON demonstrated Hamilton's first carbon-arc lamp in the 1880s. Soon after, he went to the US where he discovered a method of producing calcium carbide. This substance was used in vehicle lamps, particularly for bicycles and motorcycles, as well as in lighthouses and in miners' lamps. A controlled trickle of water, combined with the calcium chloride, produced a continuous supply of acetylene gas that was conducted to a special burner. These lamps had worldwide use but, in Canada as elsewhere, have been superseded for transportation purposes by electric lighting, powered by batteries or generators. *See* TECHNOLOGY. CATHERINE M.V. THURO

Reading: L.S. Russell, *A Heritage of Light: Lamps and Lighting in the Early Canadian Home* (1968); Catherine M.V. Thuro, *Oil Lamps: The Kerosene Era in North America* (1976) and *Oil Lamps II: Glass Kerosene Lamps* (1983).

Lightning, sudden electric discharge that occurs as a giant spark between one portion of an overhead THUNDERSTORM and another portion of the overhead CLOUD or some point on the ground below. Thunder is the noise such a discharge makes as the air is violently heated along the lightning stroke path. In the absence of clouds, the Earth has a downward-directed, fair-weather electric field, with positive electric charges carried in the air on various ions, and a neutralizing negative charge on the planet's surface. As a thunderstorm grows, or a mature storm approaches, this electric field is reversed. In general, the lower part of a cloud is negatively charged; the upper portions, positively charged. A further positive charge is induced on the Earth's surface below a thunderstorm. As the storm develops, the electric field within and below the cloud may reach several thousand volts per centimetre, at which stage an electrical breakdown occurs in the form of lightning. A lightning stroke to the ground starts out as a luminous, erratic path of ionized air that proceeds rapidly from the cloud base. As it nears the ground, it is met by an upward-moving column of electric charge originating from some high point on the ground below. On meeting, a violent surge of electric current occurs which constitutes the main stroke. Such lightning is commonly referred to as streak or forked lighting. The sequence of stages is essentially the same when the electrical breakdown occurs between upper and lower portions of the same cloud. In this case the stroke is usually so obscured that only a diffuse flash of light, commonly known as sheet lightning, is seen. The basic mechanism responsible for thunderstorm charging is the interaction of HAIL pellets and supercooled water droplets in colder regions of the growing cloud. Collision of these, followed by partial freezing of the latter, results in the ejection of small, positively charged ice splinters; a net negative charge accumulates on the growing hail pellet. Cloud updrafts then complete the process by carrying the small ice crystals towards the cloud top, leaving the negatively charged pellets at lower levels. Within a vigorous and growing thunderstorm, charge separation by these updrafts rapidly rebuilds the electric field following each lightning stroke, so that another can occur from the same cloud region a few minutes later. J. MAYBANK

Lillie, Beatrice Gladys (Lady Robert Peel), comedienne (b at Toronto 29 May 1898). Her saucy songs and unruly rope of pearls made her a beloved revue entertainer. She began in Ontario as a concert singer with her mother and sister ("The Lillie Trio") and went to England in 1914 where she was hired for a series of wartime revues. She made her New York debut in 1924, and throughout the 1930s alternately headlined at the Palace Theatre in New York and London's Palladium or Café de Paris. Following WWII, in which she tirelessly entertained the troops, her important shows were *Inside USA* (1948-50), *An Evening with Beatrice Lillie* (1952-56), *Auntie Mame* (1958) and *High Spirits* (1964), the musical version of Coward's *Blithe Spirit*. DAVID GARDNER

Lillooet, BC, Village, pop 1725 (1981c), inc 1946, is located in the southern interior of BC, 325 km NE of Vancouver. It sits at the foot of the Cascade Mtns above the W bank of the FRASER R. A larger part of the area's population is native Indian, of the Lillooet tribe of the Interior SALISH.

Miners came by the thousands from the coast to the interior in the 1850s gold rush, travelling up the Harrison, Lillooet, Anderson and Seton Lks to the present site of Lillooet. The new settlement (1858) quickly became an important town on the route to the Cariboo and Fraser R goldfields. It received its name (meaning "wild onion") in 1860. Shortly thereafter it became mile "0" on the new CARIBOO ROAD, and is said to have grown quickly to 4-5000 people. The Lillooet route was abandoned when the Cariboo later went through the Fraser Canyon, and the town declined. After the gold rush waned, the area was known for big-game hunting, and many settlers were employed as outfitters and guides. Logging and lumbering have been important; today a sawmill is the major employer. The local newspaper, the *Bridge River Lillooet News*, achieved notoriety under owner and editor Margaret (Ma) Murray, known for her colourful, commonsense editorials and commentary on public events. JOHN R STEWART

Lily, common name for members of genus *Lilium* of the lily family (Liliaceae). The family, comprising over 200 genera and perhaps 3000 species, includes PLANTS as diverse as onion, daffodil and lily of the valley. Some authors divide it into subfamilies; others confer separate family status. Family members are mainly herbaceous; rootstocks form bulbs, tubers, rhizomes, etc. Genus *Lilium* comprises about 80 species native to northern temperate regions. Canada lily (*L. canadense*) and western red or prairie lily (*L. philadelphicum*) are native to Canada. Lilies are among the most popular ORNAMENTALS, and many decorative hybrids have been produced. Since 1941, the western red lily has been the PROVINCIAL FLO-



The western red, or prairie, lily shown above (*Lilium philadelphicum*) is the floral emblem of Saskatchewan (*photo by Mary W. Ferguson*).



The madonna lily (*Lilium candidum*) was chosen Québec's floral emblem for its resemblance to the fleur-de-lis (*photo by Mary W. Ferguson*).

RAL EMBLEM of Saskatchewan. It grows in abundance in meadows and clearings; however, picking the flowers weakens the plant and causes its progressive disappearance. The tall (1.2-1.5 m) madonna lily (*L. candidum*), an introduced Asian species, has fragrant, trumpet-shaped, white flowers with yellow stamens. Although not indigenous to Québec and somewhat difficult to cultivate, it was chosen as Québec's floral emblem in 1963. It resembles the fleur-de-lis on armorial emblems and on Québec's flag; however, the fleur-de-lis is generally thought to be a stylized version of the flower found along the Lys R in France, probably *Iris pseudacorus*. Blue flag (*I. versicolor*) has been proposed as a new floral emblem for Québec. This pretty, bluish violet flower, 8 cm in diameter, is native to Canada (Manitoba to S Labrador, Newfoundland and NS) and appears in late May or early June. CÉLINE ARSENEAULT

Limestone, a SEDIMENTARY ROCK largely or wholly composed of calcium carbonate ($CaCO_3$). Carbonate rocks are important to the CONSTRUCTION INDUSTRY as building stone and aggregate, and as the primary component of portland CEMENT and lime. Limestones are also used in glass manufacture, as fillers, abrasives and soil conditioners and in the manufacture of various chemicals. Quicklime is formed by the process of calcination, in which limestones are heated to the dissociation temperature of the carbonates (402-898°C), and held there long enough to release carbon dioxide. Although the word "lime" is used generally to refer to pulverized limestone as well as forms of burned lime, more correctly it refers to quicklime and its products, slaked and hydrated limes. Slaked lime is quicklime mixed with water; hydrated lime, slaked lime dried and possibly reground. Lime is used principally in the steel, PULP AND PAPER and MINING industries, where its chemical qualities are required as a flux (promoting ease of melting), in digesting liquors and as a neutralizing agent, respectively. Water and sewage treatment and removal of sulphur dioxide from smelter-stack gases and thermal power-plant emissions will require large amounts of lime in the near future. The use of lime in construction (eg, in mortar and sand-lime bricks) has been greatly reduced in recent years.

Lime plants have been established near industrial centres in Canada where reserves of suitable limestone are available and where major consumers are situated. Ontario and Québec produce over 80% of Canada's total lime. A high-bulk, low-cost commodity, lime is rarely shipped long distances because the raw material for its manufacture is so widely available. Calcining is done in kilns of various types, including traditional vertical or rotary types, or more recently developed rotary hearth, travelling grate, fluo-solid and inclined vibratory types. The high cost of energy has required inclusion of preheating facilities in new plants, and environmental regulations have necessitated incorporation of dust-collection equipment. Canada ranks about 12th among world producers of quicklime and hydrated lime. The value of production contributes only 0.05% to the GNP.

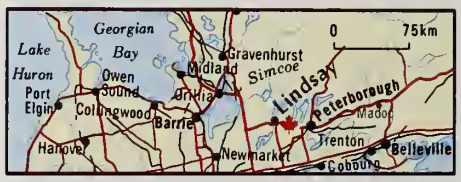
D.H. STONEHOUSE

Lincoln, Ont, Town, pop 14 196 (1981c), inc 1970, situated in the Niagara Peninsula, immediately W of St Catharines. The town was formed from the townships of Clinton and Louth (part) and town of Beamsville and comprises several distinct communities (Beamsville, Vineland, Jordan, Jordan Station and Campden) interspersed with rural areas. The area was settled in the 1780s, and the various communities grew up in response mainly to agricultural needs. Since 1900 it has been important for tender fruit and grape growing, and Jordan is the home of one of Niagara's oldest wineries. Though people of British origin predominate, Mennonite and, more recently, Dutch people are also important elements in the population. The town, named for Lincolnshire, Eng, has attracted many light industries, particularly close to the QUEEN ELIZABETH WAY, and various tourist facilities, and the federal and provincial governments have agricultural research facilities in Vineland. H.J. GAYLER

Lindbergh, Alta, UP, pop 47 (1981c), is located 200 km E of Edmonton. Formerly called Mooswa, it was renamed (1928) in honour of American aviator Charles Lindbergh, after his famous solo flight across the Atlantic. The hamlet declined when the CNR branch line (built 1928) was abandoned in 1946. In the 1940s a SALT bed 300 m thick and several kms long was discovered, and up to 350 tonnes of salt are refined and packed daily at the Canadian Salt Co plant. The salt bed contains enough salt to supply Canada's needs for 200 years. ERIC J. HOLMGREN

Lindner, Ernest, artist (b at Vienna, Austria 1 May 1897). Lindner came to Canada in 1926 and worked first as a farm labourer in Saskatchewan. By 1931 he had won local recognition as an artist and by 1933 was beginning to exhibit in eastern Canada. Lindner is best known for his works in watercolour and pencil, although he has produced linocut and wood-block prints and has studied etching and lithography. The subject that has concerned him most is the cycle of life. His preferred metaphor is the plant life of northern Saskatchewan forests. Lindner's images are often composites of human and plant forms, overlapping and blending into each other. He is regarded as a superb craftsman, and is noted for the tenacity of his ideas. He was elected a member of the Royal Canadian Academy of Arts in 1977. JUDY GOUIN

Reading: T. Heath, *Uprooted: The Life and Art of Ernest Lindner* (1983).



Lindsay, Ont, Town, pop 13 596 (1981c), inc 1857, located on the Scugog R, which connects it to Sturgeon Lk and the Trent-Severn Waterway, about 95 km NE of Toronto. Originally it was named Purdy's Mills, after William Purdy, an American settler who built gristmills and sawmills on the site in 1828. The dam Purdy built backed up the Scugog R until it formed Lk Scugog out of what had formerly been bog and swamp, but it also flooded surrounding farmland and the farmers marched to town and destroyed the dam. The name Lindsay commemorates a surveyor's assistant who died after being accidently shot on the site. In 1844 the government built a lock which opened the Scugog R to navigation. A new one constructed in 1870 is now one of 43 on the Trent-Severn system. Lindsay developed as a farming and lumbering centre. During the summer it is a jumping-off spot for vacationers visiting the central KAWARTHA LAKES. Now the seat of Victoria County, its riverfront is dominated by a stone gristmill dating from the 1860s. A campus of Sir Sandford Fleming College of Applied Arts and Technology is located here. A famous native son was Sir Sam HUGHES, newspaper publisher and controversial minister of militia 1911-16. DANIEL FRANCIS

Lindsay, Robert Blake Theodore, Ted, hockey player (b at Renfrew, Ont 29 July 1925). He joined Detroit Red Wings in 1944 and played left wing on the famous "Production Line," with Sid Abel at centre and Gordie HOWE on right wing. He won the NHL scoring title in 1949-50, but he was best known for his toughness and fearless checking. He was traded to Chicago when Detroit manager Jack Adams discovered his role in forming the NHL players' union. His 379 goals and 472 assists were records for a left winger when he retired. He returned to Detroit for an unsuccessful stint as general manager.

JAMES MARSH

Lindsley, Thayer, mining engineer, promoter (b at Yokohama, Japan 17 Aug 1882; d at New York C 29 May 1976). Born of American parents in Japan, Lindsley returned to the US at 15, graduated from Harvard in engineering and worked for the New York City subway. After serving in WWI, he worked up a mine in Oregon, selling it for $30 000 in 1923. With this stake he set up Ventures Ltd in 1928. Ventures prospected, developed and financed mines, and by the mid-1950s owned mines or shares of mines on every continent except Asia. Lindsley's best-known venture was Falconbridge Nickel Mines near Sudbury, Ont, which he and a partner, Joseph Errington, incorporated in 1928. He and his brother, Halstead, also helped establish Sherritt Gordon mines in 1927.

ROBERT BOTHWELL

Linear Mounds, a cluster of archaeological sites located mainly along the SOURIS R of southwestern Manitoba. Although scattered throughout the northeastern Plains, the linear mounds along the Souris contain the greatest concentration of long prehistoric burial mounds in Canada. These earthen mausoleums, massive undertakings with a technology of stone and bone, consisted of long straight ridges up to 230 m long and 7 m wide, with circular mounds on the ends. They appear to date to 900-1400 AD, and the grave goods, though rare, show that the local Plains Indian tribes were part of vast continental trade networks involving dentalium from the West Coast, obsidian from Yellowstone, brown chalcedony from western N Dakota, copper from Lk Superior, catlinite (red pipestone) from southern Minnesota and items of conch shell traded up the Mississippi R from the Gulf of Mexico. *See also* ARCHAEOLOGY; PREHISTORY. E. LEIGH SYMS

Linguistics, the study of LANGUAGE. Language accompanies almost all human activities, and is the medium for many of them. The subject of speculation and inquiry throughout history, in the 20th century its study has come to be called "linguistics," and this modern term characterizes a modern emphasis, with special methods and techniques.

The foundations of the modern discipline were laid at the beginning of the 20th century. Ferdinand de Saussure, a professor at U of Geneva, is credited with bringing together the results of many types of language study into a coherent discipline. Numerous scholars elaborated and refined de Saussure's framework in the next 3 decades. Among the influential early contributors were Nikolas S. Trubetzkoy and Roman Jakobson (USSR), Edward SAPIR and Leonard Bloomfield (US), J.R. Firth (Britain), Louis Hjelmslev (Denmark) and André Martinet (France). Since 1950 linguistics has become firmly established throughout the world. Much of its rapid growth is due to the stimulating and often controversial work of American linguist Noam Chomsky, beginning with his first book, *Syntactic Structures* (1957). Chomsky's ideas presented challenges not only to the tradition begun by de Saussure, but also to philosophers, mathematicians and psychologists.

Linguistics in Canada Canada is rich in languages, with dozens of native languages (*see* NATIVE PEOPLE, LANGUAGES), 2 official languages (*see* ENGLISH LANGUAGE; FRENCH LANGUAGE) and several flourishing immigrant languages, such as Italian, Ukrainian, Greek and Japanese (*see*

ETHNIC LANGUAGES). Much of Canada's political, cultural and social distinctiveness and many of its national issues are rooted in multilingualism. Language and language-related studies have inevitably played an important part in Canadian society, and the recent growth of linguistics as a systematic discipline has found fertile soil in Canada.

Linguists seek to discover the principles that underlie the human capacity for language. They begin with some fairly obvious observations: that all speakers of a language can utter and understand an unlimited number of sentences; that their capability develops rapidly when they are children, without much conscious learning or teaching; that they automatically know whether a sentence is grammatical, sensible, or ambiguous; and that they cannot discover the principles of their language abilities simply by thinking about what is going on in their minds while they are speaking.

The mental representation that allows speakers to use language is called the *grammar* (not to be confused with the rules intended to help students write better). Those simple observations about language prove that the grammar is not a simple device: it must be a finite device with an infinite output, because each human being can produce and comprehend a potentially unlimited set of utterances; it is organized on several different levels because speakers can judge sentences in several ways; it is subconscious, or tacit; and it is innate, rather than learned. The study of the grammar makes up the core area of linguistics; several subfields apply the results of grammatical study to numerous types of human interaction. The core and the subfields depend upon one another, and in practice it is not easy to separate them; all linguists work in both areas, often simultaneously.

For many years linguists worked individually in branches of the government, in museums or in ANTHROPOLOGY and language departments at universities. The first department of linguistics (still one of the largest in Canada) was formed at U de Montréal in the late 1940s, when Jean-Paul Vinay gathered together several colleagues from various departments. A decisive step in promoting the discipline occurred at U of Manitoba in 1954, when scholars from all parts of the country gathered to form the Canadian Linguistic Assn. Henry Alexander of Queen's U became the first president (1954-56) and, during the early years, other founding members succeeded him: Gaston Dulong, J.B. Rudnyckyj, E.R. Seary, Vinay, M.H. Scargill, Jean Darbelnet and Walter S. Avis. The founding members also began publishing *The Canadian Journal of Linguistics*, which, from its modest beginning in 1954, has come to provide an international forum for linguistic research.

During the 1960s many universities expanded to include departments of linguistics, beginning with Laval in Québec City (1961). Universities in English-speaking Canada caught up a few years later when Memorial, Toronto, Alberta and Simon Fraser expanded their programs into full departments. By 1975, departments had also been established at Sherbrooke, McGill, Québec à Montréal, Ottawa, Carleton, Calgary, British Columbia and Victoria. Between 1975 and 1984 no new departments were formed, but most Canadian universities offer instruction in the subject.

Lisgar, Sir John Young, Baron, politician, colonial administrator, governor general of Canada and governor of PEI 1869-72 (b at Bombay, India 31 Aug 1807; d at Bailieborough, Ire 6 Oct 1876). John Young was educated at Eton and Corpus Christi, Oxford. A Tory MP for County Cavan, he served as a lord of the Treasury 1844-46 and chief secretary for Ireland 1852-55. Young's colonial appointments before coming to Canada, the Ionian Islands and New South Wales, both ended in controversy. During his term in Canada Lisgar took an active part in diffusing Canadian-American tensions created by the RED RIVER REBELLION and the Fenian raids. A keen supporter of CONFEDERATION, he tried to mediate the conflict created over the transfer of RUPERT'S LAND and the entry of Manitoba into Confederation and encouraged BC to join. He also organized the Governor-General's Foot Guard. Although Lisgar was outspoken and independent, John A. MACDONALD considered him the ablest governor general he had known.

CARMAN MILLER

L'Islet-sur-Mer, Qué, Village, pop 1070 (1981c), on the S shore of the ST LAWRENCE R, 100 km E of Québec City, within the former seigneuries of L'Islet-St-Jean and Bonsecours (granted 1677). Before the arrival of the first resident parish priest in 1745, L'Islet was served by missionary priests. The parish of Notre-Dame-de-Bon-Secours-de-L'Islet was founded in 1721. Until the end of the 19th century, agriculture was the principal economic activity. The arrival of the railway in 1860 brought some industrial development: several brickworks exploited but soon exhausted the local clay deposits; a foundry that was in operation for several years has more recently become a trailer factory; a large cabinetmaking enterprise also established several shops in the village. These industries have had an influence on urbanization: in 1911 the village separated from the parish municipality (est 1845), and in 1950 L'Islet-Station broke away, eventually becoming a town (L'Islet). The church, built in 1768, is a designated historic building and contains several religious masterpieces. A major maritime museum opened in 1970.

ANTONIO LECHASSEUR

Lismer, Arthur, painter, educator (b at Sheffield, Eng 27 June 1885; d at Montréal 23 Mar 1969). Lismer studied at Sheffield School of Art 1899-1906 and the Académie royale des beaux-arts, Antwerp, 1906-07. He moved to Canada in 1911, seeking work as a commercial illustrator. At the Grip Engraving Co in Toronto, he met J.E.H. MACDONALD, Tom THOMSON and F.H. JOHNSTON, and, shortly thereafter, Frank CARMICHAEL. In 1912 he returned to England to marry and spoke so highly of Canada that F.H. VARLEY followed him to Toronto.

Lismer began his distinguished career as an art educator as principal of the Victoria School of Art and Design in Halifax 1916-19. A prodigious worker, he painted views of Halifax harbour and returning troopships for Canadian War Records in 1918-19. He returned to Toronto to become VP of the Ontario College of Art in 1919 and in 1920 became a founding member of the GROUP OF SEVEN.

Lismer's first Canadian paintings were heavily influenced by John Constable, but during the 1920s he developed a powerful expressionist style of his own, characterized by raw colour, heavy impasto, deliberately coarse brushwork and simplified form. But Lismer devoted most of his time to art education. From 1927 to 1938 he was the educational supervisor at the Art Gallery of Toronto (now Art Gallery of Ontario). In 1932 he undertook a nation-wide lecture tour; invitations to conferences in Europe and South Africa followed, and he returned to teach in South Africa in 1936-37. In 1938 he was visiting professor at Teachers' Coll, Columbia. He ran the Montreal Children's Art Centre, affiliated with the Montreal Museum of Fine Arts from 1941 to 1967. This activity left Lismer with little time to paint, but he produced many of his most original works after 1930, painting first in the Maritimes and Georgian Bay, and from 1951 at Long Beach, on Vancouver I, each summer. The lurid, intestinal and claustrophobic qualities of many of these paintings were not to contemporary taste, but have gained acceptance in recent years, for they seem to have developed from a form of deep, personal expressionism.

CHRISTOPHER VARLEY

Reading: John McLeish, *September Gale: A Study of Arthur Lismer of the Group of Seven* (1955).

Literacy has been defined both as the ability to read and write one's own name and as the ability to read and understand newspapers and magazines, and encyclopedia articles written at a level of sophistication often well above that of the average graduate of grade 10. Such widely varied definitions make it difficult to form a reliable estimate of the number of illiterates in a particular society. Claims by different writers,



Arthur Lismer, *A September Gale, Georgian Bay* (1921), oil on canvas. An original member of the Group of Seven, Lismer developed a powerful expressionist style of his own, characterized by raw colour and simplified form (*courtesy National Gallery of Canada*).

eg, that illiteracy in the USSR has been eradicated and that 28% of Canadians are illiterate, are incomparable.

Although no precise figures are available for Canada, in Western societies generally the incidence of complete illiteracy is relatively low. Data from a provincial assessment of reading achievement in BC suggest that no more than 2% of Canadians cannot read or write at all (in this context the fact that a number of recent or older immigrants may be relatively illiterate in English or French but literate in their mother tongue must be considered). Estimates of how many Canadians are functionally literate, ie, able to understand the limited basic written communications thought to be essential in order to function in modern society, provide a more meaningful indication of illiteracy. Tests of functional literacy often include excerpts from such documents as bus schedules, drivers' manuals, classified advertisements, cookbooks, etc. Not surprisingly, scholars studying literacy often disagree on exactly what and how much an individual must be able to read in order to "function" in Canadian society. For instance, is someone who cannot read the Revenue Canada tax forms functionally illiterate?

Organizations such as UNESCO consider that anyone in an industrialized society who has less than a grade 5 education is wholly illiterate and that those with less than grade 9 are functionally illiterate. By these standards, one in every five Canadians was functionally illiterate in 1981. Though females generally learn to read faster and score higher on reading tests while in school, the proportion of functional illiterates calculated by the grade-completed criterion is nearly identical for males (19.6%) and females (20.5%). Literacy has often been equated with occupational status. For example, it was calculated that of the population 15 years of age and over, 60% of those considered functionally illiterate were employed, while among those who did not complete grade 9, only 39% were employed.

"Grade completed" however, is a very indirect and inadequate measure of literacy. First, it is not at all clear whether even with 10 or 11 years of schooling individuals can be considered functionally literate in advanced technological societies; moreover, individuals vary greatly in achievement after a specific period of schooling — many grade 8 students perform well above the level of the average grade 10 student; conversely, many grade 10 students perform below the level of the average grade 8 student.

More importantly, such calculations fail to take into account other and possibly more important factors affecting employment and social mobility, ie, class, ethnicity and sex. In the 19th century the majority of IRISH Catholic immigrants to Canada were literate, but they occupied the lower economic and social ranks. Women and blacks, regardless of education, fared even worse.

In Canada, since the 19th century, literacy has been perceived as a personal and social "good," although the precise meaning of literacy and the understanding of what individuals are expected to achieve from their instruction in and possession of literacy is unclear. Nevertheless, many individuals exert great effort to become literate, even late in life, and societies with sharply contrasting political systems promote literacy through widespread popular education.

In Canada, literacy has been promoted primarily by school boards, libraries and, to a lesser degree, by private organizations. Public EDUCATION in Canada has fostered and encouraged literacy. Among private agencies, Frontier College, est 1898, was the first Canadian organization to receive a UNESCO medal for exemplary work in promoting literacy (1977). Canada's colleges in general are largely responsible for the provision of basic ADULT EDUCATION programs, including those specifically designed to enhance literacy.

Claims of an absolute increase in illiteracy among Canadians are generally unsubstantiated, but drops in reading performance for specific groups for specific periods of time and for specific skills are recorded occasionally. For example, authorities agree that although basic reading skills at lower grade levels have improved during the last 15 years, a loss among older pupils of higher order skills, such as inferential reading, has been documented. Nevertheless, Canadians in general are gradually becoming more literate and more educated. For example, the proportion of Canadians completing secondary school rose from 62% in 1971 to 70% by 1981; during the same period the percentage of Canadians with university degrees increased from 4.8% to 8%.

Although Canadians are now more literate in an absolute sense, it is not known if they keep pace with the demand in new literacy skills, because little work has been done in tracking the changing levels of literacy needed for full participation in society. The ability to read involves 3 major components: reasoning ability, mastery of language, and familiarity with the alphabetic code. The second component, mastery of language, is particularly important. Much of language is coded knowledge. As knowledge expands, so does the language that is needed to describe it. This in effect means that individuals can be or become relatively illiterate because they are or have become ignorant of new knowledge. In order to read anything at all with understanding, individuals must possess sufficient prior knowledge. If, therefore, knowledge expands at a rate faster than the ability to absorb it, the potential of a decline in situational or relative literacy is real.

Over the past few years the terms "visual literacy" and "computer literacy" have become popular. In both instances "literacy" refers to familiarity with and an ability to manipulate the object in question: visual symbiotic material or computers.

J.J. TUINMAN

Reading: Harvey J. Graff, *The Literacy Myth* (1979).

Literary and Historical Society of Quebec, fd 1824, is Canada's oldest HISTORICAL SOCIETY. The Earl of DALHOUSIE, governor-in-chief of Canada 1819-28, was a driving force in establishing the bilingual society, which received its royal charter in 1831. It had as its objective the preservation, care and dissemination of the colony's historical records, and was one of the first bodies to collect archival material for these purposes. It achieved considerable success and shared its findings through an active publications program. By 1924 the Literary and Historical Society of Quebec had published its *Transactions* series for all but its first 5 years, along with numerous monographs. It remains an active organization today.

CARMAN V. CARROLL

Literary Bibliography in English The essential foundations of literary scholarship are adequate research tools and definitive texts of the literature itself: both are the products of literary bibliography — the former of enumerative, the latter of textual and analytical, bibliography. Enumerative bibliography aims at recording the literary achievement — past and present, primary and secondary — of a nation. At its best it enables scholars to determine the structure and perceive the historical shape of their discipline; and on a more practical level it helps them to be selective in their research and to establish, without time-consuming work, the publishing history and transmission of primary texts. The bibliographies themselves may range from mere chronological listings of short titles to elaborate catalogues of quasi-facsimile title pages, and may include any combination of primary, secondary, retrospective and current material. The chief criteria of usefulness are comprehensiveness, accessibility and currency.

The literary scholar's first concern is to know the primary texts. The standard retrospective bibliography in this area of Canadian LITERATURE IN ENGLISH is R.E. Watters's *Checklist of Canadian Literature and Background Materials 1628-1960* (2nd ed 1972) which, though inconveniently organized and now outdated, has contributed greatly to an awareness of the scope of Canadian writing. This work, augmented by such references as Marie Tremaine's *Bibliography of Canadian Imprints, 1751-1800* (1952), library catalogues and current listings in the National Library's *Canadiana* (monthly and annually), goes far towards giving a complete view of Canada's primary texts, but falls far short of the ideal of enabling scholars to ascertain any author's literary *corpus*.

More helpful in doing so are a number of retrospective primary and secondary bibliographies which attempt to define each author's *corpus* and also offer complete listings of critical and historical commentary. R.G. Moyles's *English-Canadian Literature to 1900* (1976), Peter Stevens's *Modern English-Canadian Poetry* (1978) and Helen Hoy's *Modern English-Canadian Prose* (1983) together provide a focused view of Canadian literature up to the 1970s. Intended for students and beginning researchers, these offer primary and secondary bibliographies for over 150 authors, and also introduce the user to other reference guides, major anthologies, literary histories and general criticism, and important literary periodicals.

More intensive and detailed is *The Annotated Bibliography of Canada's Major Authors* (1979-) edited by Jack David and Robert Lecker — each volume containing 5 major writers. When completed the series will have covered 50 authors, detailing not merely the usual primary/secondary work, but such important items as manuscripts, works published in periodicals (very important for poets) and reviews.

The scholar's research will, of course, often lead far beyond creative writing, and into many ancillary disciplines such as history or native studies. Bibliographies in these areas can easily be found through Douglas Lochhead's *Bibliography of Canadian Bibliographies* (1972) and a number of specialized regional guides. Also indispensable are such reference tools as *The Canadian Periodical Index* (annual), *The Canadian Book Review Annual, Canadiana* and the *MLA International Bibliography* (annual); this last, though American, contains a great deal of current Canadian criticism.

Enumerative bibliography in Canada is nevertheless both disparate and idiosyncratic. There is still too little attention paid to textual transmission, variant editions and minor authors. Bibliographical investigation is still too dependent on individual initiative and preference, and a greater effort must be made to produce, by scholarly consensus, a single complete and comprehensive primary/secondary bibliography of Canada's creative literature. But enumerative bibliography has at least made a strong beginning; textual bibliography has not.

It used to be felt that analytical and textual bibliography were necessary only in defining the provenance of very old texts, eg, those of Shakespeare or Milton, where many authoritative variant versions existed. Analytical bibliography examined the text's printing history and textual bibliography applied those findings to the production of a definitive edition. It is now accepted, however, that following the textual path is necessary in producing a critical edition in the following steps: 1) establishing and collecting the authoritative texts; 2) choosing a base text for comparison; 3) thoroughly collating all texts or versions; 4) determining a

copy text; 5) preparing a critical apparatus; 6) determining through these steps the extent of emendation and correction needed. In the past this was not done: new editions of Canadian classics were, if not truncated or bastardized, merely reprints of any preceding edition.

But now several textual studies of such authors as John RICHARDSON (by William Morley) have made editors aware of the value of scientific textual investigation. New critical editions are being prepared. Most notable are those being produced by the Centre for Editing Early Canadian Texts at Carleton University: Frances BROOKE's *The History of Emily Montague* (1769), James DE MILLE's *A Strange Manuscript Found in a Copper Cylinder* (1888), Thomas MCCULLOCH's "Letters of Mephibosheth Stepsure" (1821-23), Susanna MOODIE's *Roughing It in the Bush* (1852), Richardson's *Wacousta* (1832) and Catharine Parr TRAILL's *Canadian Crusoes* (1852). It is a painstaking task, necessitating considerable cost and computer assistance, but the result is gratifying: the text as the author would have wished it printed. R.G. MOYLES

Literary Bibliography in French Bibliographies of Canadian LITERATURE IN FRENCH can be roughly divided into 2 groups: retrospective, which list printed items of an earlier period, and current, which record the publication of books and articles as they appear. Québec books printed after the introduction of printing to central Canada (1764) and before 1820 are called *incunabula* (early printed works) and, because of their rarity, are usually described in detail by bibliographers. Québec incunabula are listed in 3 compilations: Marie Tremaine, *Bibliography of Canadian Imprints, 1751-1800* (1952), John Hare and Jean-Pierre Wallot, *Les Imprimés dans le Bas-Canada, 1801-1840* (only vol 1, 1801-1810, has been published, 1967), and *Laurentiana parus avant 1821* (1976). Books of the later 19th and early 20th centuries are listed in the multivolume *Bibliographie du Québec, 1821-1967* (1980-) and in *Canadiana, 1867-1900* (on microfiche; 1981-), both to appear over several years.

Among retrospective bibliographies limited to literary works, the most complete are those contained in the *Dictionnaire des oeuvres littéraires du Québec* (1978-); 4 vols to 1984). Separate listings by John Hare for the novel, poetry, drama and essays are included in volumes 3-6 of *Archives des lettres canadiennes* (1961-). Specialized bibliographies exist for 19th-century short stories (Aurélien Boivin, *Le Conte littéraire québécois au XIX^e^ . . .*, 1975), novels (David M. Hayne and Marcel Tirol, *Bibliographie critique du roman canadien-français, 1837-1900*, 1968), travel narratives (John Hare, *Les Canadiens français aux quatre coins du monde*, 1964) and journalism (André Beaulieu and Jean Hamelin, *La Presse québécoise des origines à nos jours* (1973-); 6 vols to 1984). Plays of both the 19th and 20th centuries are listed in Edouard-Gabriel Rinfret, *Le Théâtre canadien d'expression française* . . . (4 vols, 1975-78).

Short bibliographies for most Québec writers are provided in Réginald Hamel, John Hare and Paul Wyczynski, *Dictionnaire pratique des auteurs québécois* (1976). More detailed references for authors are found in university theses devoted to them or in library science theses submitted to Québec universities. The former are indexed in Antoine Naaman, *Répertoire de thèses littéraires canadiennes de 1921 à 1976* (1978) and in *Canadian Theses / Thèses canadiennes* (1952-). The latter are listed in Jeanne Proulx, *Bio-bibliographies canadiennes-françaises* (1970) and in *Bibliographie de bibliographies québécoises* (1978; supplement 1980). A few authors have been the subject of book-length bibliographies, eg, Paul Wyczynski's *Bibliographie descriptive et critique d'Emile Nelligan* (1973).

For the current bibliography of Québec's greatly increased literary production since 1960, the basic reference is the official monthly *Bibliographie du Québec* (1968-), which lists all material published in, or about, Québec. An excellent annual review appears under the title *Livres et auteurs québécois* (1969- ; formerly *Livres et auteurs canadiens*, 1961-1968). A comprehensive listing of magazine articles on Québec literature is found in Pierre Cantin, Normand Harrington and Jean-Paul Hudon, *Bibliographie de la critique de la littérature québécoise dans les revues de XIX^e^ et XX^e^ siècles* (5 vols, 1979), with supplements in each issue of the *Revue d'histoire littéraire du Québec et du Canada français* (1979-). DAVID M. HAYNE

Literary Magazines in English After a tentative beginning with the publication of the *Nova Scotia Magazine* (1789-92) in Halifax and the *Quebec Magazine / Le magasin de Québec* (1792-94) in Québec City, brief experiments in literary journalism in the British North American colonies appeared more frequently in the 1820s and 1830s with the increase in an educated middle-class population. The earliest magazines largely contained material reprinted from books, newspapers and British and American magazines. The response of contributors grew, however, and patriotic editors encouraged an indigenous literature, so that increasing amounts of original material were introduced. Contributions were generally unsigned or acknowledged by initials or pseudonyms, such as "Canadensis"; the traditional anonymity of contributors was not abandoned until the latter part of the century. Some early titles — the *Christian Recorder* (Kingston and York, 1819-20, the first in Upper Canada), the *Literary Miscellany* (Montréal, 1822-23), the *Canadian Magazine & Literary Repository* (Montréal, 1823-25), the *Acadian Recorder, or Literary Mirror* (Halifax, 1823-25) — indicate the journals' eclectic nature: in them appeared history, current events, travel description, tales and verse. The term "magazine" was used in its most basic sense, meaning "storehouse." Other titles, such as the *Canadian Garland* (Hamilton, 1832-33), the *Colonial Pearl* (Halifax, 1837-40), the *Amaranth* (Saint John, 1841-43) and the *Mayflower* (Halifax, 1851-52) evoke the flowery gentility of their literature. Most successful was the *Literary Garland* published in Montréal by John Lovell and edited by John Gibson, 1838-51. Its most frequent contributor was Susanna MOODIE; others included John RICHARDSON, Charles SANGSTER, Catharine Parr TRAILL and Anna JAMESON. Mr and Mrs Moodie's venture in Belleville, the *Victoria Magazine* (1847-48), followed the more usual pattern of a short life, expiring within a year.

At mid-century, improvements in printing presses and an increase in literacy opened new markets for special interest publications, most notably those devoted to religion. In 1852 the Royal Canadian Institute founded the *Canadian Journal: A Repertory of Industry, Science and Art*. Edited initially by geologist and explorer Henry Y. HIND, it became an important medium for the academics of the newly formed universities of Canada East and West. It was superseded by the *Proceedings* of the institute in 1878. Vying with the popularity of weekly newspapers, easy access to American and British magazines, and struggling to overcome problems of distribution to a scattered population, publishers attempted to reach a national audience with the *Anglo-American Magazine* (Toronto, 1852-55), edited by R.J. McGeorge; the *British American Magazine* (Toronto, 1863-64), published by G. Mercer Adam and edited by Hind; John Dougall's *New Dominion Monthly* (Montréal, 1867-69); and *Stewart's Literary Quarterly* (Saint John, 1868-72), edited by George Stewart, Jr.

The *Canadian Monthly and National Review* was launched in 1872, abetted by the new nationalistic fervour abroad after Confederation. Published by Adam and with the early support, both financial and editorial, of Goldwin SMITH, it amalgamated in 1878 with *Belford's Monthly* (1876-78) to become *Rose-Belford's Canadian Monthly and National Review*. During its 10 years of publication most of the leading figures of the day contributed articles, essays, fiction and verse. Intellectual in tone, highly moral in purpose, it became a nonpartisan forum for Canadian writers on controversial issues and lent impetus to the development of a Canadian literature. Smith continued some of its tradition in his review of current events in *The Bystander* (1880-83, 1889-90), and *The Week* (1883-96), whose first editor was the young Charles G.D. ROBERTS. By the century's end, mass circulation weeklies and magazines, such as *Saturday Night* (1887-), *Dominion Illustrated* (1888-95), *Canadian Magazine* (1893-1939) and MACLEAN'S (1896-), began to thrive as advertisers' interest in their potential increased. Several university quarterlies were established (*see* LITERARY PERIODICALS). *The* UNIVERSITY MAGAZINE (1907-20) succeeded *McGill University Magazine* (1901-06). Another group of regional magazines appeared at this time: *New Brunswick Magazine* (Saint John, 1898-1905), *Great West Magazine* (Winnipeg, 1891-1908), *Prince Edward Island Magazine* (Charlottetown, 1899-1905), *Acadiensis* (Saint John, 1901-08) and *Westminster Hall* (Vancouver, 1911-27). These magazines are invaluable in providing a picture of the social and political life of the times and a reflection of the current ideas of writing and literary taste. MARILYN G. FLITTON

Modern and Contemporary Periods

Until WWI, writers looked to Britain and the US for their literary models, but after 1918 magazines in Canada began to define Canadian literary activity. *Saturday Night* had always noted literary development in Canada and now *Canadian Forum* (1920-) could point with pride to the achievements of Canadian THEATRE and the GROUP OF SEVEN. The Canadian Authors' Association (fd 1921) began with its official organ, *Canadian Bookman;* this was succeeded by the *Authors' Bulletin* (1923-33) and *Canadian Author;* in 1940 this became incorporated into *Canadian Author & Bookman. Canadian Poetry Magazine* (1936-), also under the aegis of the CAA, was incorporated into *CAB* in 1968. The major forerunner to the exciting literary magazines of later years was the supplement to the *McGill Daily*, founded by Frank SCOTT and A.J.M. SMITH. It evolved into the *McGill Fortnightly Review* (1925-27), from which Scott moved to the *Canadian Mercury* (1928-29). Modelled on British examples, the Montréal-based magazine launched a revolution in Canadian poetry inspired by T.S. Eliot and Ezra Pound. Apart from the UNIVERSITY OF TORONTO QUARTERLY (1931-) which brought mature critical standards to Canadian criticism, the Depression years were a barren decade for creative publishing. But during WWII new ground was prepared for serious creative development. It started in Montréal with Patrick Anderson's left-wing *Preview* (1942-45), which published the writing of P.K. PAGE, Scott and A.M. KLEIN. Despite differences in outlook between this magazine and John SUTHERLAND's *First Statement* (1942-45), the 2 merged as NORTHERN REVIEW (1945-56). The magazine was criticized for its right-wing, traditional and formal poetry, but it published early work by Irving LAYTON, Miriam WADDINGTON, Louis DUDEK and Raymond SOUSTER. From N Vancouver and later Victoria, Alan Crawley published CONTEMPORARY VERSE (1941-52), which later inspired the Winnipeg-based *CV II* (1975-). *Imago* (1944-73) was devoted to the long poem. An expensive but short-lived Toronto publication was *Here and Now* (1947-49).

The 1950s was a decade of literary growth, partly because of the ease of reproduction by mimeograph. *Quarry* (fd 1952 at Queen's U), *CIV / n* (1954-56) and TAMARACK REVIEW (1956-82)

under Robert Weaver published sophisticated writing. In Montréal Louis Dudek began *Delta* (1957-66), which was taken over by *Yes* (1956-70) in 1966. Souster began CONTACT (1952-54) and *Combustion* (1957-60). In 1945 A.G. BAILEY had founded *The* FIDDLEHEAD as a poetry magazine at University of New Brunswick; under Fred COGSWELL's editorship (1952-66) it broadened to include prose and scholarship, and became a magazine of national significance. In Vancouver, George WOODCOCK began CANADIAN LITERATURE (1953-), which often publishes poetry alongside literary criticism.

The 1960s saw the beginnings of literary magazines in every area of the country. Photo-offset reproduction methods improved production quality at reasonable cost, and literary manifestations of a surging nationalism were encouraged by the CANADA COUNCIL, by provincial arts funding and municipal grants. James REANEY's *Alphabet* (1960-71) was inspired by the mythopoeic theories of Northrop FRYE. Frank DAVEY founded *Tish* (1961-65) at University of British Columbia, stressing the poem as a developing experience, rather than as a finished product. This magazine, which frequently published George BOWERING, Fred Wah, Daphne Marlatt and David McFadden, continues as *Open Letter* (1965-), publishing critical commentary on experimental work. The variety of the 1960s is indicated by such titles as bill BISSETT's *Up the Tube With One I Open* (1961-63), which became the radical *blewointment* (1963-72); *Edge* (1963-69); *Evidence* (1960-67); and *Parallel* (1966-67). *Culture* (1931-71), one of the few bilingual scholarly magazines, began regular publication in 1965. Another bicultural magazine was *Le Chien d'or / The Golden Dog* (1971-75). *Ellipse* (1971-) began publishing translations of French and English poets. Magazines such as *Northern Journey*, Sheila WATSON's *White Pelican* and Dave GODFREY's *Porcépic* all contributed to the nation's awareness of its literary artists. In Québec, a number of important LITERARY PERIODICALS IN FRENCH performed a similar service for francophone writers and readers.

One significant development in the 1960s was the university-based quarterly; creative writing courses were established, and by mid-decade many universities had literary magazines, including *University of Windsor Review* (fd 1965), *West Coast Review* (Simon Fraser, 1966), *Wascana Review* (U of Saskatchewan, 1966), *Malahat Review* (U of Victoria, 1967), MOSAIC (U of Manitoba, 1967), *Antigonish Review* (St Francis Xavier U, 1970), CAPILANO REVIEW (North Vancouver, 1970) and *Exile* (York U, 1972). These in turn have generated short-lived student- and professor-edited publications on campuses across Canada. Another important feature of the 1960s was the alternative newspaper, such as Vancouver's *Georgia Straight* (which evolved into New Star Books), or Guelph's Marxist *Alive*, which likewise grew into a small press. Many magazines of the 1960s evolved into the SMALL PRESS publishers of the 1970s, including *Talon, blewointment, 3¢ Pulp, Alive, Porcépic, Fiddlehead, Square Deal, Blackfish, Quarry, NeWest Review* and *Delta*.

Running against the impulse of nationalism were the internationalist magazines such as *Prism International* (1956-), *Contemporary Literature in Translation* (1967-78), *Malahat Review* and *Exile. Descant* (1970-), *Waves* (1972-) and *Jewish Dialog* (1970-) reflected a cosmopolitan awareness. By the 1970s, literary magazines numbered in the dozens. CANADIAN FICTION MAGAZINE (1971-), edited by Geoffrey Hancock, published innovative short fiction, especially magic realism, surrealism and fiction of the marvellous. The *Journal of Canadian Fiction* (1972-) published stories, bibliographies and critical commentary. *Essays on Canadian Writing* (1974-), BOOKS IN CANADA (1972-), *Canadian Poetry* (1977-) and *Brick* (1977-) took part in the continuing critical examination of Canadian letters. *Poetry Canada Review* (1978-) was the country's first poetry tabloid. Women's magazines reflected the many concerns arising from the women's movement at the populist and academic levels with *Fireweed* (1977-), *Branching Out* (1971-81), *Room of One's Own* (1975-), *Canadian Woman Studies* (1978-), *Atlantis* (1975-), and others such as *Makara, The Other Woman, Kinesis* and *Broadside* that answered particular needs.

In the 1980s some ambitious new magazines, like *Ethos* (1983), strove for international circulation. Others, like *Canadian Literary Review* (1982), found a balance between older traditions and the newer international writers. Committed to new writing, literary magazines continue to keep the literature vital. GEOFFREY HANCOCK

Literary Periodicals in English In the 19th century, Canada relied mainly on foreign imports for its literary scholarship, and early attempts to provide native periodicals aiming at more than a merely popular standard were generally short-lived. The most successful and long-lasting journals of this kind were the *Canadian Journal* (1852-78), the *Canadian Monthly and National Review* (1872-78, later amalgamated into *Rose-Belford's Canadian Monthly and National Review*, 1878-82) and *The Week* (1883-96). The last 2 were fostered by Goldwin SMITH, and Charles G.D. ROBERTS was the first editor of *The Week*. The 20th century has seen a fragmentation of the audiences, with university-based journals providing academic, learned articles and glossier magazines catering — often superficially — to a more popular audience. In the middle stands the CANADIAN FORUM, which has appeared regularly since 1920. Describing itself as "an independent journal of opinion and the arts," it is not officially connected with any university but draws upon the academic community, mainly in Toronto, for many of its contributors. Although its origins were primarily political, reflecting (in the words of its opening editorial) "a desire to secure a freer and more informed discussion of public questions" and generally presenting a radical or left-wing viewpoint, it has consistently endeavoured to "trace and value those developments of art and letters which are characteristically Canadian."



The *Tamarack Review*, which covered all literary genres, set a high standard for later Canadian literary magazines (*cover design by Fred Huffman / used with permission*).

The first of Canada's 3 main university journals founded to further humanistic scholarship was QUEEN'S QUARTERLY, which first appeared in 1893. It began with the twofold aim of serving the intellectual needs of Queen's University graduates and "promoting the interests of culture in Canada." Its early emphasis was on religious matters, but it soon became a wide-ranging, respected academic publication. It was joined in 1921 by the DALHOUSIE REVIEW, which claimed in its first issue to be a project "of university extension" discussing "problems of general import" in "a style that can be generally understood." Ten years later, the UNIVERSITY OF TORONTO QUARTERLY began with similar goals. Offering itself as "a Canadian Journal of the Humanities," it has generally succeeded in providing a forum for academic discourse where Canadian and internationally recognized scholars can appear side by side. All 3 journals have continued to publish and maintain a high standard.

The most remarkable feature of Canadian periodical publishing in recent years has been the rich crop of scholarly journals devoted to discussion of the nation's own literature. The earliest, and still best known, is CANADIAN LITERATURE, a quarterly founded in 1959 at University of British Columbia with George WOODCOCK as its first editor. Since then it has published scholarly articles and reviews on works of Canadian origin, often devoting individual issues to topics of special interest and concern. Initially considered by some to be a premature venture, it not only succeeded in creating its own readership, but has, by its very existence as an outlet for Canadian literary studies, helped to nurture the subject to which it is devoted. Without rivals for many years, it was later joined by several journals with similar aims, notably *Essays on Canadian Writing* (fd 1974, York University) and *Studies in Canadian Literature* (fd 1976, University of New Brunswick).

The interdisciplinary *Journal of Canadian Studies*, a wider-ranging quarterly embracing history and social studies as well as literature, was founded at Trent University in 1966. The flowering of Canadian fiction and poetry in recent years is reflected in the appearance of 2 journals specifically devoted to each genre: CANADIAN FICTION MAGAZINE (1971-), the *Journal of Canadian Fiction* (1972-), *Canadian Poetry* (1977-) and the *Journal of Canadian Poetry* (1978-). In addition, *Canadian Drama* has been published at University of Waterloo since 1975 and *Theatre History in Canada* appeared in 1980.

A number of Canadian LEARNED SOCIETIES publish their own specialized periodicals, eg, the Association of Canadian University Teachers of English, whose *English Studies in Canada* first appeared in 1975. Of more general interest is the Humanities Association of Canada's *Bulletin* (1951-73), which was replaced with the more ambitious *Humanities Association Review*. Not considered here are the numerous journals from *The* FIDDLEHEAD (1945-) in the Maritimes to the *Malahat Review* (1967-) in BC that concentrate on the publication of creative writing. It will be noticed that the majority of literary periodicals in English that are of scholarly importance were established quite recently, reflecting the expansion of Canadian universities since the late 1950s and the concurrent growth of Canadian LITERATURE IN ENGLISH. *See* LITERARY MAGAZINES.

W.J. KEITH

Literary Periodicals in French Periodicals have always played a leading role in the dissemination and development of Québec literature. In the 19th century, when books were rare, the contributors to periodicals affirmed the need to lay the foundations of a literary identity. Originally patriotic in outlook, the periodicals that coincided with the "Literary Movement of

1860" (SOIRÉES CANADIENNES, 1861-65, *Le Foyer canadien*, 1862-66 and *Les Nouvelles Soirées canadiennes*, 1882-88) encouraged the publication of legends and short stories drawn from popular culture, as well as historical facts that had to be rescued from oblivion. *L'Opinion publique* (1870-83), *L'Album universel* (1884-1902) and *La Revue canadienne* (1864-1922), despite their more diversified content, expanded this concept of an essentially traditionalist and folkloric literature.

Early 20th-century writers preferred to approach the problem of national literature as a choice between regionalism and universalism. Despite their brief existence, *Le Terroir* (fd 1909), whose contributors were members of the École littéraire de Montréal, and *Le* NIGOG (fd 1918) were the 2 poles of a debate waged later by essayists and pamphleteers on the theme of the language of writing. Periodicals such as *Idées* (1935-39), *La* RELÈVE (1934-41) and its successor, *La Nouvelle Relève* (1941-48), and *Gants du ciel* (1943-46) sought to stimulate the mind and arouse a spiritual and humanistic renewal. Far from being folkloric, the literary works of *La Relève's* contributors focused on an expression of the self, the psyche and the spiritual problems that affect modern life. AMÉRIQUE FRANÇAISE (1941-63) extended these reflections by posing the problem facing those who have both French and American backgrounds.

More political than literary, CITÉ LIBRE (1950-66) also had an effect on the ideological climate in which the literature of the 1950s evolved. Opposed to the pervasive conservative trend, contributors encouraged internationalism. This group soon became a target of those writing for PARTI PRIS (1963-68), a political and cultural periodical with 3 objectives: independence, socialism and secularism for Québec. *Parti pris* gave nationalism a leftist stance and articulated the relationship between the literary and the political. LIBERTÉ (fd 1959) debates current issues ranging from cultural fatigue to the language battle, from cultural policies to literary institutions. Although it has published articles by foreign authors, *Liberté* gives prominence to young Québec writers, who have often had their first works published there. After a few years, *Liberté* changed its editorial board and found a new dynamic spirit fueled by concern, humour and vigilant criticism.

While *Parti pris* countered *Cité libre* and supported the leftist *Liberté*, LA BARRE DU JOUR (1965-76) and *La Nouvelle Barre du jour* (fd 1977) broke with the strictly social concept of literature: the writer is no longer the measure of society's pain. In tune with his own instincts, he translates a writing in gestation in which one sees the encoded writing of modern times — halfway between literary theory and fiction, where even theory becomes fiction and is considered fictitious. Hence an inevitable formalism. *Herbes rouges* (fd 1968) chose to publish only one author in each issue. Here, too, there was talk of the materiality of the text as the setting for questioning and strategy. The texts of *Herbes rouges* are generally more provocative than those of *La Barre du jour*. Everything is material for prose and poetry, from publicity to comics, from social discourse to political conscience. In another vein, *Estuaire* (fd 1976) publishes young writers' poetry. The journal at first highlighted the poetry of oral expression, of proclamation, of sharing. This initial orientation was gradually replaced by more diversified poetry which still sought a level of readability. Between 1960 and 1980 other periodicals had a fairly ephemeral existence. They included *Maintenant* (1962-75), which published a number of manifestos on Québec language and condition, *Mainmise* (1970-78), a voice of the counterculture originating in the US, *Presqu'Amérique* (1970-73), torn between different intellectual attachments, and the Marxist *Chroniques* and *Stratégie* (1972-77). *Les Têtes de pioche* (1976-79) was in the vanguard of radical feminism in Québec.

There are a number of useful surveys of current Québec literary journalism: *Livres et auteurs québécois* (fd 1961), an annual collection of reviews of Québec's literary production; *Lettres québécoises* (fd 1976), a systematic review of current publications; and *Spirale* (fd 1979), a periodical of literary criticism that tries to fight clichés and received ideas. In theatre, the excellent *Jeu* (fd 1976) links theory and practice, carefully examines productions, interviews troupes and reports on theatrical activity in Québec.

The many university reviews generally devote each issue to the study of a theme or a writer. This is true of *Études littéraires* at Laval and *Études françaises* at the Université de Montréal. *Voix et images du pays*, published by the Presses de l'université du Québec, is the only journal devoted solely to Québec. In Sherbrooke, *Ellipse* publishes works in translation, while *Présence francophone* reports on activities in various French-speaking countries. In Ottawa, *Incidences* and *University of Ottawa Quarterly* discuss literary issues.

The most recent journals include *Dérives* (fd 1975), *Possibles* (fd 1976), *Intervention* (fd 1978), *Le Temps fou* (1978-83) and *La vie en rose* (fd 1980). All favour opening up every field of cultural activity and anti-dogmatism. These periodicals integrate creation within a global view of society and question new cultural practices that are based on co-operative, self-managed and feminist movements. Two journals are devoted to science fiction: *Solaris* (fd 1974 as *Requiem*) and *Imagine* (fd 1979).

Analysis of cultural periodicals thus reveals a number of coexisting currents struggling for symbolic recognition, whereas Québec's literary history has accustomed us to seeing only one group dominate in any single period. Breaks with established trends are less violent than in the days of the REFUS GLOBAL and *Parti pris*. Writers no longer oppose, simply transpose and transgress.

LISE GAUVIN

Literary Prizes in English Until the 1920s there were no annual literary awards in Canada for writers in English. Ironically, the first such prize was the Québec Literary Competition prize, awarded 1923-70 by the Province of Québec. The oldest literary prize still being awarded is the Lorne Pierce Medal, sponsored by the ROYAL SOCIETY OF CANADA and first awarded in 1926. In 1928 the Royal Society began offering the Tyrell Medal for contributions to Canadian history. These two medals were presented annually until 1966, when a $1000 prize was added to each award and they became biennial.

No other literary awards established in the 1920s are still being offered. The Imperial Order of the Daughters of the Empire National Short Story Competition lasted 1923-33, and the IODE National One-Act Play Competition lasted 1923 to 1936. The Montreal Poetry Contest sponsored by the Montréal branch of the Canadian Authors Association (CAA) was offered 1925-46, and the Maclean's Magazine Short Story Awards were presented 7 times between 1927 and 1955.

Of the awards established in the 1930s, the GOVERNOR GENERAL'S LITERARY AWARDS have become pre-eminent in Canada. Begun in 1936 by the CAA, they were originally made in 3 categories: fiction, nonfiction and poetry or drama. In 1959 the CANADA COUNCIL took over partial responsibility for the awards, created matching categories for works in French, and added a $1000 prize to each award. Finally, in 1971 the Canada Council took over full responsibility for the awards, the value of which increased to $2500 in 1966 and $5000 in 1975. In 1981 a separate category for drama was created.

Two other awards from the 1930s have survived: the Alberta Poetry Contest, established in 1930 by the Edmonton branch of the CAA, and the Canadian One-Act Playwriting Contest, established in 1937 by the Ottawa Little Theatre. The various awards offered 1934-69 by the Dominion Drama Festival were once prominent, but the festival (now Theatre Canada) became noncompetitive in 1970.

The most familiar award created in the 1940s is perhaps the Stephen Leacock Memorial Medal (est 1947), awarded for humour. In 1973 the Manufacturer's Life Insurance Co added a cash prize, for which the Hudson's Bay Co assumed responsibility in 1981. Other prizes established in the 1940s include the Book of the Year Medal for children's books, begun in 1947 by the Canadian Association of Children's Librarians; the IODE Provincial Chapter of Ontario Short Story Competition, established in 1948; the Eaton Short Story Competition, set up in 1948 by the Winnipeg Women's Canadian Club and the Winnipeg branch of the CAA (the present name was adopted in 1960 when the T. Eaton Co began contributing a cash prize); and the Nova Scotia Poetry Contest, created in 1949 by the Nova Scotia Centre of the Poetry Society of England. Also established in the 1940s were the Ryerson Fiction Award, presented by Ryerson Press 14 times between 1942 and 1960; the O'Leary Newfoundland Poetry Awards (1944-55); and the IODE Annual Book Contest (1946-57), sponsored by the Alberta branch.

The 1950s saw the establishment of the University of Alberta National Awards in Letters, Music, and Painting and the Related Arts (1951-); the University of British Columbia Medal for Popular Biography (1952-); the University of Western Ontario President's Medals (1952-), which are awarded in recognition of periodical publications and are meant to complement the Governor General's Literary Awards; the Chauveau Medal (1952-) of the Royal Society (annual until 1966, when a $1000 prize was added and it became biennial); the Government of Newfoundland and Labrador Arts and Letters Competition (1952-); and the Little-Brown Canadian Children's Book Award (1957-). Several others, such as the Maclean's Magazine Novel Award (1953-57), and the Beta Sigma Phi Award (1956-67), awarded for a first novel, lasted only a few years.

The most prestigious awards to come out of the 1960s were the MOLSON PRIZES, made possible by a grant from the Molson Foundation to the Canada Council. Three prizes of $15 000 each are awarded annually for distinguished achievement in any area of culture. Among other prizes established in the 1960s and still being awarded are the Vicky Metcalf Award (1963-) for children's literature; the Beaver Trophy (1965-) awarded by the HBC in Edmonton; the CAA, Vancouver Branch, Award (1966-); the Alberta Playwriting Competition (1967-); and the Dr William Henry Drummond National Poetry Contest (1969-). The Doubleday Canadian Prize Novel Award (1961-67), worth $10 000, was another first-novel award that did not survive.

More than 50 new prizes have been established since 1970. The growth in the number, value and prestige of literary awards is undoubtedly a correlative of both our increasing awareness of our national literature in English and of the increasing quality and quantity of that literature. Although most of these new awards are single, several associations have established series of awards that are intended to compete with the Governor General's Literary Awards. In 1973 the CAA began to award a series of medals to replace the Governor General's Awards which they had administered before 1971. In 1975 Harlequin Books added a $1000 prize to the medals, and the prize money now stands at $5000. In 1975 the Canada Council established the Children's Literature Prizes ($5000 annually) for 2 writers in English and in

French; in 1980 the award was extended to include illustrators of children's literature. The Canada Council also awards prizes for TRANSLATIONS. In 1980 CBC Radio made its first series of annual CBC Radio Literary Awards. In 1982 the Writers Development Trust and the National Book Festival sponsored the first Writers' Awards, an annual series which includes the Gerald Lampert Memorial Award, the Pat Lowther Memorial Award and the John Glassco Translation Prize. In Alberta in the late 1970s the Edmonton *Journal* set up the Edmonton Journal Awards, and in the early 1980s the Writers Guild of Alberta Awards were established.

Several other single, general awards came into being after 1970: the City of Toronto Book Award (1973-); the Rothmans Merit Award for Literature (1974-); the IODE Book Award (1974-); the Canada-Australia Literary Prize (1976-), given to a Canadian every second year; the Gibson Merit Award for Literature (1977-); the Evelyn Richardson Memorial Award (1978-) for residents of Nova Scotia; the Periodical Distributors of Canada Book of the Year (1977-) and Author of the Year (1981-); and in 1984 the Philips Prize, $5000 plus a new word processor, was awarded for the first time.

First-novel prizes continue to be popular, and several new ones have been set up: the Search for a New Alberta Novelist Competition (1972-); the Books in Canada First Novel Award (1977-); the Gibson First Novel Award (1977-); and the much publicized $50 000 Seal Books First Novel Award (1978-). There are several other new awards for fiction, including the Canadian Booksellers' Association Literary Award (1972-); the Chatelaine Magazine Annual Fiction Competition (1979-); and the Young Canadian Writers Award (1982-). Perhaps the most interesting new fiction award is the Pulp Press International 3-Day Novel Writing Contest (1978-), which has grown quickly and has gained considerable interest in the US.

Most new awards for poetry have been incorporated into the general awards series, with the exception of the Poetry Award of the Federation of Women Teachers Associations of Ontario and the Canadian Author & Bookman Poetry Award. On the other hand, several distinct awards have been established for drama, juvenile literature and nonfiction writing. Among the drama awards are the Alberta Televison Playwriting Competition (1970-); the University of Saskatchewan Playwriting Competition (1971-); the Chalmers Award (1972-); and the Clifford E. Lee Award (1973-). The juvenile literature awards include the Amelia Frances Howard-Gibbon Medal (1971-); the Collier-MacMillan Award (1974-); the Ruth Schwartz Memorial Award (1976-); the Vicky Metcalf Short Story Award (1978-); and the Claude Aubry Award (1981-). New nonfiction prizes include the Sainte-Marie Prize in History (1971-); the Alberta Non-Fiction Award (1973-); the Alberta Regional History Award (1973-); and the Saskatchewan Native Writers' Contest (1976-).

A sign of the vitality of literary awards in Canada is the recent creation of a new category of award: in 1982 the first Malahat Review Awards for Book Design were presented.

ALAN R. KNIGHT

Literary Prizes in French date from the beginning of the 19th century. In 1809 the Société historique de Québec, as its founding activity, launched the first literary competition to celebrate the anniversary of British sovereign George III. A number of other competitions, which publicized their sponsoring organizations, usually dealt with historical or political issues. At the beginning of the 20th century greater organizational stability allowed awards to be made annually: one was the prize offered by Action intellectuelle de l'Association de la jeunesse canadienne-française, which was open to persons less than 35 years old. In 1922 the Québec government established literary and scientific competitions, which were known as the Concours littéraires du Québec and quickly became the most important in Québec in both prestige and financial value. Other major prizes followed, such as the Prix Duvernay (1944) and the Prix du Cercle du livre de France (1949), and there was an explosion of new awards in the 1960s. Most still exist.

The Prix David (named for Athanase David, provincial secretary 1919-36) dates from 1968, and in 1970 it virtually replaced the prizes given in the Concours littéraires, for which the last awards were presented that year. The Prix David, which is open to all genres and is worth $15 000, is awarded for an author's entire body of work, and it consists of a series of literary and scientific awards, each given for a specific work. Prix David winners have included Mgr Félix-Antoine SAVARD, Alain GRANDBOIS, Gabrielle ROY, Paul-Marie LAPOINTE, Hubert AQUIN, Marcel DUBÉ, Rina LASNIER, Fernand Dumond, Pierre VADEBONCOEUR, Jacques FERRON, Anne HÉBERT, Yves THÉRIAULT, Gérard BESSETTE and Gilles Archambault.

The Prix France-Québec Jean Hamelin was established by the Association des écrivains de langue française (ADELF) with the co-operation of the General Delegation of Québec in Paris and the Ministry of Cultural Affairs of Québec. It is open to any writer who has been published in France or Québec. The Prix France-Canada, fd 1961, is sponsored by the Association France-Canada, the General Delegation of Québec and the Ministry of Cultural Affairs of Québec. This prize may be awarded to any French Canadian writer who has been published either in Canada or in France.

In 1959 the GOVERNOR GENERAL'S LITERARY AWARDS, given by the CANADA COUNCIL, began honouring writers in French as well as in English. The awards, instituted in 1936 by the Canadian Authors' Association, have gone to a large number of authors representing all literary fields. The prize is accompanied by $5000.

The Grand Prix littéraire de la ville de Montréal is awarded only to authors resident, or works published, in Montréal. The $3000 award, open to all literary genres, was created in 1964 at the initiative of the Greater Montreal Arts Council.

One of the oldest Québec prizes, originally the Prix du Cercle du livre de France, is now financed by Imperial Oil and is called the Prix Esso du Cercle du livre de France. The prize of $5000 is for a fictional work: novel, short story collection or fictionalized biography. Bertrand Vac and André LANGEVIN have each won this award more than once. In 1968 that prize was joined by the Prix Jean-Béraud-Molson, which gives $3000 for the best avant-garde work of the year. The Prix de la revue *Etudes françaises* was created in 1967 by printer J.A. Thérien and is open to all francophone writers working in any genre, living in a country other than France. Gaston MIRON won this prize in 1970 for *L'Homme rapaillé*.

In 1979, the centenary of Émile NELLIGAN's birth, the Émile Nelligan Foundation inaugurated a $3000 award which is open to poets under 35. Winners have included François Charron for *Blessures* (1979), Claude Beausoleil for *Au milieu du corps l'attraction s'insinue* (1980) and Jean-Yves Collette for *La Mort d'Andrê Breton* (1981). The Prix Robert-Cliche, instituted 1978 by the Salon international du livre de Québec, was awarded for the first time in 1979. Its purpose is to encourage the creation of Québec novels, and it is open only to unpublished writers. The prize is subdivided into 3 awards of $1000, $500 and $300, all given by the newspaper *Le* SOLEIL. The winning manuscripts are published in Quebec by Éditions Quinze and, since 1981, in France by Juliard, in English Canada by General Publishing of Toronto, and in the US by Beaufort Books of New York.

SILVIE BERNIER

Literature and Politics This subject is usually examined in 3 categories: the political content in works of literature; the political activities of writers and their organizations to secure respect, recognition and economic independence; and relations between writers and the state respecting the rights of the author and of literature (*see* AUTHORS AND THEIR MILIEU).

From the beginning, Canadian history has presented highly political subjects for our literature. European nations struggled for territorial possession and for favourable boundary decisions. Christian missionaries and settlers struggled with the aborigines for souls and space for settlement. Settlement groups disputed among themselves and with outsiders the nature of the society that was forming. Later, history and literature were shaped by tension between the individual and the community, between "authority" and "personal freedom," between imperial powers and the national will for self-determination. Finally the continuing global tension between socialist and liberal-capitalist ideologies is mirrored in Canadian literature.

Since early times, relations between literature and politics have been manifested in the organization of many literary interest groups, formed to make members' work better known, to encourage production, to pressure governments and other patrons for support, and to secure an atmosphere in which writers can produce well and profitably. Such organizations have been born and have died according to the energy of their members and the liveliness of the political and social issues with which they have been engaged. The first in what is now Canada may have been the ORDRE DE BON TEMPS (Order of Good Cheer), founded by Samuel de CHAMPLAIN in ACADIA in 1606 to entertain the colonists through the long winter with literary creations and scientific studies. Usually claimed as the oldest, however, is the LITERARY AND HISTORICAL SOCIETY OF QUEBEC, fd 1824, a largely English organization despite its location. The later francophone INSTITUT CANADIEN, fd 1844, had over 700 members, a large library and connections with France. It was liberal, and for a short time some members favoured annexation of Canada East (Québec) to the US. The Institut was attacked by Mgr Ignace BOURGET for its willingness to spread secular ideas. It diminished in the 1860s and 1870s largely because of church opposition to its progressive policies, and it faded away at the turn of the century. The École littéraire de Montréal (1895) concerned itself principally with aesthetic matters and is renowned for having among its members Émile NELLIGAN, Albert Lozeau and Albert Ferland.

In English Canada the claims of literature were often expressed in Mechanics' Institutes, which appeared as early as the 1820s in many cities "to afford instruction in the principles of the arts and in the wonders of science and useful knowledge." Literary and historical societies also developed in Montréal, Toronto, Halifax, Saint John and Winnipeg as the century progressed. One of the most publicly volatile organizations in the 19th century was the CANADA FIRST movement. Formed in Ottawa in 1868, with a platform that united political nationalism and the encouragement of literature and culture, it eventually became a political party. Unsuccessful in politics, it nevertheless had a significant effect on the production of literature and the establishment of a Canadian tradition in the arts.

In 1921 the Canadian Authors' Association was founded "to foster and develop a climate favourable to the creative arts, to promote recog-

nition of Canadian writers and their work." Support for the CAA was strong, and in its first 3 years it lobbied hard for COPYRIGHT legislation to safeguard the interests of Canadian authors. A francophone section was created in 1922 and became, in 1936, the Société des écrivains canadiens. The CAA involved itself with the production of periodicals and poetry anthologies. It helped to create the Governor General's Literary Awards (1937) and was the precursor of more recently created literary organizations devoted to the rights and well-being of writers, such as the League of Canadian Poets (1968), the Newfoundland Writers Guild (1968), Playwrights Canada (1972), the WRITERS' UNION OF CANADA (1973) and the Union nationale des écrivains québecois (1977).

The claims of writers, and indeed all artists, to organized support by government was considered sympathetically in the 1951 report of the Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES. This report led in 1957 to the creation of the CANADA COUNCIL, which has transformed the relation of writers and other artists to government. Today, provincial councils parallel and supplement the Canada Council's work, providing financial and other support for people in the arts. The grants, LITERARY AWARDS and support structures that have developed since 1957 have been criticized, however: some claim that public money is spent badly upon people who have little talent, and for the production of inferior works; others feel that public support of artists introduces political bias in the production of literary work and invites writers to censor themselves in order to please the governments of the day. Nevertheless, Canadian governments follow the pattern of governments elsewhere, actively supporting the production of literature through various agencies.

Naturally, writers espousing political ideas or policies that are distinctly opposed to the governments of the day have found themselves in tense situations, despite the widespread belief that Canadians have full freedom of expression. For example, in 1933 a mock trial drama, *Eight Men Speak*, played to an audience of 1500 in Toronto. The play alleged that Canadian Communist Party leader Tim BUCK, recently arrested with others under an eccentric and unpopular section (98) of the Criminal Code, had an attempt made upon his life by a prison guard who acted with approval of people in the government. Police moved in on the play, effectively suspending its life until it was published in book form in 1976. The effect upon the general sense of literary freedom caused by such individual acts of government intervention cannot be measured. But at various times actions initiated or sanctioned by governments and their agencies have made it clear that the state has disapproved of some kinds of literature.

Novels and other literary forms dealing with political events or beliefs are numerous. A few representative works that show Canadian authors' wide range of political interest are Irene Baird's novel *Waste Heritage* (1939), concerned with unemployment in the GREAT DEPRESSION; George RYGA's play *The Ecstasy of Rita Joe* (1967), dealing with the plight of native people; Richard Rohmer's novel *Ultimatum* (1973), about conflict between Canada and the US; Hubert AQUIN's novel PROCHAIN ÉPISODE (1965), dealing with the psychology of Québec separatism; and Ivan Shaffer's novel *The Medicine Man* (1975), exploring conflict arising between large corporate interests and reformist members of the Canadian House of Commons. In a less confrontational way writers have treated the political nature of life in Canada from the earliest times. John RICHARDSON's *Wacousta* (1832), William KIRBY's *The Golden Dog* (1877) and Philippe AUBERT DE GASPÉ, Sr's, *Les Anciens Canadiens* (1863) all deal, each in its own way, with the character of the Canadian community and the nature of the political order. That theme has continued unflaggingly as a subject of literature to our day.

Because modern Canada continues to debate REGIONALISM and centralism, ANARCHISM and communitarianism, national independence and association with US power, socialism and capitalism, and independence or federal association for Québec, the country's literature exhibits a continuing political dimension. Literary associations occupy themselves with many of these questions, and theories of literary creation in Canada tend to be closely associated with the political views of those who construct the theories. Indeed, the character of Canada's internal and external relations ensures that the literature of the country, which began in the midst of strong political tensions, will continue in a similar milieu. Our nation provides an especially clear argument that a country's literature and its politics are inseparable and affect each other on many visible and invisible levels.

ROBIN MATHEWS

Literature in English, written in what is now territorially Canada or written by Canadians abroad, is currently termed "Canadian literature in English." "English-Canadian Literature," though still in use, has been rejected by many who consider it to refer only to the literature of Canadians of English descent. The terms "Colonial Literature," "Commonwealth Literature," "Littérature américaine" and "New Literature Written in English" have sometimes referred to Canadian literature in English. The term "Canadian writer" has been applied to long-term visitors such as Malcolm LOWRY, to short-term residents who still hold citizenship such as Brian MOORE, and to travellers and settlers who came before Canada existed as a nation.

Writers have described Canada in many ways, for example, as a French or English colony, a "fifty-first state," a Pacific Rim country, an arctic giant, a friendly territory or an uninhabitable wilderness. Canadian literature has often had to deal with such differences in attitude, not just because many Canadian authors were born elsewhere and brought outsiders' expectations with them, but also because popular attitudes often perpetuated stereotypes of Canada. Three pervasive stereotypes portray Canada as a physical desert, a cultural wasteland and the raw land of investment opportunity. These distortions have created an audience for stereotypes, which Canadian writers sometimes chose to serve by writing romantic adventures of the frozen North, in which everything local was savage and hostile and culture was imported; but in time they sought to record local experience and to use literature to shape their own culture rather than to imitate or defer to that of another society.

Language and Literary Form Canadian writers needed to be able to refer appropriately to local flora, fauna, place-names and events, and to use local vocabulary unapologetically (*see* ENGLISH LANGUAGE). Words such as "moose" and "Medicine Hat," which had been automatically comic because they transgressed English conventions of verbal propriety, became legitimate to use in literature. Native words ("igloo," "muskeg"), borrowings from French ("tuque," "gopher"), adaptations of English ("separate schools," "sky pilot"), regionalisms ("slough," "lakehead," "Bluenose") and vernacular cadences all became accepted during the 19th century. Still, the dominant vocabulary was "international English," neither so highly localized as to impede communication nor different enough to require readers outside the culture to recognize the need to adjust to it.

By the 20th century, irony had become a dominant literary mode, and the documentary narrative and the sequence of short sketches became recurrent literary structures. There is more humour in Canadian literature than is commonly recognized — more often in asides and understatement than in broad farce — and HUMOROUS WRITING is often combined with serious subjects and more earnest stances.

Many writers became highly conscious that what distinguished them and their community was not the tale they told but the manner of telling it. By documenting local experience and using the local voice, they fostered regional and national culture. Newfoundland writers such as E.J. PRATT drew on a tall-tale tradition, Prairie writers such as Robert KROETSCH on an anecdotal tradition, and Ontario writers such as Margaret ATWOOD and Robertson DAVIES on a laconic interplay between irony and moral orderliness. Much of the force of their style derived from their control over regional cadence, which is as important as literal meaning because it reveals the inner motivations of the characters and also the social context. Narrative method is often indirect in Canadian writing (modes of parable and allegory are common); narrators usually hide their true feelings or have limited understanding of events around them, and the oblique or implied meanings are richer and more instructive than the obvious ones.

Motifs and Patterns Some commentators have interpreted literary indirectness politically and psychologically, finding in it a sign of national insecurity and a group feeling of inferiority. Others argue that indirectness is a healthy demonstration of the culture's ability to adapt an inherited tongue to its own purposes. Although the national character is not always the subject of literature, the culture's social attitudes and values can be seen in the language and forms it uses. Several specific narrative patterns recur in Canadian writing: 1) a community walls itself off from the wilderness (the "garrison mentality"); 2) a person leaves the homeland, adjusts to the new world, then finds the "homeland" to be "alien"; or a person born in Canada always feels a stranger in his own home; 3) a woman struggles to come to terms with her own creativity and the inhibitions of her cultural upbringing (often told as conflict between colony and empire); 4) an apparently passive observer, surrounded by articulate tricksters and raconteurs, turns out to be able to tell both their story and his own, often ironically; 5) an adventurer turns failure into a form of grace; 6) a child grows up to inherit a world of promise, or a world of loss, or usually both at once; 7) a subjective historian meditates on place and memory; 8) a character celebrates space and wilderness, usually after a struggle to learn to accept that the wilderness provides spiritual therapy only on its own terms. To epitomize the character of their society, many writers have portrayed particular historical figures, such as Samuel HEARNE, Louis RIEL, Susanna MOODIE, Sir John A. MACDONALD, Emily CARR and William Lyon MACKENZIE, each possessing a vision, but each still an ordinary, less than heroic, frail human being.

Settings often possess a symbolic dimension. Catholic Québec recurrently figures as a land of mystery, attractive but enthralling and morally dangerous; Ontario as an enigmatic blend of moral uprightness and moral evasiveness; Atlantic Canada as a repository of old values; the North as a land of vision; the Prairies as a land of isolation and acquisition; and the West Coast as a dream of the future in which people often mistakenly believe. Europe often appears as the home of refinement and discrimination, the US as a land of crass achievement and tangible success, and Africa as the embodiment of all that seems "other" to Protestant rationalism. Although most Canadians live in cities, until re-


SAM SLICK;

THE

CLOCKMAKER.

"I AM SAM SLICK, SAYS I."

Philadelphia:

T. B. PETERSON, No. 306 CHESTNUT STREET.

Cover from Thomas Chandler Haliburton's satiric *Sam Slick: The Clockmaker*, published in Philadelphia *c*1858. Originally published in Nova Scotia, it was the first internationally successful book by a Canadian author (*courtesy National Library of Canada/Rare Book Division*).

cently writers used rural and small-town settings more frequently than urban ones, and they often ignored problems of class, race and poverty. From early on, however, writers such as Frances BROOKE, Susanna Moodie, Sara Jeannette DUNCAN and Nellie MCCLUNG have been important analysts of Canadian political life. Often they sharply pointed out social divisions within Canada that male adventure writers ignored or underplayed. "Regional" writing also conveyed political stances, for by rejecting a single definition of "Canada," it asserted the viability of a nation with a plural character (*see* REGIONALISM IN LITERATURE).

History

The growth of Canadian literature in English has been affected by numerous factors, from population size to the diverse literary influences of foreign writers.

1620-1867 In the first 2 centuries of Canadian writing in English, writers' techniques reflected changing literary fashions in England. There was Jacobean poetry in 17th-century Newfoundland; epistolary fiction in the English garrison community in late 18th-century Québec; political satire in the LOYALIST communities of the Maritimes and Upper Canada; folksong and folktale, and romantic poetry and fiction in the early 19th century. Fiction writers such as John RICHARDSON and Rosanna LEPROHON demonstrate the European connection both stylistically and thematically; despite their enthusiasm for the wilderness, they continued with European social and literary conventions. The tales translated from Indian and Québec sources were intended for a readership that romanticized Indians. Early poets such as Oliver GOLDSMITH and Charles SANGSTER defined the Canadian landscape as "sublime," using a British literary convention. Early folk traditions in Atlantic Canada derived from Scottish and Irish sources, but they were influenced by a thriving Gaelic literature in the New World and were adapted to local experience and language. Writers continued to use forms from FOLK MUSIC and ORAL LITERATURE well into the 20th century, as in Johnny Burke's "The Killigrews' Soiree" (1904), the tales of Pauline JOHNSON and the popular verses of Robert SERVICE.

Political and AUTOBIOGRAPHICAL WRITING has proved to be some of the most enduring early literary work. The social and moral critiques of Joseph HOWE, Thomas MCCULLOCH and Thomas Chandler HALIBURTON reveal contemporary rhetorical conventions and political stances, and Haliburton's humorous narratives of Sam Slick in *The* CLOCKMAKER (1836) in addition coined many now-familiar phrases. Also important are the journals of explorers, travellers and settlers, primarily those of Samuel Hearne, Alexander MACKENZIE, David THOMPSON, Alexander HENRY, William "Tiger" DUNLOP, Catharine Parr TRAILL, Susanna Moodie and Anna JAMESON (*see* EXPLORATION AND TRAVEL LITERATURE). The travel and settlement narratives vary from romantic tales of captivity and adventure to exact accounts of things seen. Moodie, in *Roughing It in the Bush* (1852), told of her own ill-preparedness to cope with Canada and advised the English middle class not to emigrate, though subsequent editions of her work revealed that she gradually grew to accept her new country. Settlement narratives set in western Canada, eg, those of Susan Allison and Georgina Binnie-Clark, date from the later 19th and early 20th centuries.

As local publishing ventures took root in the Maritimes, Montréal and Upper Canada — often associated with NEWSPAPERS and LITERARY MAGAZINES, such as Howe's *Acadian Recorder* and John Lovell's *Literary Garland* — they encouraged writers to apply their imaginative talents to the local scene. The result was that, by 1867, fanciful tales set in Europe and the Orient flourished in periodicals side by side with realistic sketches of Canada and political and moral commentary.

1867-1914 With Confederation came a quickened interest in the growth of a national culture. This was expressed both in celebrations of the romance of Canadian history and in explorations of the new nation's political destiny, by writers such as William KIRBY, James DE MILLE and Gilbert PARKER. Political life was recorded in new journals, such as *Rose-Belford's Canadian Monthly*, the *Canadian Magazine* and QUEEN'S QUARTERLY. Fredericton and Montréal became major creative centres; the ROYAL SOCIETY OF CANADA was founded in 1882; and in Toronto the *Globe* expanded its political and cultural influence. Yet Canadian writers published also with foreign presses and in British and American journals, and Canadian writing was affected by continental expansion, curtailed by economic pressure and restricted by changes in international COPYRIGHT LAW. Despite their patriotic sentiments, many writers were drawn elsewhere to live for financial or personal reasons; Charles G.D. ROBERTS and Bliss CARMAN went to the US, S.J. Duncan to India. Before turning her attention to the role of the British in India, Duncan, who was politically attracted to the cause of imperial federation, noted the increasing impact of American taste and ideas on Canadian culture. Poet Charles MAIR became active in the CANADA FIRST movement, and political causes also attracted Goldwin SMITH, William Dawson LESUEUR and John WATSON (*see* PHILOSOPHY).

By 1905 there was literary activity across the Prairies and a thriving cultural centre in Victoria, as the work of Martin Allerdale Grainger attests. Children's writers Margaret Marshall SAUNDERS and L.M. MONTGOMERY, both from the Maritimes, wrote the international best-sellers *Beautiful Joe* (1894) and ANNE OF GREEN GABLES (1908). Early in the century Stephen LEACOCK established an international reputation as a comic writer and lecturer in the Dickensian tradition. He satirized social pretensions and political and literary fads, among them the mannered comedies, melodramas, historical romances and muscular adventures made popular by writers such as Parker, Ralph Connor (C.W. GORDON) and Robert Barr, and early dramatists Charles HEAVYSEGE and John Hunter-Duvar.

The dominant literary figures of the late 19th century were the poets and SHORT-FICTION writers Duncan Campbell SCOTT and Charles G.D. Roberts, and 2 poets with whom they were associated, Archibald LAMPMAN and Bliss Carman. Known as the "Confederation Group," these writers (along with W.W. CAMPBELL and I.V. CRAWFORD) together reshaped Canadian POETRY. Influenced by the later English Romantic poets and the American Transcendentalists, they shunned Sangster's verbal ornamentation, rejected the notion of "sublimity," sought plainer ways to record the beauty and reality of the Canadian landscape, and used natural imagery as a language of spiritual inquiry. Scott's work sympathetically sketched patterns of life in Québec and among the Indians, and it introduced psychological realism into narrative form. Roberts's anthropomorphic animal stories, as well as those of Ernest Thompson SETON, observed nature closely, imaginatively adapting Darwinian scientific method. Though Roberts and Scott continued to write long after WWI, their main work belongs to the 2 decades before it began.

1914-41 WWI had a profound cultural and political impact. Many creative people were lost in the war, among them John MCCRAE, author of the villanelle "In Flanders Fields." Attitudes towards empire and nationhood altered as Canada moved towards equality within the COMMONWEALTH; tensions involving Québec's cultural presence in the country increased; immigration patterns changed following the war; and there was a shift in political influence among the country's regions. Pacific cultural contacts with Australia, China, Japan and India diminished, though immigration from Asia increased. The literature of RACISM increased as well. Germanic and E European immigration to the Prairies had a marked literary result in the family sagas of Martha Ostenso, Laura Goodman Salverson and, most notably, Frederick Philip GROVE. Grove was singled out as a writer of substance for his large-scale portraits of immigrant life and his analysis of the Canadian economic class structure. In Ontario, Mazo DE LA ROCHE's family chronicle, the JALNA series (1927-60), continued to celebrate the imperial connection.

In 1921 D.C. Scott reflected that the violence of the new age required poets to express the values of their time in a more discomforting, rebellious, critical fashion. This judgement also applied to fiction. Early war fiction included the harshly realistic work of Charles Yale Harrison (*Generals Die in Bed*, 1930). WWI preoccupied writers for 50 years, from Philip CHILD, Robert Stead, Edward Meade and Colin McDougall to Douglas Le Pan, Alden NOWLAN, Timothy FINDLEY and John Gray. Class conflict in Vancouver during the GREAT DEPRESSION was the subject of Irene Baird's *Waste Heritage* (1939). The fiction of Morley CALLAGHAN portrayed crime and deprivation in Toronto and Montréal, but appealed also to the sustaining force of the Roman Catholic faith. Callaghan's plain style set a new standard for Canadian prose. Callaghan's and John GLASSCO's artful autobiographical accounts of life in Paris in the 1920s date from this time, though they were published much later. Painter Emily CARR wrote of West Coast Indian culture and character, of changes in artistic taste and practice and of her own engagement with the wilderness.

As with prose, the dominant tone of poetry and DRAMA in the postwar decades was critical. In drama, Merrill DENISON's satiric sketches challenged empty nationalism and the pageantry of earlier English-language theatre. In poetry, the "McGill Group" (F.R. SCOTT, A.J.M. SMITH, Abraham KLEIN) emerged in Montréal in the 1920s to

praise the GROUP OF SEVEN's revolution in painting, to respond to the international literary influence of T.S. Eliot, W.H. Auden and James Joyce, and to challenge the Confederation Poets' Victorian formalism. Newfoundland poet E.J. Pratt, fascinated by modern science, penned lyric and narrative verse celebrating heroic action and the power of personal and public decision. Raymond Knister and W.W.E. Ross were other significant figures. Still other writers to emerge at this time and to go on to greater formal experimentation were Dorothy LIVESAY and Earle BIRNEY; their work, by turns dramatic, narrative, lyrical, documentary, meditative, ironic and autobiographical, juxtaposes personal experience with social causes. Between 1950 and the 1980s they addressed McCarthyism, African independence, and feminism, poverty and cultural impoverishment within Canada.

1941-59 Hugh MACLENNAN's 1941 novel *Barometer Rising* ushered in a period of liberal reassessment of Canadian culture, a period which declared Canada's freedom from constraint, a Canadian role in world affairs, and the viability of Canadian subjects in literature. It was a time that believed in progress. These themes, given impetus by the humanist and anticlerical stances of francophone writers Ringuet (Philippe PANNETON), Gabrielle ROY, Roger LEMELIN and Germaine GUÈVREMONT (*see* LITERATURE IN FRENCH), were also recorded by Pierre BERTON, Roderick HAIG-BROWN and Farley MOWAT. But MacLennan's 1959 novel *The Watch that Ends the Night* caps the period, placing faith in the land but by then acknowledging a sense of disillusionment in political causes. Prose stylists of the 1940s and 1950s nonetheless demonstrated that the period had a darker side, one that focused on the moral psychology of individualism. Malcolm Lowry in *Under the Volcano* (1947) and Ethel WILSON in SWAMP ANGEL (1954) explored the psychological pressures of alcoholism and women's limited options in society, respectively. Using prairie settings, Sinclair ROSS (AS FOR ME AND MY HOUSE, 1941) and W.O. MITCHELL (WHO HAS SEEN THE WIND, 1947) probed the psychological barriers that often prevent individuals from connecting productively with their community. Thomas RADDALL and Ernest BUCKLER examined similar problems in Maritime contexts, as did Henry KREISEL against a background of European war and cultural displacement. In 1959 the raw satire of Mordecai RICHLER's *The* APPRENTICESHIP OF DUDDY KRAVITZ and the elliptical modernism of Sheila WATSON's *The* DOUBLE HOOK augured a different, more sardonic era of literary attitude and technique. In Québec the QUIET REVOLUTION of the 1960s was to bring about a secular and politically rebellious, separatist literature.

New poetic movements also developed in the shadow of WWII. In Montréal the "cosmopolitan" *Preview* poets (Patrick Anderson, P.K. PAGE) joined briefly with the "proletarian" *First Statement* poets (Louis DUDEK, Irving LAYTON) in John SUTHERLAND's magazine NORTHERN REVIEW. The continuation of old journals (primarily *Canadian Forum*) and the development of new ones (*Fiddlehead* in Fredericton; *CIV/n* and *Delta* in Montréal; *Tamarack Review* and *Here and Now* in Toronto; Allen Crawley's *Contemporary Verse* in Vancouver; and, after 1960, James REANEY's *Alphabet* in London) gave poets new opportunities for publication; among those to emerge were Anne WILKINSON, Wilfred WATSON, Robert Finch, A.G. BAILEY, Elizabeth BREWSTER, Fred COGSWELL, Miriam WADDINGTON and Roy DANIELLS. Initially linked as poets of social protest, Dudek, Layton and Raymond SOUSTER went on to explore separate avenues of poetic form and political engagement.

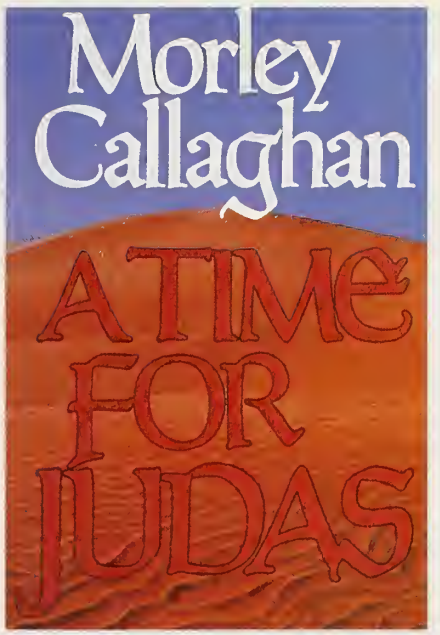
At this time drama was affected by the development of radio and by the growth of play societies and the LITTLE THEATRE MOVEMENT. Outstanding radio playwrights included Mavor MOORE and Fletcher Markle; Gwen Pharis RINGWOOD, James Reaney and Robertson Davies furthered the art of the stage play. Radio dramatizations (W.O. Mitchell's *Jake and the Kid* series, John Drainie's readings, Robert Weaver's *CBC Wednesday Night*) helped foster the short-story form; and radio writers such as Mary Grannan gave a Canadian voice to CHILDREN'S LITERATURE (*see* RADIO DRAMA).

The period closed on the threshold of a new wave of nationalism and creative energy. Several anthologies and critical surveys became available; society was enjoying postwar prosperity; and the report of the Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, which led to the creation of the CANADA COUNCIL in 1957, encouraged concentrated support for Canadian culture in ways that would allow it tangibly to develop.

1959-80s Periods of economic prosperity and adversity sharply affected literary activity during the next decades. The number of publications grew markedly during the 1960s, fostered in part by the Canada Council and the establishment of government support programs for the arts. In the wake of legislation curtailing foreign control over the production and distribution of Canadian writing, SMALL PRESSES developed (including House of Anansi and Oberon, and for several years asserted a pronounced cultural nationalism. New LITERARY PERIODICALS began, among them CANADIAN LITERATURE, *Prism*, *ECW*, *Journal of Canadian Studies*, CANADIAN FICTION MAGAZINE and *Canadian Children's Literature*. An increase in the number of available texts and paperback books (represented by McClelland and Stewart's New Canadian Library), the formation of professional societies (Association for Canadian and Québec Literatures, League of Canadian Poets, WRITERS' UNION OF CANADA), the establishment of several popular festivals and the increase in academic attention to Canadian writing also helped expand the audience for Canadian letters. Influential Québec and Acadian writers were translated.

Technological innovation affected both the manner and matter of publication — charting a change from mimeographed journals such as *Tish* in 1961 (edited by George BOWERING and Frank DAVEY) to the sophisticated design and computer printing systems of a press such as Coach House in the 1980s. Poets mixed media, wrote concrete poetry (bp NICHOL), sound poetry (bill BISSETT), found poetry (J.R. COLOMBO) and popular songs (Leonard COHEN), and tried out other experimental forms in linguistic and visual design (Joe ROSENBLATT). An important development involved the writing of long meditative poetry (Michael ONDAATJE, Kroetsch, John NEWLOVE, Christopher Dewdney). Technology thus became an artistic paradox: as a literary theme it often implied the enervating routine of mechanization, but as an aid to literary production it opened new freedom of technique.

South American writers Jorge Luis Borges and Gabriel García Márquez were particularly influential on Ondaatje and Kroetsch. Northrop FRYE's theories of myth influenced other writers (Jay MACPHERSON, James Reaney, Eli MANDEL); still others were affected by CHRISTIANITY and Black Mountain poetics (Margaret AVISON), by traditional format of various kinds, including bardic models, and by an awareness of social inequities (Patrick Lane, Milton ACORN, Tom Wayman, Daryl Hine, Ralph Gustafson, Francis Sparshott, George JOHNSTON, Richard Outram, Kristjana Gunnars), by vernacular cadences (Al PURDY, Phyllis WEBB, D.G. JONES, Alden Nowlan, Marilyn Bowering) and by the conservative Loyalist philosophy of George GRANT (Margaret Atwood, Dennis LEE). Rather more general influences included the views of historians and communications theorists H.A. INNIS, Donald CREIGHTON, W.L. MORTON and Marshall MCLUHAN, and of international social analysts O. Mannoni, Frantz Fanon, Ruth Benedict, Robert Ornstein and Jean Piaget.



Book jacket design for *A Time for Judas* by Morley Callaghan (*courtesy Macmillan of Canada*).

Dennis Lee (in poetry) and Mordecai Richler, Gordon Korman and Christie Harris (in fiction) became leading writers of children's literature. Margaret Atwood (in poetry, fiction and criticism) dominated the period, in both poetic craft and nationalist and feminist commentary. Other important prose writers also addressed feminist issues, including Margaret LAURENCE, Audrey THOMAS, Jane RULE, Marian ENGEL and Alice MUNRO. Each of these writers honed a highly individual style. Political justice was a major concern, as were the nature and source of violence, both in the work of these writers and in that of Timothy Findley, Dave GODFREY, Adele WISEMAN, Hugh HOOD, Richard Wright, Juan Butler, George WOODCOCK, Joy KOGAWA and David Adams Richards. Native writers such as George CLUTESI and Markoosie used English to tell of traditional experience and the possibility of moral continuity. Other writers, notably Jack HODGINS and Rudy WIEBE, took literature itself as their subject, exposing the imaginative artifice of storytelling and asserting the morality of art.

Major fictional achievements of the period include Wiebe's epic enquiries into the language of different cultures (Mennonite and Cree in particular), Findley's dramatizations of the loss of innocence in the 20th century, Laurence's social mythology of Western woman and Robertson Davies's Jungian rendering of ambition and aspiration in Loyalist Ontario (in his Deptford Trilogy). English-language immigration from the US (Leon Rooke, Thomas, Rule) and from the Commonwealth (Ondaatje, John METCALF, Moore, Robin Skelton, Daphne Marlatt, Austin CLARKE, Bharati Mukherjee, Sean Virgo) added other dimensions of ethnic sensitivity, stylistic versatility and comic insight to modern Canadian writing. The period, partly under the influence of Québec's politically active theatre, also saw the emergence of strong dramatic talents, including Sharon Pollock, George Walker, Rick Salutin, David Fennario, Cam Hubert (Anne Cameron), George RYGA and Michael Cook.

Critics have recorded the history of Canadian literature in English, observed its connections with other literature, probed its derivation, analysed techniques and charted patterns, and assessed its value as a cultural record. As international attention to Canadian literature in-

creased during the 1970s, Canadian studies organizations were established in Europe, the US, Japan, the S Pacific and elsewhere. By 1983 many critics in Canada were turning from thematic to technical subjects; others were writing literary BIOGRAPHY, theorizing about the procedures of criticism, and attempting to establish accurate, scholarly texts of the works of major writers. By the latter part of the 20th century, there were clear but diverse traditions in Canadian literature. W.H. NEW

Reading: Carl F. Klinck, ed, *Literary History of Canada,* 3 vols (2nd ed, 1976); William Toye, ed, *The Oxford Companion to Canadian Literature* (1983).

Literature in English: Teaching In colonies, the literary tradition of the mother country normally prevails. This was true in Canada, where it has taken English-speaking Canadians a long time to accept their own literature as a legitimate subject for study. Throughout the late 19th century, English language and literature, with some admixture of CLASSICS, held undisputed sway in the literary curricula of Canadian schools and universities. Outside the institutions, however, the groundwork of an indigenous literature was being laid. The first Canadian anthology was E.H. Dewart's *Selections from Canadian Poets* (1864). Although there is no evidence that this book was used in the schools, it was the first of many anthologies that would support the teaching of Canadian literature as the subject gained recognition. W.D. LIGHTHALL's *Songs of the Great Dominion* (1889) was another landmark volume. Biography and literary history had their beginnings in H.J. MORGAN's *Bibliotheca Canadensis: A Manual of Canadian Literature* (1867). By the end of the century, to such established names as Haliburton, Moodie and Richardson had been added Lampman, Carman, Roberts and Scott. The making of a teaching canon of early Canadian writers was in sight.

Records of pioneering attempts to bring Canadian literature into university curricula are often unreliable. In 1924 the *Canadian Bookman* published the results of a survey undertaken by the Canadian Authors' Association on the status of "Canadian Literature in Education." Most universities reported, rather defensively, that they keenly supported the subject. The public schools said they liked to use Canadian authors "to diffuse a sane view of patriotism." These were, however, apparently only token interventions. Desmond PACEY claims that the first undergraduate course was offered by J.B. Reynolds at Macdonald Inst (*see* UNIVERSITY OF GUELPH) in 1906-07. The McGill calendar for 1912-13 listed a course in "American and Canadian Literature." Its instructor, Susan E. Cameron, seems to have taught in this field as early as 1907-08. The "Am-Can" combination (satirized by Robertson DAVIES in *Leaven of Malice,* 1954) soon became a common expedient for allowing Canadian literature a place in the sun. In practice the balance usually favoured the American component. Although U of Toronto was late in giving its formal blessing to the study of Canadian literature (an Honours American-Canadian course was first offered in 1933-34), it had endorsed a series of "popular" lectures emphasizing Canadian subjects at the turn of the century. A full-fledged course in Canadian poetry, given by Alexander W. Crawford, was in place at U of Manitoba, 1919-20.

A more serious claim to the pioneering role comes from Acadia U, where in 1915 John Daniel LOGAN began lecturing on Canadian literature. Logan joined the army in 1916, but in 1919 he returned as "Special Lecturer in Canadian Literature without salary." The *Acadia Bulletin* had called the 1915 series "the first course of lectures on distinctively Canadian Literature which has ever been given in a Canadian University." The appointment of 1919 was hailed by the Toronto *Globe* as "an innovation of national importance." The same year V.B. Rhodenizer taught "The History of Canadian Literature," a half course. Logan later attacked Archibald MacMechan and Dalhousie U in *Dalhousie University and Canadian Literature. . .* (1922), a broadside discounting their claim to lead the way in teaching Canadian literature by offering a half course in 1921-22.

Expediency and compromise governed the entry of Canadian literature into academe: noncredit courses; courses not acceptable for credit in majors or honours programs; half-credit courses; courses treating Canadian literature as a wayward extension of English literature or as a footnote to American literature were offered. Carlyle King's full-fledged, upper-level and fully accredited course at U of Sask in 1946-47 may have been the first of its kind.

In fact, a new, strengthening current reached critical force just before and after WWII. Although the 1920s and 1930s had produced few curricular developments, there had been an increasingly widespread awareness of writers and writing in Canada. The Canadian Authors' Association (fd 1921) had preached literary nationalism and had created the necessary tension to spark the coming of modern poetry to Canada by the decade's end. Moreover, 68 anthologies and collections were published 1920-40. A handful of texts, such as *Our Canadian Literature* (1922) by Watson and Pierce and *A Book of Canadian Prose and Verse* (1923) by Broadus and Broadus were designed specifically for school and university use. J.D. Logan and D.G. French published *Highways of Canadian Literature* (1924), one of 6 literary histories which appeared in the 1920s. It was also important, in the context of teaching, that the criticism of Canadian literature had begun to fall to a new breed of established scholars. W.E. Collin's *The White Savannahs* (1936) brought an urbane manner and sophisticated techniques to bear on the work of selected Canadian poets. E.K. BROWN and a roster of experienced scholars contributed, from 1936 on, incisive annual reviews of contemporary Canadian writing to the "Letters in Canada" supplement of UNIVERSITY OF TORONTO QUARTERLY. Symbolic of a general quickening of literary energies was the publication in 1943 of Brown's *On Canadian Poetry,* the first extensive and scholarly treatment of the tradition of poetry in Canada, and A.J.M. SMITH's *The Book of Canadian Poetry,* the first such anthology compiled on scholarly principles. Publication of new poetry was on the upsurge. The return of the war veterans set the stage for the dramatic expansion of university enrolment over the next 20 years.

Until at least 1960 the introduction of Canadian courses continued to face opposition from defenders of the traditional curricula of English departments. American literature, moreover, which had been an expedient for getting Canadian literature into course work, became, especially 1960-70, a threat when a high incidence of American appointments to Canadian departments was reflected in a sometimes smothering expansion of American courses. The establishment of postgraduate studies in Canadian literature at U of T (1947-48) was an important development. C.T. Bissell and R.L. McDougall were early instructors. On the one hand this development marked a first step towards the legitimation of Canadian literature as a subject for advanced study, and on the other it charted the way for the first generation of scholars trained in this specialty. The next 20 years saw strong postgraduate centres established at Carleton, U of New Brunswick, McGill, Queen's, Western, U of Alberta and U of British Columbia. Among those who set the pace were C. KLINCK, Malcolm ROSS, D. Pacey, R.L. McDougall, L. DUDEK, R. Watters, F. COGSWELL, A. Lucas, G. Roper and J. Matthews. The expansion of course work was nourished by (and in turn nourished) the publication of texts and supporting critical material. Landmark publications were Klinck and Watters's *Canadian Anthology* (1956); the New Canadian Library series of reprints (1957-); the *Literary History of Canada* (1964); and the periodical *Canadian Literature* (1959-). Finally, demographic, economic and cultural factors produced a dynamic development of Canadian courses and enrolments in the 1960s. The development was fed by the arrival at university age of the youth of the postwar BABY BOOM; it was accelerated by a prosperous economy and the wishes of a generation of students seeking "relevance" in education. It was at the same time fueled by a national movement towards "Canadianization," the term used by R. Mathews and J. Steele in their highly public efforts to increase Canadian content in the educational system.

By 1970 there seemed little reason to question the status of Canadian literature as an academic subject. In 1948, 10 universities had offered half courses in Canadian literature; 2 offered full courses. In 1972, 38 universities offered 90 full undergraduate courses, for a total enrolment of over 6000 students. At the graduate level, offerings had risen from virtually nothing in 1948 to 30 graduate offerings in 22 universities 1972-73, for a total enrolment of over 200 students. Nevertheless, T.H.B. Symons stated in *To Know Ourselves* (1975), the report of the Commission on Canadian Studies, that undergraduate courses in Canadian literature represented only 8% of the total offerings of departments of English. Perhaps more serious was the commission's finding that the atmosphere of denigration which had surrounded the teaching of Canadian literature for the better part of 50 years was far from dead. The 1970s closed with severe financial stringencies imposing new priorities on the universities. Nevertheless, Canadian literature as an academic subject is firmly enough established to hold its own. R.L. MCDOUGALL

Literature in English: Theory and Criticism Samuel Taylor Coleridge, the father of modern literary theory in English, made little direct impression in 19th-century Canada, largely because literary life in Canada shared the antitheoretical biases of Victorian England. Thomas Carlyle, John Ruskin and Matthew Arnold, the most powerful arbiters of Victorian taste, were essentially moral determinists. For them, good art was at root a matter of good morality, directing the sensuous imagination of artist and audience alike; if the artistic vision was true, then technical details of expression would take care of themselves. In taking "vision" in this sense, these authorities effectively denied access to the essence of art other than by uncritical, unsystematic procedures. Great or successful literature was the occasion for ostensive definition (comparison with similar points of excellence drawn from Homer, Dante, Shakespeare or Milton) or for the invocation of a moral standard; it was not the occasion for sustained reflection on particular literary arts, or for isolation and analysis of a text's distinctive features.

In Canada, LITERARY MAGAZINES provided the first forum for discussion of literary theory. Long before John George Bourinot's *The Intellectual Development of the Canadian People* (1881) there appeared essays and reviews in the literary press that identified and attempted to assess the vital issues in contemporary Britain and the US. This was not easy, given limited resources and circulation, and the fact that the migration of ideas is constant and complex. Most striking about the early efforts is the shrewdness and clarity with which they established the topics that have remained at the centre of Canadian theoretical debate: the possibility and desirability of a distinctive Canadian literature, and the nature of literature's contribution to the national life. Although interest in these questions was largely a

legacy of the European romantics, Canadians claimed them as their own — not in the first instance through the usual channels of theoretical innovation (new analytical tools and terminology, a new conceptual matrix), but rather through recognition that to address these questions was to deal with the condition of all Canadians, whose great matrix was the historical and geographical reality of Canada itself. There was no lack of derivative and pedestrian commentary on literary genres, literature as the interplay of fact and precept, and similar topics. And it was easy for Goldwin SMITH to assure the readers of *The Week* in 1894 that "no such thing as a literature Canadian in the local sense exists or is ever likely to exist." There was little prospect of original theorizing while Canada's cultural autonomy remained in question. Meanwhile, Canadians could draw on the values and expectations nourished by the Scottish intellectual tradition in immigrants such as Daniel Chisholme, David Wilson and Graeme Mercer Adam, and take heart from the sensitivity shown by native-born Canadians of the calibre of journalist and novelist Sara Jeannette DUNCAN and social commentator John A. Cooper.

The early 20th century witnessed a steady growth in Canadian literary scholarship, but little innovative theory. Despite the stocktaking of J.D. LOGAN's *Aesthetic Criticism in Canada* (1917) and A.J.M. SMITH's sardonic demand of 1928, "Wanted — Canadian Criticism," academic conservatism held firm. Canadian PHILOSOPHY and LANGUAGE study continued to be more historical than analytical, while orthodoxy was fortified by scholars such as Pelham Edgar, E.K. BROWN and A.S.P. Woodhouse. Even George Whalley's *Poetic Process* (1953) was more of a tribute to Coleridge than an advance beyond him. However, with the work of Marshall MCLUHAN and Northrop FRYE this situation changed dramatically.

Literary essays written by McLuhan between 1943 and 1962 (collected in *The Interior Landscape*, 1969) revealed an erudite but profoundly restive mind moving away from "mere literature" and traditional scholarship towards a new vision of cultural history, human cognition and the challenges facing academe. In *The* GUTENBERG GALAXY (1962) McLuhan anticipates the concerns of European theorists with the impact of technology on man's responses to the world around him, and reflects on the changes wrought on speech and writing by advances in COMMUNICATIONS TECHNOLOGY. He draws on the spiritual and intellectual resources of scholasticism to elucidate the implications of *The Gutenberg Galaxy*, enriching in the process the vocabulary of literary theory, recognizing the advantage of interdisciplinary studies, and dramatizing the idea that criticism enlivened by radical theory and unafraid of analogy can claim to be not parasitism or prostitution, but creative predation.

Frye, like McLuhan, has written one major work of theory and many subsequent validations of it. Since the appearance of ANATOMY OF CRITICISM (1957), Frye has become a highly influential theorist. Lucid, learned and witty, polemical and yet plausible, *Anatomy* is a series of interlocking theoretical essays built upon definitions of symbol ("any unit of any literary structure that can be isolated for critical attention"), criticism (which "begin[s] with, and largely consist[s] of, the systematizing of literary symbolism") and related terms — the whole synoptic scheme being held together by the proposition that "in myth we see the structural principle of literature isolated." In collections such as the *The Bush Garden* (1971) Frye refers not to Canadian isolation itself, but to the autonomy-through-isolation enjoyed by "great" literature and literary study. His works have inspired some of the finest contemporary Canadian writers, but have too often occasioned mere condemnation or rapture within the university community, or led his more careful readers into a no-man's-land between autonomous and socially determined performance, as in Francis Sparshott's *The Concept of Criticism* (1967). More recently, however, literary theorists have freed themselves from Frye's bias against structuralism and ideologically motivated criticism. Debate is carried on in the LEARNED SOCIETIES and in publications such as the *Journal of Literary Theory* (1980-) and Tillottama Rajan's *Dark Interpreter* (1980).

A strong interest in avant-garde and theoretical approaches to literature was nurtured in *Open Letter* (1965-), a literary magazine edited by Frank DAVEY. The influence of recent European trends (post structuralism, deconstruction, narratology, reception theory, etc) can be seen in E.D. Blodgett's *Configuration* (1982) and in *Labyrinths of Voice* (1981), a series of interviews with Robert KROETSCH by Shirley Neuman and Robert Wilson. Perhaps the most important evidence of the new interest in theory is in the works of feminist critics, including Lorraine Weir and the editorial collective TESSERA (Barbara Godard, Kathy Mezei, Daphne Marlatt and Gail Scott), whose work also links criticism in English Canada with that of critics and writers in Québec, such as Nicole Brossard, Louky Bersianik and Louise Cotnoir. LEONARD M. FINDLAY

Criticism

The work of critics is generally to define, classify, interpret and judge literature, but which of these activities achieves prominence varies from period to period and place to place. In countries such as France and England, where the classics are widely agreed upon, little need exists to define the national literature (it is simply understood to be these classics) or to promote it (since all agree that the classics should be widely read and taught). When such a consensus exists, critics can devote their time to editing famous texts or to interpreting famous authors. Many English Canadian critics, including Barker FAIRLEY, Douglas Bush, Leon Edel, Hugh Kenner, Kathleen Coburn, Marshall McLuhan, George WOODCOCK and Northrop Frye, have achieved international recognition for this kind of work on world writers or for their literary theory. If such critics turn their attention to Canadian literature, a new literature with few classics, they often change their approach. In Canada much critical energy has been consumed in attempts to define Canadian literature. Furthermore, critics who feel that Canadian literature deserves an audience must promote its publication, study and popular reception.

The history of English Canadian literary criticism has also involved a struggle to promote Canadian literature by providing it with a literary institution: publishers, readers, reviewers, booksellers, literary associations, journals, reference works, textbooks and university courses (*see* AUTHORS AND THEIR MILIEU; BOOK PUBLISHING). Even before Confederation, Edward Hartley Dewart concerned himself with the economic difficulties of Canadian authors and publishers. Three important later institution builders were Pelham Edgar, head of English at Victoria College, University of Toronto, 1903-18; Lorne PIERCE, literary editor of the RYERSON PRESS, 1920- 60; and William Arthur Deacon, book reviewer for the GLOBE AND MAIL and other important Toronto publications, 1922-60. Although these men wrote much about Canadian literature, they also strove to set in place permanent institutional structures to support the growth of that literature. Their projects were precursors to such later ones as the establishment of the NATIONAL LIBRARY (1953) and the CANADA COUNCIL (1957), and the publication of *Literary History of Canada* (1965; rev 1976).

In their attempts to define Canadian literature, critics have been dominated by romantic nationalism. This still-common view sees the nation-state as an ideal association because it is based primarily on linguistic, cultural, social and geophysical unity, rather than on political expediency or the accidents of imperialism. Non-European countries rarely possess the unity required by this theory, and Canada is no exception. For example, Canada has officially recognized BILINGUALISM and MULTICULTURALISM. Critics, therefore, have had the difficult task of identifying national characteristics not shared by Canada and the US or Britain yet common to English and French Canada. Thus Canada's cold climate, northern wilderness and colonial mentality have been seen as crucial in the formation of the nation's literature; more recently, native peoples and myths, French-English relations, and early history have become popular "Canadian" topics. Several general books based on the ideas of romantic nationalism were published; the most representative is perhaps Archibald MacMechan's *Headwaters of Canadian Literature* (1924). E.K. Brown's writings, especially *On Canadian Poetry* (1943), best exemplify the continuing tradition. Lionel Stevenson's *Appraisals of Canadian Literature* (1926) made some interesting revisions to the main tenets of romantic nationalism in order to approach the older generation of Canadian poets more flexibly. Despite its title, W.E. Collin's *The White Savannahs* (1936) falls outside the tradition.

With the 1920s and the introduction of modernist poetics to Canada (documented in Louis Dudek and Michael Gnarowski, *The Making of Modern Poetry in Canada*, 1967) came resistance to romantic taste and to romantic nationalist literary theories. CANADIAN FORUM (1920-) provided the most public medium for the new poetry and its supportive criticism, which was influenced by T.S. Eliot, the Imagists and the French Symbolists. A.J.M. Smith, a central figure in the attack on Canadian romantic poetry and criticism, argued that the focus on writing "distinctively Canadian" poetry led to low standards and a parochial ignorance of foreign innovations. In his introduction to *The Book of Canadian Poetry* (1943), he made an influential distinction between "native" writers, who concentrated on "what is unique and individual in Canadian life," and "cosmopolitan" writers, who make a "heroic effort to transcend colonialism by entering into the universal, civilizing culture of ideas." Although Smith himself recanted in later editions of his book, the "native-cosmopolitan" split has been revived in the debate between Frank Davey, a postmodernist who supports McLuhan's concept of the "global village," and Robin Mathews, a left-wing nationalist.

The greatest contemporary influence on Canadian criticism has been the work of Northrop Frye. Although he approved of Smith's modernist taste, Frye has rehabilitated many of the important themes of romantic nationalist criticism. For example, his view that nature is a major determinant of the "Canadian" quality in our literature is similar to that of Dewart, who wrote in 1864 that Canadian "nature unveils her most majestic forms to exalt and inspire the truly poetic soul." For Frye, Canadian nature inspires the "deep terror" that leads to a "garrison mentality." Because of the threat of a "huge, unthinking, menacing, and formidable physical setting," this mentality promotes the human and moral values of the group over those of the individual.

Frye's ideas influenced D.G. JONES's *Butterfly on Rock* (1970), which argues a change from garrison mentality to communication between man and his formerly frightening surroundings, and Margaret ATWOOD's *Survival* (1972). Atwood sees the Canadian literary fixation on survival as arising less from the threat of the real wilderness than from the threat of American cultural

domination. Detractors from these and other "thematic" discussions of Canadian literature argue that the emphasis on man's relation to the wilderness is not unique to Canadian literature, and that this approach risks equating Canadian content with quality, oversimplifies Canadian-American relations and overemphasizes Canadian landscape at the expense of more time-bound and problematic intellectual, social, economic and political influences.

Frye's ideas have been turned inside out by several writers and critics who, instead of claiming that the land determines the literature, argue that writers invent the land. Eli MANDEL suggests that an environment is "a mental construct, a region of the mind, a myth." Because no one can grasp the variety of the real Canada, we continually evolve, in art, popular culture, journalism, literary criticism and especially literature, an imaginative version of Canada to stand for the real Canada.

The surge of Canadian self-awareness that accompanied the Centennial of Confederation in 1967 encouraged the expansion of Canadian literature courses (*see* LITERATURE IN ENGLISH: TEACHING) and of Canadian criticism. New journals sprang up to join *Canadian Literature,* which had stood alone since its establishment in 1959: *Journal of Canadian Fiction* (1972-), *Essays on Canadian Writing* (1974-), *Studies in Canadian Literature* (1976-) and many others. Many articles in these journals followed thematic lines of criticism. Frank Davey was prominent among those who called for a more formalist and theoretical approach. At the same time, much criticism was being written by novelists and poets, such as Davey, Atwood, Blodgett, Jones, Kroetsch, Mandel, Douglas Barbour, George BOWERING, Dennis LEE, Tom Marshall, Stephen Scobie and Fred Wah, so that the traditional distinction between writer and critic was breaking down.

By the early 1980s the gains of the previous decade were evident in critical articles and were being consolidated in a number of large-scale projects, including *The Oxford Companion to Canadian Literature* (1983, ed William Toye) and ECW Press's proposed 20-volume series, *Canadian Writers and Their Works*. That the bare survival of Canadian literature perhaps need no longer be the central concern of Canadian critics is indicated also by the recent publication of several major works about individual writers: biographies, volumes of letters and monographs. Although definition and promotion will not vanish completely from the Canadian critical repertoire, it seems that Canadian literary culture has achieved the maturity, both institutional and economic, necessary to support the more specific and analytical critical writing typical of an established literary culture. MARGERY FEE

Reading: Carl Ballstadt, ed, *The Search for English-Canadian Literature* (1975); Northrop Frye, *The Bush Garden* (1971) and *Divisions on a Ground* (1982); Eli Mandel, *Another Time* (1977) and ed, *Contexts of Canadian Criticism* (1971); A.J.M. Smith, *Towards a View of Canadian Letters* (1973); David Staines, ed, *The Canadian Imagination* (1977).

Literature in French During the 1960s, "Québec literature" became the established term used in Québec to refer to all francophone literature in Canada. Outside Québec the older expression — French Canadian literature — has not disappeared, and Québecois historians themselves continue to use it for other Canadian French-language literatures: Acadian, Franco-Ontarian and western Canadian. The history of this francophone literature of Canada may be divided into 7 periods.

French Origins (1534-1760) This period began with the travel accounts of Jacques CARTIER and ended with the French regime itself. The metropolis had never allowed printing presses to be installed in the colony: works were published in France and sometimes elsewhere in Europe. Though most of the writers were born in France, a good many may be called Canadians, for they came to Canada while very young and lived here for their most active years. The works of this period consisted primarily of the reports of discoverers (Cartier) and explorers; missionaries' letters (*Les Relations des Jésuites;* selections tr *The* JESUIT RELATIONS *and Allied Documents,* 1963); EXPLORATION AND TRAVEL LITERATURE (Gabriel Sagard, Baron de LAHONTAN); histories (François-Xavier CHARLEVOIX); studies of customs and mores (Joseph-François Lafitau); spiritual writings (MARIE DE L'INCARNATION); annals (Marie Morin); and personal correspondence (Élisabeth Bégon; *see* AUTOBIOGRAPHICAL WRITING IN FRENCH). Few were purely literary works, excepting the writings of Marc LESCARBOT.

Narratives were primarily eyewitness accounts and descriptions. The author was more concerned with educating than amusing his reader, but since he also wanted to be interesting and was often well educated, he frequently wrote in colourful style. His pleasure in writing is contagious: today's reader gains a fresh vision of the country by rediscovering it through eyes that literally looked upon a "New World." It is this aspect that has been most beneficial to many modern writers (Félix-Antoine Savard, Pierre Perrault, Jacques Ferron, Gilles Vigneault). These humanistic works also influenced the literature of France and inspired great writers (Rabelais, Montaigne, the Encyclopedists, Rousseau, Chateaubriand), and contributed to the development of a literature spurning socialized man and lauding the "noble savage."

Canadian Origins (1760-1836) After the CONQUEST of 1760, France yielded Canada to Britain in the TREATY OF PARIS (1763). French Canada was in ruins: it was economically and politically shattered; its administration and commerce had passed into the hands of the conquerors; its educational system had lost its teachers and its resources. The remaining 65 000 Canadiens clustered about their natural leaders: some 125 impoverished seigneurs, 100 or so priests, a couple of dozen men of the law and an equal number of doctors. Isolated from France, loyal to England, involuntarily thrown upon their own resources, they forged their will to live through fidelity to their French origins.

In 1764 the first Québec NEWSPAPER was born, the bilingual *Quebec Gazette / La Gazette de Québec.* Its French translations were appallingly bad and the original Canadien articles either precious in tone or obsequious. A French newspaper, *La Gazette du commerce et littéraire, pour la ville et district de Montréal,* appeared in 1778. It was of good quality but lasted only a year. The first truly Canadien paper, *Le Canadien,* started in 1806. It was devoted to the defence of the rights and liberties of the conquered. With this paper the French Canadian people found their voice and their literature took on a nationalist tone that has been nurtured ever since.

The best writer of the time was journalist Étienne PARENT, editor of *Le Canadien.* He clearly analysed the political battles of the 1830s, and his compatriots, although they did not always listen, respected his independence and lucidity. When he retired from journalism and abandoned politics, he was sought after as an adviser and lecturer; today he is regarded as the first Québec sociologist. Two orators marked the same era: Joseph-Octave PLESSIS, bishop of Québec, whose traditionalist sermons supported the authorities of the day, and Louis-Joseph PAPINEAU, political leader and charismatic populist member of the legislative assembly. There were no indigenous novels and no theatre. In 1830 an inferior imitator of Boileau, Michel Bibaud, published the first collection of Canadien POETRY. That was the sum of Canadien literary production for this period.

The Literary Homeland (1837-65) The political struggles which stimulated the birth of Canadien literature led first to the REBELLIONS OF 1837 and then to the union of Upper and Lower Canada. French Canadians once again lost their homeland but were intellectually better equipped than in 1760. In 1824 and again in 1829, they had created a respectable network of primary schools. This system was reorganized after the union of the Canadas in 1841. At the secondary level, 7 *collèges* were founded after the turn of the century. The students, molded by their studies of Greco-Latin humanities and the French classics, willingly believed that the glory of a people came from its literature.

Two NOVELS appeared in 1837: *Les Révélations du crime,* by François-Réal Angers, an account of a real incident, and *L'Influence d'un livre,* by Philippe AUBERT DE GASPÉ, Jr, who drew his inspiration from anecdotes and FOLKLORE. The adventure novel made its appearance with *Les Fiancés de 1812* (1844) by Joseph DOUTRE and *Une de perdue, deux de trouvées* (1849) by Georges Boucher de Boucherville. The rural novel was born in 1846 with *La Terre paternelle* by Patrice Lacombe and *Charles Guérin* by P.J.O. CHAUVEAU, a great admirer of Balzac. Antoine GÉRIN-LAJOIE gave substance to Chauveau's dream and that of the majority of his compatriots by creating a whole new parish, a kind of homeland in miniature, for the hero of *Jean Rivard* (1862-64). The glory of the nation had its history, which Philippe AUBERT DE GASPÉ, Sr, evoked in *Les Anciens Canadiens* (1863). Napoléon BOURASSA retold the tragic story of the ACADIAN deportation of 1755 in his touching history of an engaged couple, *Jacques et Marie,* 1865-66. The historical novel, like the rural novel, was to be fashionable for a full century. It owed part of its inspiration and success to the best writer of the age, François-Xavier GARNEAU, author of HISTOIRE DU CANADA, which came out in 3 editions between 1845 and 1859. Garneau had the tone of his romantic French masters but added an entirely Canadien fervour (which did not, however, cloud his objectivity). The most highly acclaimed poet of the age, Octave CRÉMAZIE, enchanted his contemporaries with poems that borrowed heavily from history. Today's reader prefers his death-haunted poems and his letters, which attain the status of literary criticism.

Messianic Survival (1866-95) The preceding era had been ideologically turbulent. The INSTITUT CANADIEN, a kind of popular university founded in 1844, had drawn the ire of Mgr Ignace BOURGET, bishop of Montréal, because of the "liberal" contents of its library. The debate between ULTRAMONTANISTS and liberals such as L.A. Dessaulles stimulated thought and produced some interesting texts. Conservatism triumphed after the 1860s; the nation gained homogeneity but lost originality of thought.

In 1866, Fr Henri-Raymond CASGRAIN established literary doctrine for the coming years. Literature was to be the faithful mirror of a Catholic, religious and moral people. He himself showed the way by theologizing history. His footsteps were duly followed: Joseph Marmette and Laure Conan (Félicité ANGERS) wrote "good" historical novels, while poets imitated the French romantics (particularly Hugo and Lamartine) and sang the praises either of NEW FRANCE (Louis-Honoré FRÉCHETTE) or of the small homeland Québec had become once again after CONFEDERATION (Pamphile Lemay, Nérée Beauchemin). Catholic journalism (Jules-Paul TARDIVEL) was dominant; literary criticism (Adolphe-Basile Routhier) was preoccupied with morality. Tedium threatened on all fronts, though it was escaped by Fréchette, a liberal, and Arthur BUIES, the only real Canadien romantic and the only great writer of the age. Also a liberal, Buies had style and showmanship; a chronicler, he observed well; a philosopher, he had independent ideas.

Exile and the Establishment of Roots (1896-

1938) The Liberals who took power in Ottawa in 1896, and then in Québec in 1897 for almost 40 years, were primarily politicians; the ideologues were either dead or silent. The first decades of the 20th century continued the established ideology of the 3 preceding ones: the dominant voice was that of nationalist historian and essayist Fr Lionel GROULX. However, literature grew in importance, thanks to an educational system whose primary and secondary levels, well developed in the 19th century, now prepared students for 2 francophone universities, LAVAL and U de MONTRÉAL.

There was an abundance of poets. The École littéraire de Montréal sought to modernize both form and themes, though with little success except in the case of one poet of genius, Émile NELLIGAN. Between the ages of 17 and 20 (1896-99), Nelligan produced some 170 poems whose quality lifted him well above his colleagues and elders. Like them, he imitated the poets of France, but with more originality and modernity. A few others, the "exotists" (Paul MORIN, René Chopin) and Robert Choquette, thematically exiled themselves from the homeland. But most poets still devoted themselves to "poetry of the soil," with more success than in the 19th century. This trend reached its ultimate expression in *À l'ombre de l'Orford* (1930) by Alfred DESROCHERS.

Rural novels appeared in large numbers. A Frenchman, Louis HÉMON, gave the style an international audience with his MARIA CHAPDELAINE (1914); *Un Homme et son péché* (1935) by Claude-Henri GRIGNON brought it back to Québec; and the genre produced its best example in *Trente Arpents* (1938) by Ringuet (Philippe PANNETON). Historical fiction peaked in 1938 as well, with *Les Engagés du Grand Portage* by Léo-Paul DESROSIERS, and then fell off. Nationalism found poetic expression in *Menaud, maître-draveur* (1937) by Félix-Antoine SAVARD, and was then silent. Criticism, like the novel and poetry, knew a certain strength in this period (Louis Dantin, Marcel Dugas), but it was led by an academic, Mgr Camille ROY, whose literature textbook sustained H.R. Casgrain's influence in the collèges.

The Age of Introspection (1939-57) The economic crisis of the 1930s caused French Canadians to rethink their traditional values; WWII forced them to open themselves to the world and to new ideas. Urbanization was underway; prosperity returned, and education was available to more people. People freed their minds from collective thought; the drama of society as a whole no longer overshadowed individual destiny. Writers became more introspective, in the manner of European writers (Mauriac, Bernanos, Julien Green, Graham Greene, Ibsen). Canadian publishing began to develop. Traditional nationalism was transformed. It was now at the humanistic level that one sought to be a better French Canadian.

The great poets of the era (Saint-Denys GARNEAU, Anne HÉBERT, Alain GRANDBOIS, Rina LASNIER) rejected versifying and the cult of the soil for new forms and new rhythms; they travelled through interior landscapes instead. It was a revelation: unsuspected shadows were found swarming there, but light eventually broke through to show a universe of colour and open space where a new awareness was taking shape. What was once felt to be the collective duty, to survive in the face of the English, was now replaced by an appetite for life as individual men and women among other men and women.

Novelists were developing in the same way. Old stereotypes yielded to more earthy characters, as authors of the psychological novel (Robert Charbonneau, André Giroux, Robert Élie, Jean Simard, André LANGEVIN) created individuals searching for themselves, not for collective salvation. French Canadian society was being transformed: it was being observed with care and a certain wariness, especially in the cities, by the first novelists of sociological analysis (Roger LEMELIN, Gabrielle ROY, Yves THÉRIAULT).

THEATRE (*see also* DRAMA IN FRENCH) abandoned melodrama and comedic variety shows for social satire (Gratien GÉLINAS) and intimate dramas of bourgeois family life (Marcel DUBÉ). The historians, except for Guy Frégault, were no longer purely writers; they sought cold scientific objectivity. Literary criticism marked time, but did so gracefully (Roger Duhamel, René Garneau, Guy Sylvestre).

Québec Literature since 1958 The political and social climate in Québec began to change at the end of the 1950s, the beginning of the QUIET REVOLUTION. Teaching institutions became more democratic; ideologies continued to diversify, and a new nationalism emerged that called for greater sovereignty, even for the independence of Québec. With a few surrealistic flourishes (Gilles Hénault, Roland Giguère, P.M. LAPOINTE) and much lyricism (Gaston MIRON, Jacques BRAULT, Fernand OUELLETTE, Gatien Lapointe, Paul CHAMBERLAND), the poets named their country: no longer Canada, but Québec. The magazine PARTI PRIS (1963-68) added a socialist, populist dimension to the nationalist option. A formalist trend also appeared, however (LA BARRE DU JOUR, *Les Herbes rouges*), whose stylistic exercises and linguistic experimentation led to intellectualization of literature, despite some Marxist, feminist and rock-inspired contributions (*see* LITERARY PERIODICALS IN FRENCH).

Novelists took the lead in the 1960s. They were preoccupied with the form and structure of their works (Jean Basile, Hubert AQUIN, Réjean DUCHARME, Gérard BESSETTE), and managed to borrow some techniques of the French nouveau roman (new novel) without losing their own originality. Female authors led the way in the creation of the poem-novel (Anne Hébert, Marie-Claire BLAIS, Louise MAHEUX-FORCIER). The traditional novel (Roch CARRIER, André MAJOR) still existed, side by side with a novel that wove its form around its words (Victor-Lévy BEAULIEU). Feminist ideology appeared at the end of the 1970s (Nicole Brossard).

Theatre expanded considerably, but moved away from literature in that it became preoccupied with showmanship (Michel TREMBLAY). Even so, it was a platform for new ideologies, such as linguistic populism and feminism. There were a great many ESSAY writers, a few of them literary (Fernand Dumont, Pierre VADEBONCOEUR).

A new criticism was born when Québec literature entered the universities. This criticism attempts to be scientific but as yet lacks originality, since it follows in the wake of its French and American masters. However, it has enormous influence on Québec writers, who are, often simultaneously, both its creators and its followers. Although good writers do produce work for a general audience (Michel Tremblay), the ordinary reader is as likely to turn to American bestsellers. Québec's preoccupation with itself has compelled Francophones in the rest of Canada to look to their own literature. Similarly, the all-powerful nature of the Montréal literary establishment has provoked (with the help of the Québec government) regional movements of self-awareness in other parts of Québec. Montréal has largely replaced Paris as the literary metropolis of the Canadian francophone world. *See also* SHORT FICTION; LITERARY BIBLIOGRAPHY; LITERARY PRIZES; ORAL LITERATURE; POPULAR LITERATURE IN FRENCH.

RENÉ DIONNE

Reading: Pierre de Grandpré, *Histoire de la littérature française du Québec*, 4 vols (1967-69); Réginald Hamel et al, *Dictionnaire practique des auteurs québécois* (1976); Maurice Lemire, ed, *Dictionnaire des oeuvres littéraires du Québec*, 4 vols to date (1978-84).

Literature in French: Criticism and Theory

No French-language literary critic in Canada seems to have stature among writers equal to that of Bayle, Sainte-Beuve or Barthes in France. Nevertheless, several writers have won a degree of prominence as much (if not more) for their works of criticism as for their other writings. Their ranks include members of the interwar generation: Marcel Dugas, whose critical prose has poetic overtones; Berthelot Brunet, whose breezy histories of French and French Canadian literature have much more life than his vapid novels; Victor Barbeau, sole editor and jack-of-all-trades of *Les Cahiers de Turc*, which appeared Oct 1921-Mar 1922 and Oct 1926-July 1927; Valdombre (pseudonym of Claude-Henri GRIGNON), whose virulent pamphlets (*see* ESSAY IN FRENCH) are as much polemic as criticism. This period also saw the critical publications of Albert Pelletier, novelist and journalist Harry Bernard and poet Alfred DESROCHERS. The list is short, not because criticism has been insignificant, but because it has always been considered a marginal literary activity. And that is the paradox. Criticism, because it has usually favoured the established order, bears responsibility for the fact that Quebecers have generally viewed their literature as a reflection of society.

The earliest French Canadian critics were journalists and a few amateurs, who set themselves the task of judging the few publications that appeared according to the norms of the French language and the rules of classical verse. The first literary critic was Valentin Jautard, a Frenchman, editor of the *Gazette littéraire de Montréal*, fd 1778 by his compatriot, Fleury Mesplet. The versatile Michel Bibaud practised the genre in the many publications which he himself founded in rapid succession, such as *L'Aurore* (1816-19), *Le Courrier du Bas-Canada* (1819-20) and *La Bibliothèque canadienne* (1825-30).

Fr Henri-Raymond CASGRAIN was the first to judge works systematically, according to an explicit theory of literature. His goal was to dictate the guiding principles for all literary production: literature had to be "essentially religious and devout" and was to reflect the "genius" of the nation. He made literature his apostolic mission, thus founding a tradition of clerical and moralizing criticism that was to last almost a century. Nobody had as much prestige and influence in this field as Camille ROY. A professor and later rector at UNIVERSITÉ LAVAL, he transposed to Québec the principles of 19th-century French criticism, with emphasis on the methodology and assumptions of Gustave Lanson and, to an even greater degree, the thought of Ferdinand Brunetière. Roy, however, also believed that allowances had to be made for the infant state of the literature to which these principles were being applied. He therefore lavished praise on many mediocre works and saved his wrath for the defence of Catholic morality and the French classical ideal of clarity. Despite occasional opposition, like that of journalist Jules Fournier, who took him to task for applying to nonentities critical methodologies developed for the study of masterpieces, Roy dominated and guided the perception of French Canadian literature for almost half a century. He had many disciples, including Maurice Hébert and priest-critics Albert Dandurand, Émile Chartier, Henri d'Arles, Marc-Antonin Lamarche and Samuel Baillargeon, who produced pedagogic works imbued with the ideals of French classicism and strict moral tone. In contrast, Louis Dantin, who wrote a remarkable introduction to the poetry of Emile NELLIGAN, was a sensitive aesthete and a man of subtlety, eclectic tastes and freedom from doctrinal limitations.

The pro-establishment narrowness of this literature and literary criticism explains the violence of the clash, which lasted 1918-48 under

a variety of forms and pretexts, between the literary schools of the "men of the soil" and the "exotists" — the former seeking a "national" literature expressed in a "Canadien" language, the latter, partisans of French linguistic norms, preaching emancipation from any form of regionalism. The basic argument resurfaced in the 1960s and 70s, this time in the form of a debate about the choice of language and centering on the publications and critiques of PARTI PRIS and the early plays of Michel TREMBLAY.

After WWII, several critics of considerable stature emerged, among them Guy Sylvestre, Pierre de Grandpré, Roger Duhamel and Gilles Marcotte; the last 3 were, at different times, in charge of the literary page of *Le* DEVOIR. From the start of the 1960s, the tradition of journalistic criticism was maintained in the departments or weekly supplements of newspapers such as *La* PRESSE, *Le Devoir* and *Le Droit* and in magazines such as *Lettres québécoises* devoted to current literature. National radio had a few programs of literary criticism, but television (whether Radio-Québec or Radio-Canada) virtually ignored the whole field. The greatest growth of criticism in the last 20 years has been in university literature departments. Though it keeps close watch on French literature, this criticism is primarily concerned with Québec writings. Inspired by the transformations of criticism in France, it has multiplied and diversified its methodologies to thematic analysis, psychocriticism, sociocriticism and, more recently, structuralism and semiotics.

The 3 principal university magazines in Québec are *Etudes françaises* (U de Montréal), *Études littéraires* (U Laval) and *Voix et images* (U du Québec). The universities have also produced a wide range of monographs and surveys, most of them published in university-press collections: "Lignes québécoises" (Presses de l'Université de Montréal), "Vie des lettres québécoises" (Presses de l'Université Laval), "Cahiers du CRCCF" (Editions de l'Université d'Ottawa), and "Constantes" and "Littérature" in the "Cahiers du Québec" series (Editions HMH).

Despite the explosive growth of criticism since 1960 and a tradition that is more than a century old, no history of criticism has yet been written which pays as much attention to its specifically literary evolution as to its ideological evolution. Moreover, critics are now questioning the degree of their dependence on outside — especially French — methodologies and arguing the need to develop their own, along with appropriate literary theories. This may be the trend of the future. *See* LITERATURE IN FRENCH; BOOK PUBLISHING, FRENCH-LANGUAGE.

JEAN-LOUIS MAJOR

Reading: F. Dumont and J.C. Falardeau, eds, *Littérature et société canadienne-française* (1964); G. Laflèche, ed, *Dix ans de recherche québécoise sur la littérature française (1970-1979)* (1980); G. Marcotte, ed, *Présence de la critique* (1966); G. Tougas, *History of French-Canadian Literature* (1966).

Literature in French: Scholarship and Teaching The first substantial publication devoted to French Canadian literature was James Huston's *Répertoire national* (1848-50; repr 1982), a 4-volume annotated anthology of writings culled from early Québec newspapers. During the period of increased literary activity known as the Mouvement littéraire de 1860, Laurent-Olivier David, Henri-Raymond CASGRAIN and Hector Fabre all published inspirational essays on the national literature, and Henry James Morgan's *Bibliotheca canadensis* (1867) included about 100 French-speaking authors. Early anthologies of poems and songs were compiled by Joseph Lenoir (1858), Antonin Nantel (1869) and Louis-Hippolyte Taché (1881). During the 1870s Casgrain, David, Adolphe-Basile Routhier and Louis-Michel Darveau composed bibliographical or satirical portraits of prominent contemporaries, many of whom were authors, and Edmond Lareau issued the first history, or catalogue, of Canadian literature in both English and French (1874). The death of Octave CRÉMAZIE in France in Jan 1879 prompted several articles on his work, and during the following decade Benjamin Sulte and Pierre-Joseph-Olivier CHAUVEAU published short historical accounts of the beginnings of French Canadian poetry. In general, however, 19th-century writing on Québec literature consisted of either anecdotal chronicles or moralizing comment, the latter typified by Casgrain's eulogistic essay on the novel *Angéline de Montbrun* (1884) by Laura Conan (Félicité ANGERS).

In the early 20th century the study of Québec literature became more scholarly. Bibliophiles Philéas Gagnon and Narcisse-Eutrope Dionne compiled extensive bibliographies of Québec publications. Charles ab der Halden, a French academic, wrote articles and gave lectures in Paris on French Canadian authors; these he published as *Études de littérature canadienne-française* (1904) and *Nouvelles Études...* (1907). Mgr Camille ROY, Québec's first literary historian to have studied the new discipline in Paris, began in 1904 to publish remarkably well-informed articles on contemporary Québec writers and on the early history of the literature. These were later incorporated into his numerous collections of essays, his classic study *Nos origines littéraires* (1909) and the successive editions of his influential *Manuel d'histoire de la littérature canadienne-française*, which appeared from 1907 until his death in 1943. Another literary historian, Mgr Emile Chartier, attempted to synthesize the INTELLECTUAL HISTORY of his province in articles collected in *La Vie de l'esprit au Canada français, 1760-1825* (1941). Genuine aesthetic criticism was rare except in the writings of Louis Dantin and Marcel Dugas. Up-to-date anthologies were compiled by Jules Fournier and Olivar Asselin (1920), Camille Roy (1934) and Guy Sylvestre (1942), and secondary-school manuals for the study of French Canadian literature were published by the Sisters of St Anne (1928) and the Brothers of the Christian Schools (1928).

Between the world wars several theses on French Canadian literature were submitted to French universities: those of Antoine Roy *"Les Lettres, les sciences et les arts au Canada sous le règime français,"* Paris, 1930) and Laurence A. Bisson *"Le Romantisme littéraire au Canada français,"* Bordeaux, 1932) are still consulted, as is Louis Le Jeune's *Dictionnaire général. . .* (1931). Most studies of Québec literature published in the 1930s were impressionistic, but the group gathered around the magazine La RELÈVE took an intellectual and universalist position. Serious histories of POETRY (1933) and the NOVEL (1937) were written by Albert Dandurand; an American, Ian Forbes Fraser, compiled the first systematic bibliography of French Canadian poetry (1935), and Jane Mason Turnbull published the best study in English, *Essential Traits of French-Canadian Poetry* (1938). Annual surveys of Québec writing began to appear: the *Bulletin bibliographique* of the Société des écrivains canadiens (1937-59) and the "Letters in Canada" issue of UNIVERSITY OF TORONTO QUARTERLY (1937-).

During WWII publication declined, but Séraphin Marion's *Les Lettres canadiennes d'autrefois* (9 vols, 1939-58) continued to appear. The Archives de folklore de l'Université Laval (1944), the Institut d'histoire de l'Amérique française (1945) and the Bibliographical Society of Canada (1946) were founded. As the war ended Marcel Trudel's thesis *L'Influence de Voltaire au Canada* (1945) and Jeanne Paul-Crouzet's *Poésie au Canada* opened a new period of more rigorous study. The 1950s saw the publication of numerous bibliographical guides by Gustave Lanctôt (1951), Marie Tremaine (1952), Gérard Martin (1954), Antonio Drolet (1955), Philippe Garigue (1956) and Gérard Tougas (1958). The outstanding publications of the decade were Luc Lacourcière's critical edition of the poems of Émile NELLIGAN and Auguste Viatte's *Histoire littéraire. . .* (1954), a pioneering comparative study.

The tremendous upsurge in Québec literary production since 1960 has been accompanied by an unprecedented growth of bibliographical, literary-historical and critical activity. The founding of the Centre de recherche en civilisation canadienne-française at U of Ottawa in 1958 was followed by the creation of similar research centres in the Québec universities. Major undertakings such as the DICTIONARY OF CANADIAN BIOGRAPHY (est 1959), Adrien Thério's annual panorama *Livres et auteurs québécois* (1961-), and the scholarly series "Archives des lettres canadiennes" (1961-) directed by Paul Wyczynski mark the beginnings of contemporary Québec literary scholarship. The Bibliothèque nationale du Québec (est 1968) implemented a wide-ranging program of bibliographical research and publication. Scholarly journals like *Incidences* (1962-69; *Co-Incidences* since 1969), PARTI PRIS, (1963-68), *Etudes françaises* (1965-), *Études littéraires* (1968-), *Voix et images* (1975-), *Jeu* and *Lettres québécoises* (1976-) published articles, interviews and documents.

Since 1960 all forms of literary study have been actively pursued in Québec. Dozens of anthologies have appeared for individual authors (Arthur BUIES, Albert LABERGE), for particular genres (Laurent Mailhot and Pierre Nepveu, *La Poésie québécoise des origines à nos jours*, 1980), or for the whole literature (Gilles MARCOTTE, *Anthologie de la littérature québécoise*, 4 vols, 1978-80). Numerous bibliographies have been compiled by John Hare (in several volumes of "Archives des lettres canadiennes"), by André Beaulieu and Jean Hamelin (*La Presse québécoise...*, 6 vols to 1984), by Pierre Pagé and Renée Legris for radio and television scripts, and by the staff of the Bibliothèque nationale du Québec in various fields. Each volume of the *Dictionnaire des oeuvres littéraires du Québec* (1978-) contains extensive bibliographies of authors and literary periods. Modern histories of Québec literature have been published by Gérard Tougas (1960), Pierre de Grandpré et al (1967-69) and Laurent Mailhot (1974), and biographical or critical studies of more than 50 Québec writers are now available. Réjean Robidoux and André Renaud (1966), Maurice Lemire (1970), Gérard Bessette (1973), Gilles Marcotte (1976) and Jacques Michon (1979) have written important studies of the Québec novel; Paul Wyczynski (1965), Marcotte (1969) and Pierre Nepveu (1979) have published major works on Québec poetry; and Jean-Cléo Godin and Mailhot (1970, 1980) have produced 2 collections of studies of contemporary Québec theatre. Sociologist Jean-Charles Falardeau has investigated (1967-74) relations between Québec society and its literature. Franco-Ontarian literature has been studied (1978-81) by René Dionne and Acadian literature by Marguerite Maillet et al (1979). Critical editions are still few in number (Nelligan, 1952; Saint-Denys Garneau, 1971; Crémazie, 1972-76; Nérée Beauchemin, 1973), but a major collective research project directed by Roméo Arbour, Jean-Louis Major and Laurent Mailhot has numerous editions in preparation. Other large collaborative projects under way are a critical edition of the works of François-Xavier GARNEAU (Paul Wyczynski and Pierre Savard), further volumes of the *Dictionnaire des oeuvres littéraires du Québec* (Maurice Lemire et al) and an augmented edition of the *Dictionnaire pratique des auteurs québécois* (Réginald Hamel, John Hare and Paul Wyczynski).

Despite the early efforts of Mgr Roy, French Canadian literature had been a marginal element of French literary studies in Québec university courses until the 1950s. During the following decade programs of specialization in French Canadian studies were established at

Laval, Montréal, McGill and Sherbrooke universities, and at the new Université du Québec from its founding in 1967. Québec literature is now the subject of as many university theses in Québec as is French literature. Elsewhere in Canada undergraduate courses in French Canadian literature began in the 1930s or 1940s and graduate study in the 1950s, but on a more limited scale than in Québec. In recent years Canadian COMPARATIVE LITERATURE (English and French) has become a popular field of study, particularly at the universities of Sherbrooke and Alberta.

DAVID M. HAYNE

Lithuanians Lithuania is a small country on the southeastern coast of the Baltic Sea. The first recorded Lithuanian immigrants to Canada were soldiers serving in the British Army in the early 19th century. At the end of the 19th century and in the early 20th century many Lithuanians (for the most part unskilled workers), fleeing Tsarist police or in an attempt to improve their livelihoods, immigrated to Canada and settled in Nova Scotia, western Canada and Ontario. The 1921 census recorded 1970 people of Lithuanian origin in Canada; another 5000 emigrated in the 1920s and 1930s. Most of these early Lithuanian immigrants found work on farms and the railways and in coal mines and factories in Toronto and Montréal. The largest number arrived after WWII, when thousands of Lithuanians, fleeing Soviet occupation, fled westward and found themselves in displaced persons' camps. Calling themselves *Dievo Paukštai* ("God's birds"), almost 20 000 of these refugee Lithuanians, many of whom were well-educated professionals, craftsmen and artists, made their way to Canada. In the 1981 census, 18 240 persons in Canada claimed Lithuanian ancestry, of which half also claimed to be able to speak Lithuanian. Most Lithuanian Canadians reside in Ontario, but substantial numbers are settled in Québec, Alberta and BC.

Social and Cultural Life Lithuanians have integrated easily into Canadian society but have maintained a strong sense of their former identity through a variety of clubs and of singing and dancing groups. Mutual aid societies were founded in the 1900s. All Lithuanian Canadians are considered members of the Lithuanian Canadian Community (1952), which has 20 chapters; its National Council in Toronto maintains links with the Lithuanian World Federation. The community holds Saturday classes across Canada in Lithuanian language, history, religion and folklore. Lithuanians are predominantly Roman Catholic.

Reading: Adam and Filomena Kantautus, *A Lithuanian Bibliography* (1975; *Supplement*, 1980).

Littérature qui se fait, Une, (1962), Gilles MARCOTTE's innovative study of the evolution of LITERATURE IN FRENCH, is an anthology of his early essays about major writers. Analysing the problems confronting authors who have outgrown the old values of church, family and the land without fully articulating new values, Marcotte identifies the experience of vertigo as a constant in urban fiction. The 19th-century poet was isolated from European cultural centres; the modern poet is a double or inner exile, searching for a language with which to inhabit the landscape. Marcotte suggests that Québec writers, successfully voicing the poetics of solitude, express alienation, despair and silence (Hébert, Blais, Jasmin) or escape into the worlds of death, dream and the past (Nelligan, Saint-Denys Garneau, Lozeau). With the appearance from 1949 onward of Roland GIGUÈRE'S writings, the Québec poets' apocalyptic vision began to confront the physical realities of life. Larry Shouldice's anthology *Contemporary Quebec Criticism* (1979) offers a translation of the chapter "The Poetry of Exile."

MICHÈLE LACOMBE

Little, Jean, writer, lecturer (b in Taiwan [Taichung], Formosa [Taiwan] 2 Jan 1932 to Canadian medical doctors). A successful contemporary writer of children's fiction, Little has won the Canada Council Children's Literature Award as well as foreign acclaim. She was educated at U of T and was a special education teacher before her royalties made her self-supporting. Almost blind since birth, she has nevertheless travelled to 27 foreign countries, and her books are widely translated abroad. Her 11 novels for young readers, and one book of poetry, treat with insight such universal themes as loneliness, alienation, intolerance, family stress, and the difficulties in interpersonal and intercultural relationships. Her best-known book is *From Anna* (1972), which has sold more than 130 000 copies.

MARY RUBIO

Little, Philip Francis, lawyer, judge, politician (b in PEI *c*1822; d at Monkstown, Ire 22 Oct 1897). Arriving in Newfoundland in 1843, Little found himself in the midst of the Reform struggle for the right of local Roman Catholics to practise law. The constitution of the Law Society at the time excluded that denomination, which particularly grieved a Reform Party supported almost exclusively by Irish Catholic voters. Little's PEI bar membership enabled him to become Newfoundland's first practising RC lawyer, and Reformers greeted his arrival as a victory and championed his election to the Assembly in 1850. He soon unified various anti-government forces in demanding self-government. By 1855 he had become premier and attorney general in Newfoundland's first responsible administration. In a short-lived tenure as premier, Little helped stabilize political affairs and led a successful resistance against France's efforts to extend her traditional fishing privileges. Ill health forced his retirement to the bench in 1858, from which he soon retired to Ireland.

JOHN GREENE

Little Theatre Movement Canada's community theatres can be traced back to the beginning of settlement. All THEATRE during the French colonial period was amateur, whether produced by high society, the Jesuit and Ursuline schools, or the military garrisons. These 3 traditions extended into the 18th and 19th centuries, and paralleled the coming of the professional touring companies. Essentially, they were Canada's indigenous theatre until Confederation and beyond. Garrison productions in particular attained high standards while bolstering morale and raising funds for charity. Other highlights were the theatricals inaugurated in 1873 at Rideau Hall by Lord and Lady Dufferin, and maintained by various governors general thereafter. With Confederation, 1867, the British troops were gradually replaced by North-West Mounted Police. While the "Mounties" played the cultural role for some years, it was the gentry who assumed the theatrical mantle and the "Little Theatre Movement" as we know it took form. Perhaps the oldest surviving civic, amateur group was the Garrick Club in Hamilton, which began in 1875 and metamorphosed into Hamilton's Players' Guild in 1929. The French-speaking equivalents were literary and theatrical circles; one of the earliest, the Cercle Saint-Henri, dates from 1878. Paul Cazeneuve, a Montréal professional, organized the first French amateur festival in 1908, the Concours de l'île. This was in response to Gov Gen Earl Grey's Musical and Dramatic Competition initiated in 1907, and held in Ottawa, Montréal, Toronto and Winnipeg until 1911. This contest would be the precedent for the famed Dominion Drama Festival (DDF), launched in 1933 by yet another governor general and one to be, Lord Bessborough and Vincent MASSEY.

The Little Theatre's golden era occurred between the 2 world wars. Inspired by European troupes, such as André Antoine's Théâtre Libre in Paris and W.B. Yeats's and Lady Gregory's Abbey Theatre in Dublin, the movement began as an idealistic reaction to the crass professional fare on tour around the turn of the century. With the rise of films and radio after WWI, the commercial theatre declined and literally hundreds of community theatres blossomed across Canada to fill the vacuum. Hart House Theatre (1919-) became the model; some of the finest were the Vancouver Little Theatre (1921-) and Carroll Aikins's short-lived Home Theatre at Naramata, BC (1920-24); Toronto's University Alumnae (1918-); the Cercle Molière in St-Boniface (1925-); the Ottawa Little Theatre (1913-); the Montréal Repertory Theatre (1930-61) and Father Legault's Compagnons de Saint-Laurent (1937-52); and the Halifax Theatre Arts Guild (1931-). Perhaps only with director-playwright Herman Voaden's "symphonic expressionism" during the 1930s and the left-wing Theatre of Action (1935-40), both in Toronto, did the Little Theatre achieve some new directions. "Agit-prop" theatre was vital across the country throughout the Depression, but the idealism had evaporated and the early experimentation gave way to comic and sentimental plays reflecting the waning colonial ties of Empire, whether French, British or American.

In 1932 the DDF was created, and for a time it was Canada's national theatre, a network of community companies that assembled each spring in a different city for a final week-long competition that distributed coveted awards for acting, directing, design and best production. These finalists had been chosen by a system of regional runoffs. Both the preliminary and final festivals were adjudicated by bilingual professionals usually imported from Britain or France. Until 1951 it was a one-act play festival and did much to foster the writing of original short plays in Canada, as well as developing Canadian actors and directors for the profession. During WWII the DDF was shelved, and many felt it was this break in continuity that triggered the eventual downfall of the organization. The postwar DDF evolved into a full-length play festival, but the rise of professionalism reduced its importance. Increasingly, Canadian adjudicators were hired and colonial ties were broken. In 1967 the DDF distinguished itself by convening an all-Canadian contest at a time when Canadian plays were not seen regularly. The organization was renamed Theatre Canada in 1970 and lovingly documented in Betty Lee's history *Love and Whisky* in 1973. But these were vain attempts to capture former glory. Money and interest dried up, and the Ottawa office of DDF Theatre Canada closed in 1978.

Amateur theatres today continue to flourish in great numbers, usually in small communities or suburban areas and often still evincing a noticeable London or Parisian accent. They also function as focal points for multicultural expression (*see* THEATRE, MULTICULTURAL). Little theatres still serve an important training role and fill an avocational need. Without the Little Theatres and the DDF, the indigenous theatre would not have bridged the 2 wars. Being avocational, they were able to exist unsubsidized through a decade of economic depression. The roots of a national theatre in Canada were amateur, even though only a few groups, such as the Winnipeg Little Theatre, Workshop 14 in Calgary and the London Little Theatre, made the actual transition to professional status. *See also* DRAMA; STAGE AND COSTUME DESIGN.

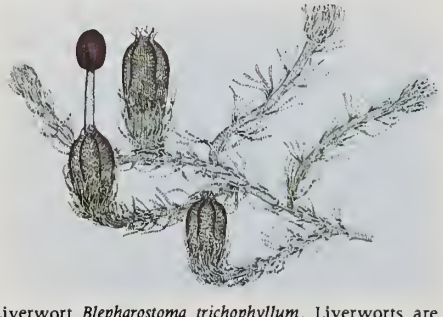
DAVID GARDNER

Liverpool, NS, Town, pop 3304 (1981c), inc 1897, is situated near the mouth of the Mersey R, at the head of Liverpool Bay, 115 km SW of Halifax. It occupies the site of a MICMAC village called *Ogomkegea* ("place of departure") and was



called Port Rossignol by De Monts. Named after the English city, Liverpool was a fishing centre for New England from at least 1670 but was not settled until 1759, by New Englanders of Pilgrim stock. During the American Revolution, when privateers ran rampant along the coast damaging shipping, the townspeople fitted out the famed Liverpool privateers. As it became a major seaport in the 18th century, its SHIPBUILDING industry flourished and with it the timber trade that sent products to Great Britain, the US and the Caribbean. The fall of the Bank of Liverpool, est 1871, ruined the county's fortunes and precipitated a long decline in the shipbuilding and timber industries. This prosperity was partially recovered with the establishment of the Mersey pulp and paper mill in 1929, and (reminiscent of the days of the privateers) with rum-running during the Depression. Fish and timber remain the town's main resources.
JEAN PETERSON

Liverwort, small terrestrial PLANT belonging, with MOSSES and hornworts, to division Bryophyta. Bryophytes show alternation of generations, ie, have 2 stages in the life cycle: a free-living, perennial gametophyte (sexual generation) and a short-lived sporophyte (asexual generation) that remains attached to and dependent on the gametophyte. The liverwort gametophyte is either a leafy stem or a thallus, ie, a flat, leafless expanse of cells (resembling the lobes of the liver, hence name). The horizontally growing gametophytes have rhizoids (structures analogous to roots), which serve to attach them to the surface on which they grow. Most leafy liverworts have stems with 2 lateral rows of leaves; many species have a third row of reduced leaves on the underside of the stem. Liverwort sporophytes have a foot, embedded into the gametophyte tissues, and a spore capsule, normally raised above the gametophyte by a fragile stalk and persisting for only a day or so. Spores are released when the capsule wall ruptures, generally into 4 sections. Inside the capsules are hygroscopic cells (elaters), which help to disperse the spores. Many liverworts reproduce asexually by gemmae, small groups of cells produced on the thallus or leafy stem. Since they lack any conducting tissues (xylem, phloem), liverworts mainly absorb water directly through leaves, stems or thallus. The 2 theories of liverwort evolution state that they developed from a primitive group of vascular plants (ie, those having true conducting tissues) or from some green algal ancestor. They belong to a group that lost much evolutionary potential by having the gametophyte generation dominant and by lacking conducting tissues, so that their size is greatly limited (most range from a few millimetres to 20 cm). Liverworts grow mostly in moist, shady places on rocks, trees, rotten wood, humus or soil. In Canada, they are rarely abundant in ground vegetation except in the temperate rain forests of coastal BC, where they can dominate ground cover and densely clothe branches and tree trunks. Over 7000 species occur worldwide, about 85% having leafy gametophytes.
GUY R. BRASSARD



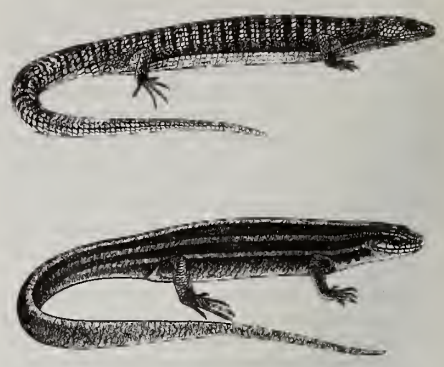
Liverwort *Blepharostoma trichophyllum*. Liverworts are rarely abundant in Canada, except in the temperate rain forests of coastal BC, where they can dominate ground cover and clothe the branches and tree trunks (*courtesy National Museums of Canada/National Museum of Natural Sciences*).

Livesay, Dorothy, poet (b at Winnipeg 12 Oct 1909). A writer of journalism, short fiction, autobiography and literary criticism, Livesay is best known as a strong, sensitive poet dealing as capably with public and political issues as with personal and intimate emotion and reflection. She was senior woman writer in Canada during active and productive years in the 1970s and 1980s, and 1983 marked her 55th year as a published poet. Her mother, Florence Randal Livesay, journalist, poet and translator, and her father, J.F.B. Livesay, general manager of Canadian Press, encouraged her literary efforts from her first publication, *Green Pitcher* (1928). Educated at U of T and the Sorbonne, she worked in left politics during the 1930s, and subsequently won Gov Gen's Awards for *Day and Night* (1944) and *Poems for People* (1947). She trained as a teacher, taught in Zambia 1959-63 and has served as university writer-in-residence. Her prolific publication continues undiminished, and her lifelong concern for women's rights and the identity of the woman artist has ripened with time. A major collection of her poetry, *Collected Poems: The Two Seasons*, was published in 1972.
R.D. MATHEWS

Liveyer (also liveyere, livyer, livier, liver), a Newfoundland term applied historically to a permanent resident of Newfoundland or Labrador, one who was not a migratory resident of the coast during the summer fishing season as was the BYE-BOAT keeper or Labrador stationer. Compared with the island's summer population, the liveyers were small in number throughout the 1600s, fewer than 1 in 6 summer residents remaining year-round. This component expanded during the 18th century so that by 1800 about 90% of the summer population of Newfoundland remained through the winter (*see* FISHERIES HISTORY).
ROBERT D. PITT

Lizard, common name for members of the most diverse of the 5 groups of living REPTILES. Most lizards occur in warm, sunny, dry climates. Some 3307 species have been recorded. Six types, ranging from 8-21 cm long, occur in Canada: northern alligator lizard (*Gerrhontus coeruleus principis*) in southern BC, including southern Vancouver I; western skink (*Eumeces skiltonianus*) in south-central BC; pigmy horned lizard (*Phrynosoma douglassii douglassi*) in the extreme S of the Okanagan Valley; eastern short-horned lizard (*P. d. brevirostre*) in SE Alberta and SW Saskatchewan; northern prairie skink (*E. septentrionalis septentrionalis*) in SW Manitoba; and 5-lined skink (*E. fasciatus*) in SE Ontario. Lizards are included with SNAKES in order Squamata of subclass Lepidosauria. Both have dry skin covered with epidermal scales. Most lizards have legs, a long tail, movable eyelids and well-developed ears. Some have adopted snakelike habits and may be very long and slender, with tiny or not externally visible legs. Some burrowing lizards have lost the eyes and ears. Snakes are thought to have evolved from lizard ancestors which underwent reduction of limbs, eyes and ears while adapting to a burrowing life-style.

Most lizards produce eggs which must be fertilized inside the female. Mating is preceded by complex courtship behaviour and by display and combat among males to defend territories and among females against each other. Most lizards form a leathery shell around eggs, which are laid in a protected site and abandoned by the female. In some species (eg, northern alligator lizard, horned lizards), females retain eggs inside their bodies until fully developed young are born. Some whiptail lizards and lacertas occur only as females which lay fertile eggs without mating, one of the few cases of parthenogenesis (a form of asexual reproduction) found among VERTEBRATES. The adaptation may have developed to allow small numbers of lizards to use small, isolated patches of suitable habitat.



Alligator lizard (*Gerrhontus coeruleus principis*) (top), and five-lined skink lizard (*Eumeces fasciatus*) (bottom) (*courtesy National Museums of Canada/National Museum of Natural Sciences/Charles Douglas*).

Most lizards are predatory, feeding on small invertebrates. The S American tegus and Old World monitor lizards will eat other reptiles and even mammals. The Komodo dragon (a 3.5 m monitor), the world's largest lizard, can kill deer and wild pigs. Tropical New World iguanas and some Old World agamas are the only herbivorous lizards.

Despite their small size, most lizards are capable of fast movement and usually will easily outdistance a predator or human pursuer to cover. The limbs are held in a sprawling position directed outward from the sides, but when lizards run, the body is raised clear of the ground. A few, eg, Australian frilled lizard and basilisks of Central America, have large hind legs and can run with forebody and forelegs off the ground and the tail elevated as a counterweight. Two species, the gila monster of southwestern US and the Mexican beaded lizard, are poisonous. Their alertness, complex behaviour and often bizarre shapes, colours and colour patterns make lizards a rewarding and fascinating subject for study.
K.W. STEWART

Ljungh, Esse Willem, radio-drama producer, actor, director, teacher (b at Malmö, Sweden 1904). Educated in Sweden in arts and law, he emigrated to Canada in 1927, worked as a farmhand for 2 years and acquired his own farm near Radville, Sask. After losing his farm during the Depression he moved to Winnipeg, to edit a small Swedish-language farm paper. He acted in the Winnipeg Little Theatre and during the late 1930s became interested in radio, first as an actor, then as audio technician, producer and director. He became famous for his imaginative use of sound, artistic integration of music and inspiring direction of actors. He joined the CBC in Winnipeg in 1942 and was transferred to Toronto in 1946. With Andrew ALLAN and J. Frank Willis he became one of Canadian radio's leading producers. His work ranged from the prestigious Wednesday Night series to the popular "Jake and The Kid" programs written by W.O. MITCHELL, the long-running soap opera "Brave Voyage" and the musical "G.E. Hour." He tried TV in the late 1950s but returned to radio and was national supervisor of radio drama

when he retired in 1969. He was awarded the Diplôme d'honneur by the Canadian Conference of the Arts, the John Drainie Award for distinguished contribution to Canadian broadcasting, and the Order of Canada.

JOHN L. KENNEDY

Lloyd, Gweneth, ballet director, choreographer, teacher (b at Eccles, Eng 15 Sept 1901). As founding director and choreographer of what became the ROYAL WINNIPEG BALLET, Lloyd exemplifies the spirit of initiative and imagination that helped build Canada's cultural institutions. Trained first as a physical education instructor in England, she later studied Greek dance and BALLET. In 1927 she opened her own dance school in Leeds. In 1938, with former student Betty FARRALLY, Lloyd immigrated to Canada, settling in Winnipeg. There she quickly opened a school and Winnipeg Ballet Club — from which a full-fledged professional company developed. Apart from a National Film Board production of Lloyd's *Shadow on the Prairie* (1952), little record remains of the more than 30 ballets she choreographed for her company, 1939-52. The records of her ballets were destroyed in a 1954 fire at the Royal Winnipeg's studios. Lloyd left Winnipeg in 1950 to found a school in Toronto. In 1946 she helped establish, and began a long association with, the BANFF CENTRE'S summer dance program, becoming director of the program in 1950. With Farrally, Lloyd resettled in Kelowna, BC, in 1957, opening a new school. Lloyd's many honours include the Order of Canada (1977). MICHAEL CRABB

Lloyd, Woodrow Stanley, educator, politician, premier of Saskatchewan (b near Webb, Sask 16 July 1913; d at Seoul, South Korea 7 Apr 1972). Lloyd was best known for his fight for free universal medical care in Saskatchewan and for his contributions in the field of education. From 1939 to 1944, as vice-president and then president of the Saskatchewan Teachers' Federation and on the executive of the Canadian Teachers' Federation, Lloyd worked for better teaching conditions and higher standards. As minister of education in the CCF government 1944-60, he introduced larger school units to improve financing and facilities and articulated the "lighted school house" concept of continuing education for all.

He became premier 7 Nov 1961, inheriting a bitter dispute over medical care which culminated in the withdrawal of doctors' services on 1 July 1962. He refused to abandon the principle of a universal government health plan, and his calmness, restraint and dignity in an explosive situation led to a settlement on July 23. Lloyd resigned as leader of the Saskatchewan NDP on 6 July 1970 and left politics in 1971. He became representative of the UN Development Program in South Korea. JEAN LARMOUR

Lloydminster, Alta-Sask, City, pop 15 031 (1981c), is located on the Saskatchewan-Alberta border, 300 km W of Prince Albert and 235 km E of Edmonton. It came into being with the arrival of the BARR COLONISTS in 1903. "Britannia Settlement" was the name in common usage before it was changed to Lloydminster in 1903 to honour Rev George Exton Lloyd, an Anglican minister who guided the destiny of the colonists after the departure of Rev Isaac Barr. When Saskatchewan and Alberta were created in 1905, the townsite found itself divided between the





Lobster boats, Skinners Pond, PEI. Several Atlantic coast communities are dependent on the lobster fishery (*photo by Richard Vroom*).

2 provinces. The problem was solved in 1930 when the Saskatchewan town of Lloydminster and the Alberta village of the same name were amalgamated as the town of Lloydminster by order-in-council in both provinces. The town became the tenth city of both provinces in 1958 when it was raised to city status. Natural resources in the area include oil, natural gas, salt, gravel and coal. DON HERPERGER

Lobster, term applied to 4 groups of decapod ("ten-footed") CRUSTACEANS: the coral, slipper, spiny and clawed lobsters. They comprise 163 species. The American lobster (*Homarus americanus*), found along the Atlantic coastline and Continental Shelf from Labrador to N Carolina, is the only species occurring in Canadian waters. It attains the greatest weight of any living arthropod: the largest male *H. americanus* on record weighed over 19 kg. Lobsters are not native to the Pacific coast of Canada, but from 1896 to 1966 there were at least 11 separate introductions of American lobsters into BC waters, and even more along the US West Coast. In Canada, introductions probably totalled no more than 5000 adults. Although American lobsters seem able to survive in the Pacific, there is no evidence that any of the introductions has resulted in a reproducing population. The clawed *Homarus* genus is the *homard* of French cuisine. The clawless spiny lobster [Fr *langouste*] is also known as CRAYFISH. *See* CRUSTACEAN RESOURCES.

D.E. AIKEN

Lobstick (or lopstick) is a tall, conspicuously situated spruce or pine tree with all but its topmost branches stripped or lopped off. This was done by northern Indians, and later by voyageurs, to turn trees into talismans, landmarks or memorials. JOHN ROBERT COLOMBO

Local Elections are the procedures by which citizens in a community choose the MUNICIPAL GOVERNMENT. Federal and provincial election systems are generally designed by a nonpartisan independent agency, and since the 1960s responsibility for redesigning constituency boundaries for local elections has sometimes been delegated to independent boundary commissions (*see* REDISTRIBUTION), reducing the possibilities for gerrymandering or for the drawing of election rules to the advantage of incumbents.

Constituency boundaries, known as "wards" in municipal elections, may conform to one of 3 types. In smaller urban centres, election at-large is common; the municipality as a whole is the constituency. Vancouver is the largest city using this system, which works to the advantage of corporate, professional and blue-ribbon civic groups. To reduce the costs of city-wide campaigning, other large cities such as Edmonton, or Winnipeg prior to 1971, have adopted division into a few multi-member "strip" wards that do not respect natural geographic or community boundaries. Wards may also be drawn in a "block" design to encompass neighbourhoods, a system favoured by left-of-centre politicians and spokesmen for community associations and some minority groups. Montréal, Toronto and now Winnipeg elect on this basis.

Canadian local elections are nominally nonpartisan. City elections, unlike provincial and federal elections, are held at a fixed time (designated by the Municipal Government Act). Parties are not identified on the ballot (names are listed alphabetically), and most candidates are elected as independents or are loosely attached to a local party. Voter turnout is low (30% is considered good), and incumbents enjoy a considerable advantage because voters recognize their names. At-large elections magnify these problems because the voter must make so many ballot choices. To become a candidate usually requires only a nominal cash deposit and the filing of a petition on the candidate's behalf by a small number of electors.

Historically the right to vote was tied to property holdings, and the property had to be of a certain value (although this restriction became unimportant in the 20th century because the required values were not adjusted for inflation). The tenant of a house is a property holder; a lodger is not. An apartment dweller may or may not be considered a property holder, depending on the relevant legislation. The practice of plural voting, ie, being entitled to vote in each municipality or ward (sometimes in each polling division) where property is owned, was widespread until the last 2 decades. Nonresident property owners still possess a local vote in several provinces (eg, Ontario). Since the mid-1960s, the provinces have widely extended the FRANCHISE so that it is virtually universal and a right of citizenship. There is frequently a municipal enumeration before an election. Votes are normally tabulated on a plurality basis, and the person (or persons, where there is a multimember ward or at-large election) receiving the most votes is declared elected; in the past, various provinces, eg, Manitoba, have permitted their municipalities to employ a form of proportional representation using a transferable ballot. Finally, unlike federal and provincial politicians, municipal councillors are elected for an established term of 2 or 3 years, which may have policy implications: eg, unpopular or controversial decisions would not normally be expected of a council in the months immediately prior to the fixed voting date. *See* CITY POLITICS. JAMES LIGHTBODY

Reading: D.J.H. Higgins, *Urban Canada: Its Government and Politics* (1977).

Local Government, the level of government below the provinces. The most important local governments are the MUNICIPAL GOVERNMENTS. Under the constitution, the provinces have exclusive jurisdiction over municipal affairs (*see*

MUNICIPAL-PROVINCIAL RELATIONS). Each province has established a slightly different system of municipal institutions (*see* MUNICIPAL ADMINISTRATION), but there is a strong family resemblance among these systems, because they are all derived from British or American models. Canada's first uniform municipal system was established in 1849 in what was then Canada West [Ontario]. The other provinces followed the Ontario example, and most of the populated area of Canada is now organized into municipalities, although there are great tracts of sparsely populated land that remain unincorporated for municipal purposes. In the latter areas, local administration falls to the PROVINCIAL GOVERNMENT or the territorial government, although in some places quasi-municipal institutions, such as improvement districts, have been formed.

A local government is distinguished from a local administrative office of the province in that it is chosen by and held accountable to the local community, conventionally by means of LOCAL ELECTION. Other local administrative bodies may also be elected. This is generally true not only for SCHOOL BOARDS, but may also be true for public utilities commissions, parks boards and other special-purpose agencies. The municipal council is therefore not the only elective local government in most Canadian communities. There is a further complication in that many other more or less autonomous local agencies — harbour commissions, library boards and police commissions — have been established by the provincial or federal governments or by the municipalities themselves. However they are constituted, these agencies often operate like independent local governments. In no Canadian community is the situation quite similar to that in metropolitan Chicago, where more than 1000 special-purpose and general-purpose local governments are at work, but the system of local government is everywhere complex and is unique to the community concerned. The bigger the community, the more complex the system: in metropolitan TORONTO, researchers have identified more than 100 authorities that could be classified as "local governments."

Despite these complexities, the municipalities remain the most important elements in systems of local government. In most places, the municipalities are the only general-purpose governments at the local level and the municipal council is therefore usually the focus of attention in local politics. The council is expected to concern itself with matters of general interest to the community and to represent the community in its relations with the outside world. The powers granted to the municipalities under the Municipal Acts of the various provinces reflect this, for municipal councils are the repositories for local government functions not assigned to other agencies. The multiplication of special-purpose bodies at the local level itself is testimony to the role of the municipalities, since these bodies have been formed to relieve the general-purpose governments of the ostensibly specialized functions that they are ill equipped, as general governments, to perform.

In each province, there are different classes of municipalities. The most important distinction is between urban and rural authorities. The latter — called TOWNSHIPS, parishes, districts, rural municipalities, etc — have the most limited functions. Generally, their most important duty is to maintain roads. People in rural areas have rarely been willing to pay for very active local government. On the other hand, in urban areas where there is a need and demand for more government activity, the situation is different. Urban municipalities are classifed by size as villages, towns and cities; to be reclassified upwards means an increase in prestige and in the powers of the municipal council. City councils are the most active municipal governments and have played a major role historically in developing new public services and the regulations necessary to modern life.

The relative increase in the activities of the provincial governments since 1945 is partly the result of an effort to make city-quality services available elsewhere. In the course of this effort, functions once performed at the municipal level (if they were performed at all) have been taken over by the provincial governments. This applies particularly to social services. What remains at the core of municipal activity is a set of economic functions. Municipal councils have always been expected to serve as agencies for local economic development. Most of them regard it as their first responsibility to provide the infrastructure for the local economy, eg, physical facilities such as roads and sewers, and basic services such as POLICE and fire protection. Since 1945, the urban municipalities in particular have attempted to play a more positive role by using physical planning controls to set the pace and determine the form of economic development. Planning issues have thus become central to municipal politics.

Municipal councils and other elective local authorities in Canada are generally quite small. Most comprise from 5 to 15 members; only the largest municipalities are liable to have bigger councils. It is usually feasible for the council (or school board) to act as its own Cabinet, with the mayor (or chairman) taking the leading role. Because most councillors are theoretically nonpartisan, collegial decision making is possible. Most councils divide themselves into committees for the different municipal functions, and this eases the burden on the central body. The traditional tendency to delegate duties to semi-autonomous agencies (whose boards are largely appointed by the municipal councils) further reduces the scope of responsibility at the centre. Since the beginning of this century, critics have been pointing to the problems arising from this dispersal of municipal responsibilities and from the connected emphasis on lay participation in administration. As a result, there have been constant efforts to make local government more professional and to centralize managerial control. In some municipalities, full administrative responsibility is given to a single manager or administrative board, acting under the political direction of the council. Elsewhere — especially in large communities — the function of executive control has been taken over by a committee of the council. In either case, ordinary councillors have become more removed from day-to-day business and stronger managerial control has been established over diverse activities.

Municipal governments must generally depend on real property taxes for most of their own revenues. This limits their financial capacity, and forces them to rely on provincial grants, which limit municipal discretion. Indeed, the municipalities and other local governments have been used increasingly as mere administrative agencies of the province and have been subjected as such to tight controls. Even when local governments are acting independently, using their own revenues for their own purposes, they are subject to the laws and regulations of the province. These may severely restrict local freedom of action, and force the governments concerned to seek provincial approval for capital spending, land-use regulations and other items of local concern. The provincial department of municipal affairs is normally the most prominent agency of control, but other departments and administrative tribunals (eg, the Ontario Municipal Board) are also involved. Local governments simply do not have the autonomy in relation to the provinces that the latter enjoy in relation to Ottawa.

Many critics have claimed that local government could be strengthened by consolidating existing authorities into larger units with wider responsibilities. This would mean eliminating most, if not all, of the special-purpose local governments and redrawing municipal boundaries to bring suburbs and satellite towns under the control of city councils. In rural areas, whole regions or counties might be unified. However, the provinces have little incentive to create local governments that would rival them in power and prestige. Thus, the trend throughout Canada has been to make comparatively minor adjustments in boundaries and functions, and to preserve local government arrangements in the face of socioeconomic change.

The most obvious recent development has been the double-tiering of municipal government. The COUNTY councils of central Canada have traditionally provided a second-level of municipal government outside the cities. These councils are composed of representatives of neighbouring rural and small urban municipalities and exist to provide common facilities and services. This model for joint action was not adopted in major urban areas until 1953, when the municipality of Metropolitan Toronto was established. The new authority was in effect a metropolitan county council for Toronto and its suburbs. To deal with problems of metropolitan development and planning, it was given greater powers than any ordinary county, and it was successful enough to inspire many imitators in Canada and elsewhere. Most of the major cities in Canada now have metropolitan or regional governments of this sort. The model has also been applied outside the metropolitan areas to strengthen or replace existing county government (as in Ontario) or to create a new level of regional municipal government (as in BC).

The creation of new units of regional municipal government reflects a more general tendency in the past few decades to enlarge the scale of local administration. Health, education and welfare administration — traditionally entrusted to special-purpose local authorities — has generally been regionalized, if not provincialized. Thus the independent local authorities that remain in these fields tend to be on a larger scale. The municipalities have been less affected by consolidation than have the school boards, in that generally they have maintained their existence even when over-arching REGIONAL GOVERNMENTS have been established. Some consolidation has occurred, especially of very small municipalities, but there are still 4000 to 5000 municipal governments in Canada, and new ones continue to be formed. It is difficult for provincial governments to persuade local communities to take responsibility for their own affairs without organizing municipal councils. Once created, these councils become symbols of local autonomy which are not easily eliminated.

To those concerned about comprehensive planning and administrative co-ordination, the fragmentation of authority at the local level among thousands of municipalities and even more numerous special-purpose bodies is the source of much anxiety. However, it is not clear that consolidation would increase the efficiency or effectiveness of local government, because bureaucratic centralization creates its own problems. Whatever advantage there is in the present system arises from the opportunities it affords for local initiative and citizen participation. To simplify present arrangements and consolidate authority in the hands of strong regional councils would be to close off many of these opportunities. This may occur regardless, but so long as the demand remains for effective local control over local public activities, the system of government at this level will remain as complex as it is now.

WARREN MAGNUSSON

Reading: D.J.H. Higgins, *Urban Canada and its Government* (1977); Warren Magnusson and Andrew Sancton, eds, *City Politics in Canada* (1983).

Lochhead, Kenneth Campbell, painter (b at Ottawa 22 May 1926). He attended the Pennsylvania Academy of Fine Arts, 1945-49, and in 1950 was appointed director of the School of Art, Regina. He was one of the REGINA FIVE and was instrumental in the establishment of the Emma Lake Workshop for Artists. His nonreferential works of the 1960s reflected the New York aesthetic imparted via workshop leaders, such as American artists Barnett Newman and Kenneth Noland, and he was included in Clement Greenberg's 1964 "Post-Painterly Abstraction" exhibition. Lochhead taught at U of Man 1964-73, York U 1973-74 and U of Ottawa from 1975. In the 1970s he reintroduced recognizable subject matter into paintings which nevertheless remain largely intuitive, colourist exercises.

NORMAN ZEPP

Lock, Édouard, choreographer (b at Casablanca, Morocco 3 Mar 1954). He first attracted attention with *Rémus* in 1978, choreographed for Nouvelle aire. He founded Édouard Lock and Dancers 1981 (later Lock/Danseurs; currently LA LA LA). His major works include *Lily Marlène in the Jungle* (1981), *Oranges* (1982) and *Businessman in the Process of Becoming an Angel* (1983), a musical. Lock aspires not to aesthetics in style but to maximum risk, emphasizing high energy, contradictory physical impulses and gestural detail. A predilection for on-stage litter indicates that he may be veering towards performance art. He received the Jean A. Chalmers Award for choreography in 1982. KATI VITA

Locke, John Lambourne, astronomer (b at Brantford, Ont 1 May 1921). After service in the Royal Canadian Navy in WWII, Locke graduated from U of T in 1946. He received his doctorate in 1949 and was appointed astrophysicist at the Dominion Observatory, Ottawa, that year and chief of its stellar physics division in 1959. From 1959 until 1962 he was officer in charge of the new Dominion Radio Astrophysical Observatory near Penticton, BC. In 1966 he was appointed radio astronomer in the radio and electrical engineering division of the NATIONAL RESEARCH COUNCIL. He became director of the division in 1970 and first director of the council's Herzberg Inst of Astrophysics in 1975. He was a member of the Canadian team that in 1967 successfully combined simultaneous observations from radio telescopes thousands of kilometres apart. The team received a Rumford Premium from the American Academy of Arts and Sciences. A.H. BATTEN

Lockhart, Grace Annie, pioneer of women's university education (b at Saint John 22 Feb 1855; d at Charlottetown 18 May 1916). On 25 May 1875, Lockhart received a bachelor of science and English literature from Mt Allison Coll, Sackville, NB, and thus became the first woman in the British Empire to receive a bachelor's degree. Although her later life was spent in a more conventional role, as the wife of the Methodist minister J.L. Dawson, Lockhart's academic achievement as a student provided clear evidence of the justice of women's claim to full rights in the field of higher education.

JOHN G. REID

Locomotives and Rolling Stock A locomotive is a self-propelled vehicle which hauls nonpowered vehicles on railway track. The first locomotive used in Canada was the *Dorchester,* built by Robert Stephenson and Co in England (1835). It ran between La Prairie and St-Jean, Qué, on Canada's first railway, the CHAMPLAIN AND SAINT LAWRENCE (1836). It had a 0-4-0 wheel arrangement (no front truck, no rear truck, 4 main wheels) with 1.2 m diameter driving wheels. In working order it weighed 5½ t and ran at an average speed of 23 km/h. The first locomotive to be constructed in Canada was built by the James Good family (1853) of Toronto. Named *Toronto,* the locomotive had a set of 4 driving wheels and 4 small front wheels for better travel through curves. This wheel configuration, 4-4-0, was referred to as the American type and was the predominant style of locomotive during the 1850-90 period. By 1887 the CANADIAN PACIFIC RAILWAY owned nearly 400 of these locomotives.

The Pacific locomotive was developed (1901) to provide faster service for passenger trains. This locomotive had larger cylinders than the American, greater boiler capacity and tremendous hauling power. During the first part of the 20th century locomotives continued to grow in size and power output. In 1927 CANADIAN NATIONAL RAILWAYS introduced the Northern locomotive. It had wheels in 4-8-4 configuration and was the largest freight and passenger locomotive east of the Rockies. At about the same time, CPR brought into service 2 types of locomotives, the Hudson and the Selkirk. The Hudson locomotive was used for high-speed passenger service. The Selkirks were the largest locomotives to operate in Canada and were used in the Rockies between Calgary and Kamloops.

The diesel engine, invented by Rudolf Diesel in the late 1890s, was first used in a diesel-electric locomotive in the US (1924). CN Railways operated the first diesel-electric locomotive in Canada. Built in 1929, it was actually 2 locomotives coupled, developing 950 kW of power each. Until the end of WWII diesel locomotives in use in Canada were low-horsepower switching engines. After the war railways began to use diesel-electric locomotives for mainline freight and passenger service. By 1960 both CN and CP railways had stopped using steam locomotives in regularly scheduled trains.

The diesel-electric locomotive uses a diesel engine to power an electric generator. The generator provides electrical energy to drive the motors on each locomotive axle. Diesel-electric locomotives are more economical to operate than steam locomotives. They have higher fuel efficiency, lower maintenance requirements and fewer breakdowns. Several units can be coupled for long trains, requiring only one engineer to operate all of them. Today most freight trains are hauled by units of approximately 220 kW (3000 hp) with 4 or 6 axles. Locomotives for passenger trains have higher gearing that gives them a higher normal operating speed.

The first electric locomotives in Canada went into service in 1906, when the St Clair tunnel at Sarnia was electrified to overcome problems with steam locomotive smoke. The Mount Royal tunnel in Montréal was electrified in 1915. Electric locomotives are clean and have low maintenance. They are not dependent on a single energy source; they can use electricity generated by coal, oil, nuclear or hydro power. Electric locomotives have the ability to withstand overload power levels for short periods, making them well suited to mountainous regions where steep grades and heavy trains predominate. Their fast acceleration makes them preferable for passenger service. They have 2 major disadvantages: they can run only where overhead wire (catenary) for electric power has been installed; and they and their necessary power supply equipment are expensive and thus economical only in regions of heavy traffic.

Rolling stock consists of nonpowered railway cars for the transport of freight and passengers. On the earliest railways, passenger cars were merely modified stagecoaches. Freight cars were of 2 basic types: open-deck flatcars and enclosed boxcars. Until 1910 most rolling stock was constructed of wood on iron or steel frames. Today, freight and passenger cars are constructed of steel and aluminum. Modern freight cars are capable of carrying up to 100 t of freight. Freight cars are of a wide variety: boxcars for general merchandise; tank cars for liquids; refrigerator cars for perishable goods; hoppers and covered hoppers for bulk commodities; flatcars for large machinery, containers and highway trailers; tri-level automobile carriers; plus various special-purpose freight cars. The caboose, the last car in the freight train, provides office space for the train crew as well as a position from which to observe the train.

The passenger coach is the standard piece of railway passenger rolling stock, seating usually 75 to 90 people. Commuter cars used in short runs have higher-density seating. Club cars are the premium of passenger rolling stock, providing more room per passenger as well as an attendant for service. For long-distance rail travel, sleeping cars provide berths and small rooms for overnight accommodation. On-board meals are provided in a cafeteria car, and at the seat in club cars.

Locomotives are constructed in Canada by 2 companies: Bombardier and General Motors Diesel. Bombardier of Montréal is the descendant of Montréal Locomotive Works, a builder during the era of steam locomotives. General Motors Diesel of London, Ont, builds locomotives from the designs of the Electro-Motive Division of General Motors in the US. Freight cars are constructed in Canada by the following companies: Hawker Siddeley (with plants at Thunder Bay, Ont, and Trenton, NS); National Steel Car Corporation of Hamilton, Ont; Procor, Ltd, of Oakville, Ont (builders of tank cars); and Marine Industries of Sorel, Qué. Passenger cars are constructed by Bombardier and Hawker Siddeley.

Future designs of locomotives will be influenced by fuel economics. Diesel-electric locomotives will probably be made more fuel-efficient. Electric locomotives may be placed in service as the price of diesel fuel increases. Research is being carried out on the design of a modern computer-controlled steam locomotive using coal as fuel. For passenger service, higher-speed trains will be placed in service, perhaps in advanced electric or magnetically levitated and propelled trains. Freight cars will become more lightweight in construction. Containerization of cargo will increase the ability to transfer freight between the various transportation modes. Highway tractor-trailers with railway wheels for train service will reduce the need for flatcars and hence reduce train weight. JEFFERY YOUNG, CANADIAN INSTITUTE OF GUIDED GROUND TRANSPORT

Locoweed, common name for PLANTS of genera *Astragalus* and *Oxytropis* of pea family (Leguminosae), notorious for causing livestock poisoning. *Astragalus* is also known as milk vetch. Both genera have pealike flowers and featherlike leaves. *Oxytropis* flowers have lower "keel" petals prolonged to points; plants are usually stemless. *Astragalus* species have blunt keels; stems are evident. Both grow in clumps of spikes; height and colours vary. Over 1000 *Astragalus* and about 300 *Oxytropis* species are found worldwide, 40 and 15, respectively, in Canada. Arctic or alpine species are unimportant to domestic animals. The most important Canadian plains species are *Oxytropis lambertii,* southern Manitoba and Saskatchewan; *O. campestris,* BC to Manitoba; and *O. sericea,* Alberta. Poisonous *Astragalus* species include *A. bisulcatus, A. racemosus* and *A. pectinatus,* all found in Canada. *Astragalus* species accumulate selenium from soil, but the toxic principle is not clearly established. "Loco," Spanish for "crazy," refers to peculiar movements of poisoned horses. In Canada most poisonings occur among cattle. *See* POISONOUS PLANTS. J.M. GILLETT

Locust, *see* GRASSHOPPER.

Lodge, Rupert Clendon, philosopher (b at Manchester, Eng 1886; d at St Petersburg, Fla 1 Mar 1961). He went to the US in 1914, then to U

of A and finally to U of Man, where he spent most of his career. Lodge was the most widely read of all philosophers in Canada and his books were popular in the US. *An Introduction to Logic* (1920) portrays his commitment to idealism, though his later philosophy of pluralism was his public trademark. Throughout a series of books he developed his tripartite theory: there will always be 3 kinds of responses to every philosophical question — that of a realist, a pragmatist and an idealist. His publications include several works on Plato. Lodge's theory of philosophical pluralism is applied rigorously in his books *The Questioning Mind* and *The Philosophy of Education* (1937), *The Philosophy of Business* (1945) and *Applying Philosophy* (1951). *The Great Thinkers* (1949, 1964) continues to be consulted.

ELIZABETH A. TROTT

Log Houses are associated with pioneer settlement, past and present, and Canada's forests provided ready building material. West Coast Indians used log frames for their large plank houses long before the arrival of European settlers. Most of the first farmhouses in NEW FRANCE were constructed of posts driven vertically into the ground, a technique used in NW France and by some local Indians. Later, the posts were placed on a sill or foundation above ground level. This method was displaced by the *pièce-sur-pièce* technique: roughly squared, relatively short logs were laid horizontally, to meet at rabbeted corners. Tapered ends of the logs fitted into slotted vertical posts at house corners and along the walls. Fur traders carried this technique into the Red River valley and the HBC adopted it as its standard building form ("Hudson's Bay Company frame") for its posts across the continent.

A wide variety of size and complexity in log houses characterized southern Ontario settlements. LOYALIST settlers introduced "Pennsylvanian" or "American" log houses, with horizontal logs interlocked at the house corners by a variety of techniques, a style originating with 17th-century Swedish-Finnish colonists on the Delaware R, refined by later German settlers and adopted by far-ranging Scots-Irish pioneers. Although most log houses were later replaced by houses constructed of other materials, many are still occupied as residences. Later immigrants to the PRAIRIE WEST often patterned their first log houses after customary forms of their homelands (eg, Ukraine). In the subarctic forests, log houses still provide comfortable shelter for trappers and woodsmen. Their attractive appearance and thermal efficiency make them popular not only with summer cottagers across Canada, but among many people with a renewed interest in traditional housing.

WILLIAM C. WONDERS

Reading: T. Ritchie et al, *Canada Builds 1867-1967* (1967); William C. Wonders, "Log Dwellings in Canadian Folk Architecture," *Annals of the Association of American Geographers*, 69.2 (1979).

Logan, John Daniel, writer, teacher (b at Antigonish, NS 2 May 1869; d at Milwaukee, Ill 24 Jan 1929). Though engaging in many occupations during his life and publishing poetry, literary and music criticism, literary history and composition texts, Logan is probably most renowned for his claim to have taught the first university course on Canadian literature (at Acadia in 1915) and for a ferocious battle he conducted with Archibald MacMechan of Dalhousie about the teaching of Canadian literature there. A brilliant student, completing BA, MA and PhD degrees, he worked in advertising, archives and journalism as well as teaching many years in American colleges and universities.

R.D. MATHEWS

Logan, Mount, elev 6050 m, is Canada's highest mountain and the second highest in N America after Mt McKinley. Situated in the Yukon's St Elias Range near the Alaska border, it has



Mt Logan, named for Sir William Logan, is the highest mountain in Canada *(photo by Richard Harrington)*.

3 summits. One of the most massive mountains in the world, it rises above surrounding glaciers to an immense snow-and-ice plateau at 5200 m, stretching 16 km E to W, and at 3050 m the mountain measures 38 km E to W. The Arctic Institute of N America conducts high-altitude research from a high camp on the mountain each summer. Well hidden from early explorers, it was first sighted by I.C. Russell in 1890. It was named for W.E. LOGAN, founder and longtime director of the Geological Survey of Canada. The largest logistical MOUNTAINEERING expedition in N America succeeded in climbing it for the first time in 1925. The climbing team of A.H. MacCarthy, W.W. Foster, F. Lambart, A. Carpé, H. Hall, R.M. Morgan, N.H. Reid and A. Taylor left McCarthy, Alaska, May 12. All except Morgan and Hall made the summit on June 23.

GLEN BOLES

Logan, Sir William Edmond, geologist, first director of the GEOLOGICAL SURVEY OF CANADA (b at Montréal 20 Apr 1798; d at Castle Malgwyn, Cilgerran, S Wales 22 June 1875). Logan identified and mapped the major geological structures of the PROVINCE OF CANADA, in particular the Laurentian and Huronian series of the Precambrian SHIELD.

He attended Alexander Skakel's school in Montréal and the Edinburgh High School. In 1816 he took a year of medical studies at the U of Edinburgh before entering an uncle's business. From 1831 Logan managed the Forest Copper Works near Swansea. A systematic thinker by nature and anxious to find a reliable source of coal, he mapped the nearby coal seams topographically and cross-sectionally. These highly accurate maps were adopted by the Geological Survey of Great Britain. In 1840 Logan read to the Geological Soc of London his theory of the *in situ* formation of coal, which enabled geologists to determine the location of workable deposits of carboniferous strata. Logan's reputation as a geologist, his Canadian birth, and his social and family connections in Montréal secured him the position of geologist of the Province of Canada in Apr 1842.

By 1844 Logan and one assistant, Alexander Murray, had divided the geological formations of the province into 3 main divisions; he concluded reluctantly that none could be expected to yield coal. But Logan justified continued public funding of the Survey in other ways. He founded a geological museum; mapped the often uncharted lands he surveyed; analysed the copper-bearing N shore of Lk Superior. As a result of his outstanding collection of Canadian minerals and his geological map of Canada, exhibited at London's Crystal Palace in 1851, Logan became the first native Canadian inducted into the Royal Society of London for achievements in Canada. Similarly, at the Paris Exposition in 1855, he was awarded the Cross of the Legion of Honour. A knighthood followed in 1856. While the Survey continued investigations in both laboratory and field, Logan in 1863 published *Geology of Canada*, followed in 1865 by an atlas and in 1869 by a larger geological map. This masterly analysis of Canada's geological structures and economic minerals earned Logan the Royal Soc's Gold Medal in 1867.

The enormous expansion of the Geological Survey after Confederation had been anticipated by Logan as a natural development. He retired to South Wales in 1869 and was succeeded by A.R.C. SELWYN. Undaunted by the "Herculean task," Logan had forged Canada's first public scientific endeavour from its initial precarious decades into a permanent institution.

SUZANNE E. ZELLER

Reading: B.J. Harrington, *Life of Sir William E. Logan* (1883); Morris Zaslow, *Reading the Rocks* (1974).



Sir William Edmond Logan, brilliant geologist who, as the first director of the Geological Survey of Canada, forged Canada's first public scientific endeavour; portrait by W.D. Bentley *(courtesy Public Archives of Canada/ C-119978)*.

Logo, a symbol, mark or word used by a corporation or other organization to distinguish its products, services or identity from those of anyone else. First used in 1937, the term was originally an abbreviation for "logogram" or "logotype" (both derived in part from Gk *logos*, "word"). It came into general use in Canada among marketers and designers in the 1960s, and by the mid-1970s it had become, to the layman, a synonym for "trademark."

One of the first details a new company must consider is its corporate image, reflected in the design of a symbol to be used in advertising and on packaging, vehicles and stationery. A long-established company may redesign an old trademark or adopt a new one, as CANADIAN NATIONAL RAILWAYS did in 1960. For many years CNR had used a realistic maple leaf as a frame for a dark square within which appeared "Canadian National Railways" in white, each word under the next. The designing of a new mark was entrusted to James Valkus of New York, who asked Toronto designer Allan R. Fleming to take on the assignment. After months of work, Fleming joined the letters C and N into one continuous flowing line, to symbolize the movement of people, materials and messages across the country. The design, accepted by CN, created a national controversy. There were complaints that it looked like a "tapeworm rampant" or the numeral 3 on its back; but around the world the idea of having a simple, bold logo had come into vogue.



VIA Rail logo (*courtesy Canapress*).

Many Canadian firms adopted new corporate symbols such as the M for the BANK OF MONTREAL, designed by Hans Kleefeld of Stewart & Morrison Ltd, who also designed the AIR CANADA symbol of a maple leaf within an open circle. Burton Kramer and Allan Fleming created the animated C design for the CANADIAN BROADCASTING CORPORATION-Société Radio-Canada. The Canadian Confederation Centennial symbol, a maple leaf composed of 11 equilateral triangles to represent the 10 provinces and the territories, was the work of Stuart Ash of Gottschalk & Ash Ltd, and Georges Beaupré designed the NATIONAL FILM BOARD symbol representing the eyes of mankind seeing the world. *See also* GRAPHIC DESIGN.

FRANCES E.M. JOHNSTON

Reading: Yasaburo Kuwayama, *Trademarks & Symbols*, 2 vols (1973); C.J. Werkman, *Trademarks* (1974).

Lombardo, Guy (Gaetano Alberto), bandleader, violinist (b at London, Ont 19 June 1902; d at Houston, Tex 5 Nov 1977). His dance band, the Royal Canadians, was the most popular in N America, selling some 300 million records in over 50 years, despite critical disdain for its bland style. In 1923 Lombardo went to Cleveland, Ohio, together with other London musicians, including his brothers: Carmen (1903-71), a saxophonist, singer and later successful songwriter ("Coquette," "Boo Hoo," etc), and Lebert (b 1904), a trumpeter. In 1924 they took the name Royal Canadians. Their New Year's Eve broadcasts (later telecasts) from New York's Roosevelt Grill — the band's base 1929-62 — were a traditional part of N American celebrations, known especially for their "Auld Lang Syne" theme.

MARK MILLER



London, Ont, a regional base for business and government, with the Thames R in the lower right. The site was chosen by Governor Simcoe as the future capital of Upper Canada. The arrival of the Great Western Ry in 1854 ensured its growth as the regional centre of the rich agricultural land of SW Ontario. The city today is a financial, commercial and educational centre as well as an active regional centre of the arts (*photo by Ron Nelson Photography Ltd*).

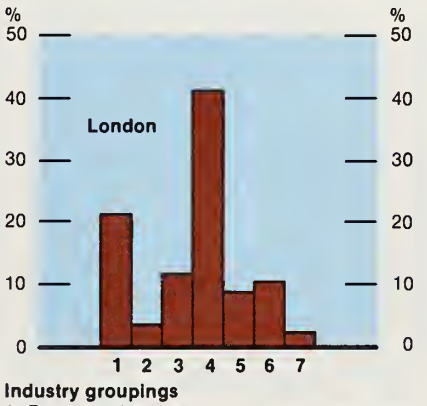
London, Ont, the seat of Middlesex County, is centrally located in the SW peninsula of the province, on the Québec-Windsor corridor midway between Toronto and Windsor. Due S lies Lk Erie, with Lk Huron to the NW. London's market and service area to the N and NE includes much highly productive farmland. To the SW and SE lie intensive cash-crop areas, especially Canada's main tobacco-growing area. Noted as a financial, educational and medical centre, London is also a regional base for business and government.

Settlement Originally within the territory of the Attiwandaronk nation (NEUTRALS), London began as a 405 ha site reserved by John Graves SIMCOE 1793 as the future provincial capital. There were then few European settlers W of Lk Ontario, but after Thomas TALBOT's colonization scheme expanded N from Lk Erie, it became expedient to relocate the seat of the London Dist at the reserved townsite. Construction of the masonry courthouse — a fortresslike structure with crenellated towers — followed the beginning of formal settlement in 1826.

Development SW Ontario saw a large influx of settlers during the 1830s and the new town grew apace. The Rebellion of 1837-38 led to the stationing in London of the largest body of troops W of Toronto; from this time dates London's reputation as a "garrison town." During the 1840s improved road links stimulated commercial growth, and the many hotels, merchants, banks and newspapers reflected the town's regional primacy. The opening of the GREAT WESTERN RAILWAY (Niagara-Hamilton-Windsor) in 1854 ensured London's growth as a regional centre. In 1855 it was incorporated as a city (pop 12 000). It thereafter became the seat of a Roman Catholic and an Anglican diocese (Huron). With further railway construction and settlement, and an oil boom to its W, the city's economy grew and London began to develop a financial role with the formation of companies, now nationwide, such as London Life Insurance, Canada Trust Co and Avco Finance. Manufacturing, especially brewing, developed as well. Both John LABATT and John CARLING were associated with London; the headquarters of JOHN LABATT CORPORATION is still here.

In 1863 the Anglican Huron College, precursor of UNIVERSITY OF WESTERN ONTARIO (1878), was founded. In the following decades, schools and

Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980

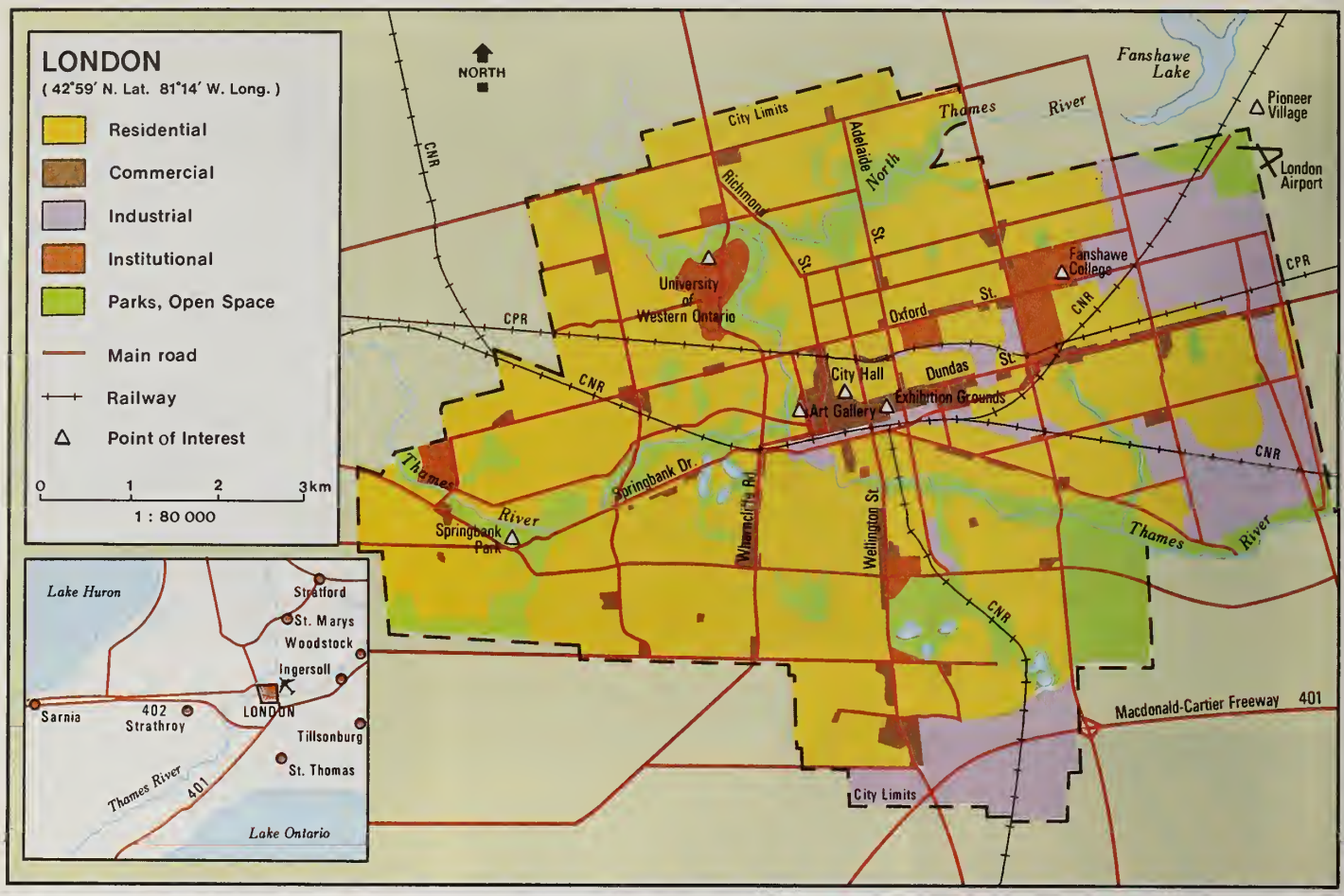


Industry groupings

1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figure II, Catalogue 31-209, Statistics Canada.



colleges of other denominations were added. A Provincial Asylum (1870) was the first regional hospital. University Hospital, famous for neurosurgery, is one of 3 current general and teaching hospitals.

Cityscape London's older central portion is a grid of wide streets laid out on level ground between N and S branches of the Thames R. The city's suburban expansion post-1945 has moved N, W and S, on somewhat higher land. Distinct neighbourhoods centered on shopping plazas now extend in a nearly complete circle around the older core, which is still a lively office and shopping precinct. London's 19th-century houses are commonly built of a pale yellow ("white") brick, frequently with a distinctive keyhole- or horseshoe-shaped side window.

Known as the "Forest City," its many 19th-century street-side plantings are chiefly of large silver maples. The total city area includes one-sixth in open space; Springbank, the largest park (113 ha), contains Storybook Gardens, a childrens' zoo. Planning activity occurred sporadically until 1946, when a planning board was formed, leading to the first offical plan and zoning bylaw in 1949. A massive annexation doubled the city's area in 1961.

Population For most of its history, London's population has grown more by in-migration than by natural increase. Of the city's population in 1981, 21% had come from outside Canada. In 1981, 63% of the population was of British stock, and 3% French.

Economy and Labour Force London's hinterland contains some of the best agricultural land in Canada, and the city's regional centrality is constantly being strengthened by improved communications. Of a total 1981 labour force of 137 075, 36% were in service industries, 21% in manufacturing, 18% in trade, 7% in financial work, 5% in public administration, 5% in construction and 6% in transportation and communications. Manufacturing in 1978 had a value-added of about $1 billion — about one-fifth of the SW Ontario region.

Transportation From the mid-1850s, London has been a major railway junction and division point. The London and Port Stanley Railway provided connections with Lk Erie until 1976. As many as 11 trains a day run between London and Toronto. A regional highway node in the 1930s and 1940s, London is connected by freeways to Windsor, Sarnia and Hamilton-Toronto (Hwy 401). These connections have encouraged a considerable tourist industry. The local airport supports feeder services to Toronto, Ontario, Sarnia and Cleveland, Ohio, with a daily flight to and from western Canada. Internally, a horsecar system gave way to streetcars in 1895 and since 1940 the city has used buses only.

Government and Politics During its history London has for the most part been governed by a mayor and aldermen representing 4 wards. After the 1961 annexation, the city added 3 wards and adopted a board of control (mayor plus 4 directly elected controllers) in addition to the 14 council aldermen. City politics are not strongly polarized, and issues tend to concentrate on control over peripheral expansion, attraction of business, viability of the city core, etc. The public and separate (Catholic) school boards and the Public Utilities Commission are also elected bodies.

Cultural Life An active community of artists, both creative and interpretive, gives the region's cultural life great vitality. London has been home to several nationally and internationally known artists — notably Paul Peel, Greg Curnoe and Philip Aziz. The Regional Art Gallery (1980) supports the visual arts. Western's Faculty of Music has contributed greatly to vigorous musical activity; there are orchestras, including the Orchestra London, choirs and outstanding organists. Museums include a pioneer village and Indian site.

One TV and 3 radio stations operate from London; there is one daily newspaper, the *Free Press*. London competes in Junior A hockey (the Knights) and various amateur sports; the many university teams also attract city spectators.

C.F.J. WHEBELL

Reading: F.H. Armstrong and D.J. Brock, *The Rise of London.*

Population: 254 280 (1981c); 283 668 (CMA)
Rate of Increase (1971-81): (City) 13.9%
Rank in Canada: Twelfth (by CMA)
Date of Incorporation: Town 1847; City 1855
Land Area: 177 km²
Elevation: 248 m
Climate: Average daily temp, July 20.5°C, Jan -6°C; Yearly precip 940 mm; Hours of sunshine 1930 per year

London and Bristol Company, est 1610, the first formal attempt to colonize NEWFOUNDLAND. A group of merchant "adventurers" from London and Bristol, Eng, obtained a royal charter giving them title to Newfoundland's E coast. The first governor of the colony at CUPIDS, in Conception Bay, was John GUY, a respected Bristol resident. After brief success, disillusionment brought about by climatic severity, hostility from English West Country merchants who sent out ships seasonally to fish in Newfoundland waters, PIRACY and the realization that non-fishery activities were unprofitable, led to the company's demise in the 1620s. F.W. ROWE

London Conference, beginning 4 Dec 1866, in which Canadian, Nova Scotian and New Bruns-

wick delegates met with the British government in London, Eng, was the important transitional stage between the 1864 QUEBEC CONFERENCE and the 1867 BRITISH NORTH AMERICA ACT. The major issue was the educational clauses of the Québec Resolutions. There was strong lobbying in London by bishops from the Maritimes, notably Archbishop Connolly of Halifax, to get guarantees for Roman CATHOLIC separate schools — schools that existed by custom, though not by law — in all 3 provinces. Maritime delegates resisted, and what emerged was Section 93 of the BNA Act, which protected whatever separate schools existed by law at the time of CONFEDERATION. This guaranteed the separate school systems in Québec and Ontario, but not in Nova Scotia or New Brunswick. Early in 1867 the London Resolutions were redrafted into the BNA Act. P.B. WAITE

Reading: W.L. Morton, *The Critical Years: The Union of British North America, 1857-1873* (1964).

Lonergan, Bernard Joseph Francis, Jesuit priest, philosopher-theologian (b at Buckingham, Qué 17 Dec 1904 d at Pickering, Ont 26 Nov 1984). Lonergan, a brilliant, original thinker, was of the highest rank. For many years his ideas have been studied by scholars in various fields. In addition to the original Lonergan Research Centre, founded in 1971 at Regis Coll, Toronto, where Lonergan had his academic and spiritual home, there were, in 1984, 9 similar centres around the world. The originality of his work lies principally in the area of method where through a penetrating study of the mind in action he demonstrated the methodical interrelation of the natural and social sciences, philosophy and theology. Lonergan was a professor at the Gregorian U, Rome (1953-65), at Harvard (1971-72) and at Boston Coll (1975-83). His honours include companion of the Order of Canada and fellow of the British Academy. Lonergan's work is too rigorously intellectual and specialized to be widely known, though popular journals have taken note of congresses held to study his ideas. His works include *Insight: A Study of Human Understanding* (1957) and *Method in Theology* (1972). WILLIAM O. FENNELL

Long-Distance Running refers to the running, generally off-track, of distances longer than 3000 m. During the 1970s the upsurge of interest in long-distance running in Canada and elsewhere gained much of its impetus from the growing popularity of running as a form of exercise to improve FITNESS. Increased numbers of entries in clubs and organized races forced improvements in race categorization. The simple 4-division arrangement of men's and women's novice and men's and women's open was enlarged to include men's and women's masters, with 10-year age stages and under-18 age divisions. However, the 26-mile, 385-yard (42 km) marathon, for most, remained the golden challenge. The marathon dates from ancient Greece; its official distance was set in the 1908 Olympics, being the 26-mile distance from Windsor to London, England, with an additional 385 yards to finish opposite the Royal Box at the stadium.

The burgeoning interest in running has revived some defunct Canadian races. The Old Home Summer 10-Miler resurrected the Halifax Herald Modified Marathon, which was first run in 1907. It drew crowds until 1942, when WWII halted its continuation. In 1926, responding to his father's bribe of a trip to compete in the Boston Marathon, a 21-year-old miner from Sydney, NS, John C. Miles, ran the Modified and finished first. In Boston, Miles battled reigning Olympic champion Albin Stenroos and the race favourite, Bostonian Clarence DeMar, to win the 1926 Marathon in a time of 2:25:40, 4 minutes faster than the previous course record. In 1982 N America's oldest race, the Hamilton "Around-the-Bay" race, had been run 74 times since its inception in 1894. The route, just over 30 km, launched the career of another great runner, Tom LONGBOAT. In 1906 Longboat defied gamblers' odds of 60-1 in winning the Hamilton race. He won the Boston Marathon in 1907 and, despite a US protest about his amateur status, competed for Canada in the marathon of the 1908 London Olympics, but did not finish. Other Canadians who have won the Boston Marathon are Jack Caffery (1900, 1901), Fred Cameron (1910), James Duffy (1914), Édouard Fabre (1915), Dave Komonen (1934), Walter Young (1937), Gérard Coté (1940, 1943, 1944, 1948), Jerome Drayton (1977) and Jacqueline Gareau (women's open, 1980). Another noteworthy victory was William Sherring's first-place finish at the mid-Olympiad festival in Athens, Greece, in 1906.

Newer races offer unique challenges to racers. The Nanisivik Midnight Sun Marathon is run on a 32 km trail of rubble, virtually the only road in the area, some 725 km above the Arctic Circle. It takes place in June, when the sun never sets in the Arctic. Where Nanisivik, like many other races, is a test of individual endurance, the Banff-Jasper Relay is a test of team endurance. The race is a dream realized for Edmonton runner and architect Jan Tereszczenko. Beginning in Jasper, Alta, it follows the 287.25 km Icefields Parkway to Banff and runs continuously for up to 24 hours, until the 17 stages are covered by no less than 5 and no more than 17 members of each relay team. In 1982 the Toronto Olympic Club set a new course record of 16:47:45.

Marathons are staged in most major Canadian cities. These and shorter races are run by notable men's open racers such as Jerome Drayton (Canadian marathon record, 2:10:09, Fukuoka, Japan, 1975) and Paul Bannon, 1978 Commonwealth Games medalists for the marathon; Mike Dyon, 1981 runner of the year, men's open division, who has a personal-best marathon time of 2:14:28; and Peter Butler, Canadian record holder for 10 km with a time of 28:19:07. Women's open notables include Cynthia Hamilton, Canadian marathon champion with a 1982 New York finishing time of 2:38:12; Linda Staudt, 1981 Canadian runner of the year, women's open division, who finished the Montréal Marathon in 2:33:33; and Jacqueline Gareau. As well, there is a wide field of master's competitors in every race. Men's master Bob Moore was 7th in the Vancouver International Marathon with a time of 2:24:10 and 10th in the Bermuda Marathon at 2:30:50. Women's master Diane Palmason became master Canadian and N American female champion when she was 3rd overall woman finisher in the 1981 Oakland marathon. World record holder Art Taylor had times in the 1982 N American and Canadian championships, 50+ age division, of 35:08 for 10 000 m and 17:04:08 for 5000 m. Some athletes are enticed to run even greater distances. Al Howie holds the Canadian records for several ultra marathon distances — 50 km in 3:12:46, 50 miles in 5:35:12, 100 km in 7:30:31, 100 miles in 14:06:18 as well as the Canadian 24-hour race record with a distance of 150 miles, 352 yards. Before attempting unsuccessfully to break his own 24-hour race record in the 1983 Sri Chinmoy 24 Hour Race, Howie ran from Winnipeg to Ottawa, a distance of 1500 miles. However, this distance is overshadowed by Kanchan Stott's achievement. On 29 Nov, 1983, 37-year-old Stott reached Halifax, NS, 207 days after leaving Victoria, BC, completing the first cross-Canada run by a woman and the longest recorded run (6688 km) by a woman. CAROLYN HLUS

Long Range Mountains are the highest and most extensive mountain range of insular Newfoundland, extending more than 500 km along the island's W coast, up the Great Northern Pen from Cape Ray in the south. A part of the Canadian Appalachians, the Long Range Mts are an average 610 m high; the Lewis Hills, elev 814 m, the S-central portion of the range, are the highest on the island. The range, generally steep on the coastal side and scarred by deep glaciation and faulting, reaches highland plateaus and flat-topped peaks before sloping away more gently to the E. In places deep fjords and bays cut into its base, and rivers, such as the HUMBER R, flow through its valleys. GROS MORNE NATIONAL PARK, N of CORNER BROOK, contains some of the mountain range's most spectacular vistas. ROBERT D. PITT

Long Sault, Ont, UP, pop 1227 (1981c). It is about 16 km NW of Cornwall and was founded after flooding during the construction of the ST LAWRENCE SEAWAY obliterated the sites of the communities of Mille Roches and Moulinette. The 2 were merged to form Long Sault on drier ground. JAMES MARSH

Longboat, Thomas Charles, distance runner (b at Ohsweken, Ont [Six Nations] IR 4 July 1887; d there 9 Jan 1949). Largely because of his ability to dominate any race and his spectacular finishing sprints, Longboat was one of the most celebrated pre-WWI athletes. He won the Hamilton Around-the-Bay (1906), the Boston Marathon (1907), the Toronto Ward's Marathon (1906-08), the "World's Professional Marathon Championship" (1909), and broke numerous records. He was one of the most sought-after performers in the brief (1908-12) revival of professional racing that followed the controversial 1908 London Olympics marathon, in which Longboat and Dorando Pietri collapsed, likely from drug overdoses. Longboat's desire to train



Tom Longboat, celebrated long-distance runner who won the Boston Marathon in 1907 (*courtesy Canada's Sports Hall of Fame*).

himself led to several well-publicized conflicts with managers. Despite constant and sometimes racist criticism, he stuck to his own methods. He bought up his contract in 1911 and ran better than ever. In 1912, he set a professional record of 1:18:10 for 15 miles, 7 mins faster than his amateur record. Longboat raced successfully during WWI while serving as a dispatch runner in France. After the war he lived and worked in Toronto until 1944, when he retired to the Six Nations Reserve. BRUCE KIDD

Longden, Johnny, jockey (b at Pontefract, Eng 14 Feb 1907). He enjoyed a distinguished career that many regard as one of the finest in THOROUGHBRED RACING history. Longden's family settled near Taber, Alta, when he was 2 years old. While still a teenager, he went to work in the coal mines and spent his weekends racing quarter horses. In 1927 he visited Salt Lake City and managed to ride a horse named Hugo K. Asher in a race, which he won, beginning a career that lasted until his retirement in 1966. During those years, he rode 6032 horses to victory, a record for that time. He was the first N American jockey to ride 4000 winners.

One of Longden's greatest achievements was training and riding Count Fleet, winner of the N American Triple Crown in 1943. In 1950 he rode the Irish-bred Noor to 4 victories over Citation, one of N America's finest thoroughbreds. Longden retired to train horses and has been successful there as well. In 1969 he trained Majestic Prince, the Kentucky Derby winner.

J. THOMAS WEST

Longhouse, the basic house type of northern Iroquoian peoples such as the HURON and IROQUOIS, sheltered a number of families related through the female line. It was established throughout the Iroquoian area by the 12th century. They were 8 m wide but of variable length (one 94 m long was uncovered at the Moyer site in southern Ontario). Longhouses described by the early French explorers and by the Jesuit missionaries in the 17th century were somewhat shorter. In the 18th century, longhouses were replaced by single-family dwellings for residences, but continued as political and ceremonial structures. Followers of the HANDSOME LAKE RELIGION continue to refer to the buildings that house their ceremonies as longhouses.

The 17th-century dwelling was constructed by driving flexible poles into the ground at fixed intervals. These were then bent over and lashed together. Horizontal poles strengthened the frame, and cedar-bark (Huron) or elm-bark (Iroquois) sheathing covered the structure. Sleeping platforms ran the length of the house. Each of the 3 to 5 hearths, 6 m apart down the middle of the longhouse, was shared by 2 nuclear families of 5 or 6 persons. Firewood was stacked in vestibules near the entrances at either end of the structure. The Iroquois characterized their confederacy as a longhouse of 5 fires.

RENÉ R. GADACZ



Longhouse at Ste Marie Among the Hurons, Midland, Ont. The reconstruction is a lively tourist attraction (*photo by Richard Vroom*).



Red-throated loon (*artwork by John Crosby*).

Longpré, Ephrem, historian, philosopher (b at Woonsocket, RI 24 Aug 1890; d at Paris, France 19 Oct 1965). His defence of the philosophy of Joannes Duns Scotus played a role in the background of Vatican II and in the opening of Catholic thought to traditions other than that of St Thomas. Longpré's French Canadian parents returned to farm at Upton, Qué, when he was 4. He was educated at Montréal, where he joined the Franciscan order. He was cured of a serious illness at age 18 after an intervention by Brother ANDRÉ Longpré studied in Rome and then worked in Florence and Paris. His study of Scotus, whose philosophy combines a subtle metaphysics of community with a strong sense of the importance of individuality, strengthened his convictions about human freedom, and he was hunted by the Gestapo throughout much of the war. His resistance work was acknowledged by the French and British governments. His most important work is *La Philosophie du B. Duns Scot* (1924). LESLIE ARMOUR

Longueuil, Charles Le Moyne de Longueuil, Baron de, soldier, colonizer (bap at Montréal 10 Dec 1656; d there 7 June 1729). The eldest son of Charles Le Moyne, he was the only native Canadian made a baron in New France. He was granted the honour 26 Jan 1700 by Louis XIV in recognition of his distinguished military career, his astute diplomacy among the Iroquois and his remarkable development of the seigneury of Longueuil. He became governor of Trois-Rivières (1720), of Montréal (1724), and interim administrator of New France after the death of Philippe de Rigaud de Vaudreuil in 1725.

JAMES MARSH

Loon (family Gaviidae), common name for a distinctive group of 4 large, swimming BIRDS, all confined to the Northern Hemisphere and all occurring in Canada. Loons nest on inland lakes and rivers, migrating to the sea for winter. Summer plumages are black or grey, streaked and spotted in bold patterns with white. Underparts are all white. For winter, dense plumage molts to an unspotted grey. During molting, loons are flightless: common, yellow-billed and arctic loons (*Gavia immer, G. adamsi, G. arctica,* respectively) molt in late winter and red-throated loons (*G. stellata*) in autumn. Sexes are similar. Bills are strong, straight and pointed; necks, long and stout; tails, very short. The legs, set far back on the body and with flattened sides and fully webbed toes, are well adapted to swimming. Walking is accomplished only with difficulty. As wings are comparatively small, loons must run along the water surface to become airborne. They come to shore only to nest, usually laying 2 olive brown eggs with darker spots, on a heap of vegetation near the water's edge. Both parents incubate for about 4 weeks and assist in rearing young. The uniformly greyish young leave the nest soon after hatching and often ride on their parents' backs. Loons eat mainly fish, diving to depths of 75 m, usually for less than one minute. Loons are known for their various cries, particularly a weird, mirthless laugh and an eerie, wolflike howl. These unique sounds are symbolic of Canada's North. R.D. JAMES

Loon Lake, Sask, Village, pop 369 (1981c), located in W-central Saskatchewan, takes its name from nearby Makwa Lk (the Cree word *makwa* meaning "loon"). Ten km W of the village is Steele Narrows Historic Park, which commemorates the clash between BIG BEAR's Plains Cree and Major Sam STEELE's forces on 3 June 1885 — the last military engagement fought on Canadian soil. DAVID EVANS

Loranger, Françoise, dramatist, novelist (b at St-Hilaire, Qué 18 June 1913). Her novel, *Mathieu* (1949), a gloomy portrayal of Québec society in the DUPLESSIS era, received critical acclaim, but it is chiefly on her dramatic texts, many televised nationally, that her reputation rests. Hers is a constantly evolving theatre, reflecting changing social realities in her province. She began writing radio scripts in 1939, but her first published stage plays date from the 1960s. *Une Maison. . . un jour* (1965) is a psychological study of the intense pressures destroying a middle-class family; *Encore cinq minutes* (1967) is one of the earliest texts to treat feminist concerns in French Canada. Contemporary political events are the focus of plays such as *Le Chemin du Roy* (1969) written in collaboration with Claude Levac, a savage satire depicting, in the guise of a penalty-filled hockey game, the confrontations between Québec City and Ottawa provoked by French President de Gaulle's visit in 1967, and *Médium saignant* (1970), dealing with conflict over language rights in the atmosphere of Québec's controversial BILL 63. Most of Loranger's plays have

been successfully transposed to television, and works such as *Une Maison. . .un jour* have been well received abroad. L.E. DOUCETTE

Loranger, Jean-Aubert poet, storyteller, journalist (b at Montreal 26 Oct 1896; d there 28 Oct 1942). Loranger belonged to a family known for its lawyers (the Lorangers), writers (AUBERT DE GASPÉ) and military officers (Charles de SALABERRY). He excelled at journalism, working for *La Patrie* 1923-27 and 1939-42, *La Presse* 1927-30, *Le Jour* 1938-39 and *Montréal-Matin* for 6 weeks in 1942. During WWI he associated with young intellectuals and artists who had lived in Paris (including his cousin, Robert de Roquebrune) and met regularly in the Westmount drawing room of architect Fernand Préfontaine. In 1918 this group started the first arts magazine in Québec, *Le Nigog*, to which Loranger contributed. Admitted to the École littéraire de Montréal on 17 Nov 1920, he broke definitively with this group, unwilling to participate in activities that fell far short of his own creative ambitions. His 2 collections, *Les Atmosphères* (1920) and *Poèmes* (1922), introduced blank verse to Québec and showed his obsession with modernity and escapism. But peasant life fascinated him and inspired his realistic, yet ironic and amusing short stories. In 1979 he was posthumously awarded the Prix France-Québec for his 2 volumes of short stories. BERNADETTE GUILMETTE

Lord, John Keast, naturalist, veterinarian (b in Cornwall, Eng 1818; d at Brighton, Eng 9 Dec 1872). After receiving his veterinarian diploma in 1844, he practised briefly, then disappeared and wandered through several only partially recorded endeavours, including a whaling voyage, trapping in Minnesota and parts of Canada, and artillery service in the Crimea. When British Columbia was established as a colony, he worked as naturalist to the boundary commission surveying the FORTY-NINTH PARALLEL from 1858 to 1862, wintering on Vancouver I. During this period he sent numerous faunal collections to the British Museum, named 2 new mammals and reported his observations in 2 vols, *The Naturalist in Vancouver Island and British Columbia* (1866). MARTIN K. MCNICHOLL

Lord's Day Alliance of Canada (renamed People for Sunday Assn of Canada in 1982), a lay organization fd 1888 under the aegis of the PRESBYTERIAN Church and supported by the other Protestant churches to combat increasing Sabbath secularization. In the early phases of Canada's INDUSTRIALIZATION and URBANIZATION, Sunday was usually the only day of rest: the issue was whether that day should be a holy day or a holiday. The churches faced growing competition for the loyalty of potential churchgoers: industrial concerns, such as railways, demanded Sunday labour from their employees; more important, new leisure pursuits beckoned. Technological advances, particularly electric urban transit systems, increased people's mobility, allowing them to escape the cities. Commercial recreation activities such as sporting events, ice cream parlours and theatres were equally tempting. Many Canadians seemed inclined to make Sunday a day both of religion and recreation.

The Alliance became one of the most effective lobbies of the early 20th century. It gained the crucial support of the French Canadian Catholic hierarchy and, with its promise of a legislated weekly rest day, of organized labour. In 1906, this combination of forces and the Alliance's sophisticated lobbying techniques persuaded PM Sir Wilfrid LAURIER to introduce a Lord's Day Act. Although strong opposition existed among transportation and manufacturing concerns and among French Canadians, the Act became law in Mar 1907. It aimed to restrict Sunday trade, labour and recreation. The struggle to secure enforcement has occupied the Alliance since then. Because the Act required provincial authorization for each prosecution, the Alliance battled in many arenas, with varying success. The Sunday shopping issue still provokes intense debate, uniting labour, retail merchants, churches and the People for Sunday Assn in opposition. Canadians' pursuit of Sunday pleasure has doubtless defeated the association's main aim — Sunday is primarily a holiday and only partly a holy day. SHARON P. MEEN

Reading: R. Allen, *The Social Passion* (1973); C. Armstrong and H.V. Nelles, *The Revenge of the Methodist Bicycle Company* (1977).

L'Orignal, Ont, Village, pop 1819 (1981c), inc 1873, seat of counties Prescott and Russell, located on the Ottawa R, 88 km E of Ottawa. Named after nearby Pointe à l'Orignal [Fr, *orignal*, "moose"], it was granted as a seigneury by the Co of New France to Françoise Prevost in 1674. With La Salle's Cataracoui [Kingston] it was the only seigneury granted by the government of New France in Ontario. After the Conquest it was acquired by Nathaniel Tredwell, then developed by his son, Charles. In 1816 it was made capital of the new Ottawa district. St Andrew's church (1832) was a pioneering Presbyterian congregation. The District Court House and Jail (1825) is the oldest remaining courthouse in Ontario. K.L. MORRISON

Loring, Frances Norma, sculptor (b at Wardner, Idaho 14 Oct 1887; d at Newmarket, Ont 5 Feb 1968). From the time she settled in Canada in 1913 she worked tirelessly, both in the development of her own work and in fostering a climate that made sculpture possible for others. She had first studied sculpture in Geneva, Munich and Paris 1901-06. A fascinating, compelling personality of keen intelligence and warm understanding, she assailed public and official indifference to SCULPTURE as a founding member of the Sculptors' Soc of Canada and a chief organizer of the Federation of Canadian Artists and the National Arts Council. For over 50 years she shared studio quarters with fellow sculptor Florence WYLE in a converted Toronto church that was widely considered the salon of Canada's art world. Her own work was architectural in nature, and among her best-known public monuments were the lion formerly situated at the Toronto entrance to Queen Elizabeth Hwy, and war memorials at St Stephen, NB, and Galt, Ont. REBECCA SISLER



Frances Loring, *Luna* (1950-51) *(courtesy MacDonald Stewart Art Centre/University of Guelph).*

Reading: Rebecca Sisler, *The Girls* (1972).

Lorne, John Douglas Sutherland Campbell, Marquess of, later 9th duke of Argyll, governor general of Canada 1878-83 (b at London, Eng 6 Aug 1845; d on the Isle of Wight 2 May 1914). Private secretary to his father, the secretary of state for India 1868-71, Lorne represented Argyllshire as a Liberal in the House of Commons 1868-78. His appointment to Canada in 1878, at age 33, had much to do with his marriage 7 years previously to Princess Louise, Queen Victoria's fourth daughter, and the British government's attempt to enhance the prestige of the queen's representative in Ottawa. In Canada Lorne helped to reconcile BC to CONFEDERATION and supported the Canadian government's efforts to establish a Canadian high commissioner to the UK, though it reduced his own vice-regal authority. A devoted patron of the arts and letters, Lorne founded the ROYAL SOCIETY OF CANADA in 1882 and the Royal Canadian Academy of Arts in 1880, a precursor to the National Gallery. An author of prose and poetry his writings include *Memories of Canada and Scotland* (1884), *Imperial Federation* (1885), *Canadian Pictures* (1885), *Passages from the Past* (2 vols, 1907) and *Yesterday and To-day in Canada* (1910). CARMAN MILLER

Lost Lemon Mine, a legendary gold deposit reputedly somewhere between the CROWSNEST PASS and the Highwood R in SW Alberta, discovered about 1870 by prospectors Frank Lemon and "Blackjack." Lemon allegedly murdered Blackjack at the mine and went mad. Two Stoney Indian witnesses were sworn to secrecy by Chief Bearspaw. Later, Lemon was unable to direct other prospectors to the mine. Thousands have since searched for the fabulous lode; many have died mysteriously. King Bearspaw, descendant of the chief, claimed to know the secret location and led many expeditions into the mountains — all in vain. FRANK W. ANDERSON

Reading: D. Riley, T. Primrose and H. Dempsey, *The Lost Lemon Mine* (1968).

Loto-Canada Inc, established May 1976 to be responsible for continued operation of the Olympic lottery. It was to turn over 82.5% of net revenues to help with the expected deficits of the OLYMPIC GAMES and to help with the COMMONWEALTH GAMES; other portions of the revenues would go to the provinces and to the federal government's national sports, fitness and recreation programs. A last draw was held in late 1979 and Loto-Canada continued to maintain a minimum staff to administer undistributed prize money and the annual provincial payment of $24 million. *See* LOTTERY.

Lottery (a centuries-old concept) is an arrangement for distributing prizes by lot or chance. Strictly, sports pools are not lotteries because of the element of skill supposedly involved, but the Supreme Court of Canada has before it [in 1984] a case that may decide whether the Sports Pool operated by Loto Québec in 1982 and 1983 is a lottery scheme under the Criminal Code of Canada. Under the Criminal Code (s189) it is an indictable offence to conduct any of a number of activities related to "any proposal, scheme or plan for advancing, lending, giving, selling or in any way disposing of any property, by lots, cards, tickets, or any mode of chance whatever." A 1969 amendment provided for a number of exceptions. Section 190(1) of the code now permits the federal government and the provincial governments to conduct and manage lottery schemes; and permits provinces to license char-

itable or religious organizations, agricultural fairs and exhibitions, and persons at public places of amusement to conduct and manage lottery schemes.

Sections 189 and 190 of the code apply whether the tickets are sold or not. However, it is the practice of governments in Canada to seek to exercise control only where tickets are sold, and the lottery scheme is really a form of GAMBLING.

Federal Government Under section 10 of the Olympic Act (1973) the Organizing Committee of the 1976 Olympic Games, a Québec corporation, was authorized to run a lottery scheme to raise money for the 1976 OLYMPIC GAMES in Montréal and was allowed to sell tickets in any province where the government of that province agreed, provided that the proceeds were used to provide financial assistance for the Olympic and for the development of amateur sport in the participating provinces. In the 9 draws between 1973 and 1976, $230 million was raised for the Olympic, $25 million for the provinces and $190 million was awarded in prizes.

LOTO-CANADA INC, a federal crown corporation, was established in 1976 to raise money through lotteries to help Québec pay for its deficit of the 1976 Olympic. This lottery was strongly opposed by the provinces which regarded lotteries as their exclusive field of operation. Under a 1979 agreement, Loto-Canada Inc was wound up by the federal government in return for the payment by the 10 provincial governments quarterly to the federal government of $6 million, adjusted according to the Consumer Price Index; 82.5% of the profit of Loto-Canada had gone to the Olympic debt, 12.5% to the provinces and 5% to the federal government in support of programs in FITNESS and amateur sport, recreation, the arts and culture.

In 1983 the federal government passed the Athletic Contests and Events Pool Act and established the Canadian Sports Pool Corporation, which has the power to conduct and manage virtually every type of lottery scheme in addition to sports pools. Charging that this constitutes a breach of the 1979 agreement with the provinces, in March 1984 the provinces started legal proceedings in the federal court.

Provincial Governments All the provinces and the 2 territories are now involved in conducting and managing lotteries. BC, Alberta, Saskatchewan and Manitoba incorporated the Western Canada Lottery Foundation under the Canada Business Corporations Act in 1974. The Yukon and the NWT participate as associate members. Each province and territory operates its separate ticket-distribution system and makes separate provision for its share of the profits. Programs in recreation, amateur sport, culture, community service and health research are the principal beneficiaries. In the fiscal year 1982-83, the foundation distributed to its member provinces and territories $69.7 million, some of which covered local expenses.

The Ontario Lottery Corporation is a crown corporation established in 1975. The profits (about $163 million in 1983) accrued to the provincial treasurer of Ontario but are earmarked for a number of grant programs, which would not normally qualify for government assistance, for sports, fitness, recreation, culture, research in health and environment, hospital capital projects and social-service programs run by volunteers in the private sector.

In Québec the lottery authority is the Québec crown corporation Société des loteries et courses du Québec. It made a profit in 1982-83 of $163.4 million for the government of Québec, none of which has been designated for any specific programs.

New Brunswick, Newfoundland, Nova Scotia and PEI jointly incorporated the Atlantic Lottery Corporation Inc under the Canada Business Corporations Act. In 1982-83 the net profit was $20.6 million which was distributed to the 4 provincial governments as general revenue, none of which was earmarked for specific programs.

In the 1982-83 fiscal year, despite the recession, lottery sales in Canada climbed by 12% from 1981-82 to $1.3 billion. All lottery games are based on the same principle; it is details such as the price and prize structures, the frequency of the draw and the technology for choosing winners that change. Games are usually "passive," ie, players match a preprinted number on a ticket against a winning number; "active," ie, players choose their own numbers; or "instant," ie, prizes are awarded based on the match of hidden numbers or symbols. J.F.C. WRIGHT

Lou Marsh Trophy, named after a former sports editor of the Toronto *Star*, is awarded annually to Canada's best athlete, as decided by a committee of Toronto sports writers. Louis Edwin Marsh died on 5 March 1936 after 43 years as a journalist, and was regarded as the dean of Canadian sports journalism. In his youth he was an excellent all-round athlete. He played on the Toronto Senior Argonaut football team and was a good sprinter and strong swimmer, being credited with some 15 rescues in the water. He raced ice boats and small speedboats, for which he coined the term "sea fleas," and was a highly regarded referee in boxing and ice hockey. His daily sports column in the Toronto *Star* from 1925-36 was entitled "With Pick and Shovel," describing his tenacious ability to obtain an in-depth analysis of the sporting scene. Made of black marble, the trophy stands about 75 cm high. The words "With Pick and Shovel" appear above the engraved names of the winners. Among the latter are Dr Philip Edwards (first winner, 1937), Marilyn BELL, Petra BURKA, Wayne GRETZKY and Russ JACKSON. The trophy is kept on exhibition at Canada's Sports Hall of Fame in Toronto, Ont. J. THOMAS WEST

Loudon, James, educator, physicist (b at Toronto 24 May 1841; d there 29 Dec 1916). President of U of T from 1892 to 1906, Loudon devoted his life to the university. Gold medalist in MATHEMATICS in 1862, he became tutor in mathematics at University College in 1863 and the first Canadian professor of the university in 1875, succeeding his teacher John Bradford Cherriman. In 1873 he was elected to the university senate. In 1878, at Loudon's recommendations, the School of Technology (renamed the School of Practical Science) was affiliated with the university. Loudon also encouraged the federation of the principal colleges of the university, and his construction program included the Chemistry Building (1895), Convocation Hall (1907) and the Physics Building (1907). Loudon continuously promoted research and established a PhD program in 1897 although, not surprisingly, he had little time for research himself. Loudon also organized the Alumni Assn and used it to persuade the government to finance its university adequately. YVES GINGRAS

Reading: H.H. Langton, *James Loudon* (1927).

Lougheed, Edgar Peter, lawyer, premier of Alberta (b at Calgary 26 July 1928), grandson of Sir James LOUGHEED. He was educated in Alberta, received a BA (1951) and LLB (1952) from University of Alberta and briefly played football for the Edmonton Eskimos (1949 and 1950). He earned an MBA from Harvard (1954) and practised law in Calgary before joining the Mannix Corporation as secretary, rising to VP (1959) and director (1960). In 1965 he was elected leader of the small Alberta Progressive Conservative Party and began building a grass-roots organization. Although SOCIAL CREDIT had maintained an iron grip in Alberta since 1935, and the Conservatives had not been a provincial political force for 40 years, Lougheed was elected to the legislature in 1967 by the largest majority of any candidate. He and the 5 other elected PCs became the official Opposition. When Prem Ernest C. MANNING retired in 1968 and was replaced by Harry STROM, Lougheed effectively characterized the Social Credit government as burned out. In Aug 1971 he was swept into office with 49 of the 75 seats. His first major action was to increase royalties paid to the province by oil companies. Lougheed proved to be a tenacious negotiator and an adept manager of relations with the media. His government's major initiatives were increasing Albertans' return on their natural resources, promoting industrial development and urban decentralization, and improving health care and recreation (new hospitals and medical research, urban parks and the large "Kananaskis Country" park W of Calgary).



Peter Lougheed, premier of Alberta, whose overwhelming support in Alberta gave him a strong voice in national politics (*courtesy Office of the Premier/Government of Alberta*).

Lougheed's industrial-development policies encouraged an expanding petrochemical industry backed by the province's huge stocks of natural gas. By 1983, many large plants were producing ethylene, methanol, benzene and other chemicals. Recognizing that Alberta's conventional oil reserves were finite, Lougheed encouraged development of the huge reserves of heavy oil and oil sands through tax policy and direct investment. In 1978 the Syncrude Canada oil-sands project — the world's largest single synthetic-fuels complex — was completed with provincial participation. The government created the ALBERTA OIL SANDS TECHNOLOGY AND RESEARCH AUTHORITY (AOSTRA) to develop improved technology for nonconventional oil production. Lougheed was also interested in agricultural diversification — an expanded food-processing industry, increased irrigation and a wider diversity of crops — and the Alberta Heritage Foundation for Medical Research. He conceded that his ultimate goal — to diversify the province's economy and ensure its prosperity beyond the oil and gas era — was constrained by Alberta's small population, its distance from foreign markets, and federal control of tariffs and other factors; he said it would not be accomplished in his lifetime. The centrepiece of the premier's determination to maximize provincial revenues and ensure a healthy long-range future for the provincial economy was the creation in 1976 of the ALBERTA HERITAGE SAVINGS TRUST FUND, which put aside a portion of oil and gas revenues in long-term investments.

In the 1970s Lougheed pushed for a stronger role for Alberta in national decision making — a role commensurate with the province's then-growing economic strength. He sharply resisted what he saw as federal incursions into provincial rights. In the negotiations that led to the CONSTITUTION ACT, 1982, he was a driving force behind the amending formula that gave no province a veto but allowed dissenting provinces to opt out of amendments that would reduce their powers. He personally championed the clause that ensures the supremacy of the legislatures over the courts. His major confrontation with Ottawa over oil revenues ultimately led to the 1981 Energy Pricing Agreement and subsequent accords, which had the effect of ensuring federal negotiation of oil and gas prices and revenues, rather than unilateral federal action.

Albertans thought highly of Lougheed's managerial competence, integrity and commitment to the province's welfare, as shown in his overwhelming electoral victories in 1975, 1979 and 1982. By the mid-1970s, Canadians at large had come to take him seriously as a major western spokesman. He dominated the province's politics as Manning had a generation earlier and gave voice to Albertans' frustrated pride and determination to be taken seriously on the national stage.

JOHN J. BARR

Lougheed, Sir James Alexander, lawyer, senator (b at Brampton, Canada W, Sept 1854; d at Ottawa, 2 Nov 1925). He practised law in Toronto and Calgary where he was in partnership with R.B. BENNETT. In 1889 he was appointed to the Senate and was its Conservative leader 1906-21. Created Privy Councillor in 1911, for 7 years he was minister without portfolio in the administration of Sir Robert BORDEN. He then held several portfolios until Mackenzie KING took office in 1921. In 1928 a mountain W of Calgary was named after him. ERIC J. HOLMGREN

Louis-Marie, Trappist priest, botanist, teacher (b Louis-Paul Lalonde at Montréal 17 Oct 1896; d there 3 Nov 1978). Trained at U de M by Frère MARIE-VICTORIN (LSc, 1924) and at Harvard (PhD, 1928), Father Louis-Marie taught botany and genetics at the Institut agricole in OKA, near Montréal, 1923-62. Under his direction the institute's herbarium grew until it contained nearly 100 000 specimens. Known as the Herbier Louis-Marie, it is now at Laval. Author of many scientific articles, Father Louis-Marie is known especially for his *Flore manuel* (1931), reissued various times, through which several generations of amateur botanists have been introduced to the study of Canadian flora.

RAYMOND DUCHESNE

Louisbourg, 18th-century fortified town, capital and major settlement of the French colony of Île Royale (Cape Breton I), 1713-58. In the 17th and 18th centuries, France and Britain competed both for territorial control of Atlantic Canada and for domination of the valuable cod FISHERIES off its coasts. In the TREATY OF UTRECHT (1713), France ceded Newfoundland and ACADIA to Britain. That year the French founded Louisbourg, which quickly became a substantial town and seaport. Unlike the other communities of NEW FRANCE, Louisbourg and its outports carried on little agriculture; instead, the export of cod paid for almost all the colony's supplies. From its base in the fishing industry, Louisbourg developed diversified shipping links. The port annually welcomed trading vessels from





Fortress Louisbourg (*photo by Malak, Ottawa*).

France, the Caribbean, the British American colonies, Acadia and Québec. BASQUE, Breton and Norman fishermen joined the fishing industry each summer, and the town's settled population, drawn partly from France, partly from other parts of New France, grew to roughly 2000 by 1740 and double that in the 1750s.

Though its governor was subservient to the governor general of New France at Québec, Île Royale functioned as a separate colony. The centre of French power in the region, Louisbourg was an important military base. It had a permanent garrison and was extensively fortified, with cannon-bearing, stone-and-mortar ramparts encircling the town. Military engineers under Jean-François VERVILLE shaped the town in accordance with the fortification theories of Le Prestre de Vauban (1633-1707) and the urban design theories of early 18th-century France.

Louisbourg was besieged in 1745, during the WAR OF THE AUSTRIAN SUCCESSION by troops from New England supported by the Royal Navy, and in 1758 by the British army and navy. Each time, the town was obliged to capitulate after suffering serious damage from artillery fire and naval blockade, and the population was exiled to France. After the first siege, France recovered the colony by treaty, but soon after the second the FORTIFICATIONS were demolished and the town permanently abandoned. The fall of Louisbourg, with the capture of Québec in 1759 and Montréal in 1760, ended France's military and colonial power in N America, although SAINT-PIERRE AND MIQUELON, acquired by France in 1763 after the SEVEN YEARS' WAR, partly replaced Île Royale as a base for the fishing industry.

The modern town of Louisbourg, a small fishing port, grew up at the other end of Louisbourg harbour. The fortress of Louisbourg became a National Historic Site in 1928, and in 1961 Parks Canada began reconstruction based on comprehensive archaeological investigation and the colony's well-preserved historical records. Part of the fortifications, the citadel buildings, the town quay and several streets with their homes, shops and taverns are now rebuilt in intricate detail. Open to the public from spring to fall and interpreted for visitors by guides, costumed animators and museum displays, the reconstruction of 1744-era Louisbourg is today a major visitor attraction, an important contributor to Cape Breton's tourist economy and a world-class model of historic-site reconstruction.

CHRISTOPHER MOORE

Reading: Christopher Moore, *Louisbourg Portraits* (1982).

Plan of Louisbourg by Bellin. The fortification was begun in 1713 and is now a major historic site (*courtesy Public Archives of Canada/NMC-27651*).



Lount, Samuel, blacksmith, politician, rebel (b at Cattawissa, Pa 24 Sept 1791; d at Toronto 12 Apr 1838). Variously employed after settling south of Lk Simcoe, Upper Canada in 1815, Lount was best known as a blacksmith. A generous, concerned man he became a Reformer in the 1830s, serving in the Assembly from 1834 until defeated by corrupt practices in 1836. He led a large party to join the REBELLION OF 1837. Captured, he was tried and executed. RONALD STAGG

Loup-Garou, the werewolf, known but less widespread in French Canadian tradition than in Europe, is not always a wolf or dog, but may also take the form of a calf or small ox, a pig, a cat or even an owl. A person could fall under suspicion of being a werewolf if one had not made one's Easter duty for 7 years in a row.

NANCY SCHMITZ

Louse, common term broadly used for certain INSECT PESTS of mammals, birds, plants (aphids), books (book lice), etc, and for CRUSTACEANS (sea lice), living commensally with aquatic mammals and fish. More commonly, the term refers to biting and bloodsucking INSECTS adapted as wingless, dorsoventrally flattened external parasites of birds and mammals. Lice have short legs with large claws. Eyes are reduced or absent. Under the most favourable conditions, lice cannot survive off the host for more than a few days. Sucking lice, of which over 200 species have been described, are blood-feeding parasites

of mammals, including humans. They have piercing and sucking mouthparts and subsist entirely on nutrients derived from host's blood. Biting lice, estimated to comprise even more species, are parasites mainly of birds but also of mammals. They have chewing mouthparts, and feed on epidermal debris and exudates. Each species is confined to one host or a few closely related ones, and at least one species is known for almost every terrestrial, warm-blooded animal. Lice harbour and transmit disease organisms to and among animals (eg, those causing relapsing fever and typhus in humans). Lice spread rapidly to cause epidemics in crowded, unsanitary conditions. W.O. HAUFE

Lousewort (genus *Pedicularis*), herbaceous PLANT of figwort family (Scrophulariaceae). Five hundred species occur in Northern Hemisphere; 22 throughout Canada. Most Canadian species are perennial; heights vary (10-100 cm). Louseworts are often found in damp, marshy ground in association with GRASSES. They are semiparasitic: green leaves produce some food and suckers connect to, and absorb food from, grass roots. Parrot-beaked, often brightly coloured flowers usually occur in showy, terminal spikes. *P. arctica*, with pink flowers on stout stems (up to 15 cm), are often abundant in alpine situations. *P. groenlandica*, common in boggy areas, grows to 50 cm and has reddish purple flowers. Common lousewort or wood betony (*P. canadensis*), now considered poisonous, was eaten and used as animal feed by settlers. N American Indians used it for food, to cure rattlesnake bite, to reduce swellings, and as an aphrodisiac. PATRICK SEYMOUR



Large flowered lousewort, found in damp, marshy ground across Canada (*photo by Julie O. Hrapko*).

Loverboy, a Vancouver-based rock group, is a top international concert draw. The band — Paul Dean (guitar), Mike Reno (vocals), Matt Frenette (drums), Doug Johnson (keyboards) and Scott Smith (bass) — won 6 Juno Awards in 1982. The worldwide success of the 1980 debut album "Loverboy" was followed by "Get Lucky," which sold over 3 million copies in the US.
JOHN GEIGER

Lovitt, William Dodge, vessel owner, entrepreneur (b 21 July 1834; d 1 Jan 1894). He purchased new sailing vessels at YARMOUTH, NS, Port of Registry during the 19th century. As an entrepreneur, he was at the centre of a family connection, including the Burrills and the Canns, that succeeded the Killams as the dominant family group in Yarmouth. Beginning as a vessel owner in the late 1850s, Lovitt was a director of the Exchange Bank 1874-86 and of insurance companies by the 1870s. As the Canadian sailing-ship industry settled into an irreversible decline, he invested in railway and textile companies during the 1880s. He was president of the Yarmouth Duck and Yarn Co, a local textile mill that was profitable into the 20th century.
GERRY PANTING

Low, Albert Peter, geologist, explorer (b at Montréal 24 May 1861; d at Ottawa 9 Oct 1942). Low joined the Geological Survey of Canada on graduation from McGill. The Québec-Labrador border was eventually defined on the basis of his 1893-95 explorations. He resigned in 1901 to prospect for iron on Hudson Bay, but returned to government service to command the 2 expeditions of the steamer *Neptune* (1903, 1904) sent to establish Canadian sovereignty of the eastern Arctic islands. Low became director of the Geological Survey in 1906 and deputy minister of mines in 1907; illness led to his retirement in 1913. DONALD J.C. PHILLIPSON

Lowden, John Alexander, "Sandy," pediatrician (b at Toronto 21 Feb 1933). After graduating in medicine from U of T in 1957, Lowden studied for his doctorate at the Montreal Neurological Inst. Appointed to the medical staff of the Hospital for Sick Children, Toronto, in 1964, he is currently professor of pediatrics and clinical biochemistry, associate director of the HSC Research Inst and president of the Research Development Corp. The author of over 80 scientific and medical publications, Lowden is a recognized authority on genetic-metabolic diseases, particularly those involving lysosomes and hydrolases. JOHN W. CALLAHAN

Lower, Arthur Reginald Marsden, historian (b at Barrie, Ont 12 Aug 1889). Professor at Wesley College, Winnipeg (1929-47) and Douglas Professor of Canadian History at Queen's U, Kingston (1947-59), Lower, the son of English immigrants, was the first of his family to attend university (U of T, Harvard). His first books, *The Trade in Square Timber* (1932), *Settlement and the Forest Frontier in Eastern Canada* (1936) and *The North American Assault on the Canadian Forest* (1938), detailed the role of the forest in Canadian development, following the STAPLE THESIS elaborated by Harold INNIS. In *Colony to Nation* (1946), written during WWII, Lower sought a basis for a sense of national community which might unite French and English Canadians. Recipient of the Gov Gen's Award (1946, 1954), the Tyrrell Medal of the Royal Soc of Canada (1947), and a companion of the Order of Canada (1968), Lower is also an honorary chief of the Ojibwa; his native name, Kikugaygawbigoneden, means "The Recorder of His People's Tradition."
MARGARET E. MCCALLUM

Reading: A.R.M. Lower, *My First Seventy-Five Years* (1967).

Lower Canada, the southern portion of present-day Québec, existing as a separate British province from 1791 to 1840. In 1791 Britain took the decision to divide the PROVINCE OF QUEBEC into UPPER CANADA and Lower Canada. The decision could have been foreseen, since Britain had followed a policy of territorial division in the 17th and 18th centuries when the American colonies were being founded; in 1768 when Prince Edward Island was detached from Nova Scotia; and in 1784 after the wave of LOYALIST immigration (which occurred in Québec as well) when the provinces of Cape Breton and New Brunswick were created. After the Conquest of NEW FRANCE Great Britain wanted to redraw the boundaries of its new colony so as to make room in the fisheries and the fur trade for the rival merchants of Québec and Montréal. The QUEBEC ACT of 1774 was a formal recognition of the failure of the project, as the borders were adjusted in closer conformity to the needs of a transcontinental economy.

In 1791 the fur trade still played a determining role for the merchants and seasonal workers drawn from the rural population. These and their dependants still felt that their territory included both the St Lawrence Valley and the huge western expanse from the Great Lakes to the Pacific. In the early 19th century, however, the economic bases for this perception grew blurry and, for most francophone Lower Canadians, took on the dimensions of the St Lawrence Lowlands from Montréal to the Gulf of St Lawrence. When in 1822 Louis-Joseph PAPINEAU attacked the proposed union of the 2 Canadas, he described Lower Canada as a distinct geographic, economic and cultural space, forever destined to serve the HABITANT as a Catholic and French nation.

This Québecois vision found little support among the anglophone merchants, who continued to challenge the 1791 decision and who, from Montréal, largely controlled the economic development of Upper Canada. These businessmen, who owned the banks and means of transportation and who fervently advocated the building of canals on the St Lawrence R, were involved primarily in the grain trade to England and in transporting Upper Canadian forest products to the port of Québec; they occupied an economic space that overflowed the borders of the St Lawrence Valley. After the unsuccessful attempt to unite the 2 Canadas in 1822, they began clamouring for the annexation of Montréal to Upper Canada and continued until after the failure of the REBELLIONS OF 1837, when a single province was formed.

An Economy in Crisis Around 1760 the colonial economy was still dominated by the FUR TRADE and a commercial AGRICULTURE based on wheat. The FISHERIES, the timber trade, shipbuilding and the FORGES SAINT-MAURICE were all secondary. The fur trade was still expanding northwards and towards the Pacific: towards the end of the century, 600 000 beaver skins and other furs worth over £400 000 were being exported annually to England. All this activity, transcontinental and international by its very nature, was largely concentrated in the hands of the bourgeoisie of the NORTH WEST COMPANY — the Montréal-based company that had triumphed over its American rivals and the HUDSON'S BAY COMPANY. However, after 1804, growing pressure from these rivals reduced profits to such an extent that in 1821 the NWC had to merge with the HBC.

The wheat trade underwent equally important transformations. After about 1730 wheat farming, the basis for a subsistence agriculture, started to become a commercial activity, thanks to the development of an external market. This market was mainly the West Indies until 1760, and then it expanded until, by the beginning of the 19th century, it included southern Europe and Britain. Thereafter, production fell off so sharply that around 1832 Lower Canada had to import over 500 000 minots (about 19.5 million L) of wheat annually from Upper Canada. The deficit became chronic. Oats, potatoes and animal husbandry occasionally brought profits to some farmers, but most grew these crops for subsistence. The increasing difficulties in agriculture and in the fur trade adversely affected the population's standard of living.

This was the context for the rapid growth of the TIMBER TRADE after 1806. Increased production and export of forest products occurred during Napoleon's Continental Blockade when England, to guarantee wood supplies for her warships, introduced preferential tariffs that were maintained at about the same level until 1840, despite successive price drops. Again there was abundant seasonal help in Lower Canada. The forest industry, with Québec City as its nerve centre, was especially active in the Ottawa Valley, the EASTERN TOWNSHIPS and the Québec and Trois-Rivières areas. Squared pine and oak, construction wood, staves, potash and shipbuilding were the industry's mainstays.

Lower Canada's economy, transformed in the climate of crisis of declining fur and local wheat shipments, was increasingly Québec-centered and yet more dependent for its exports

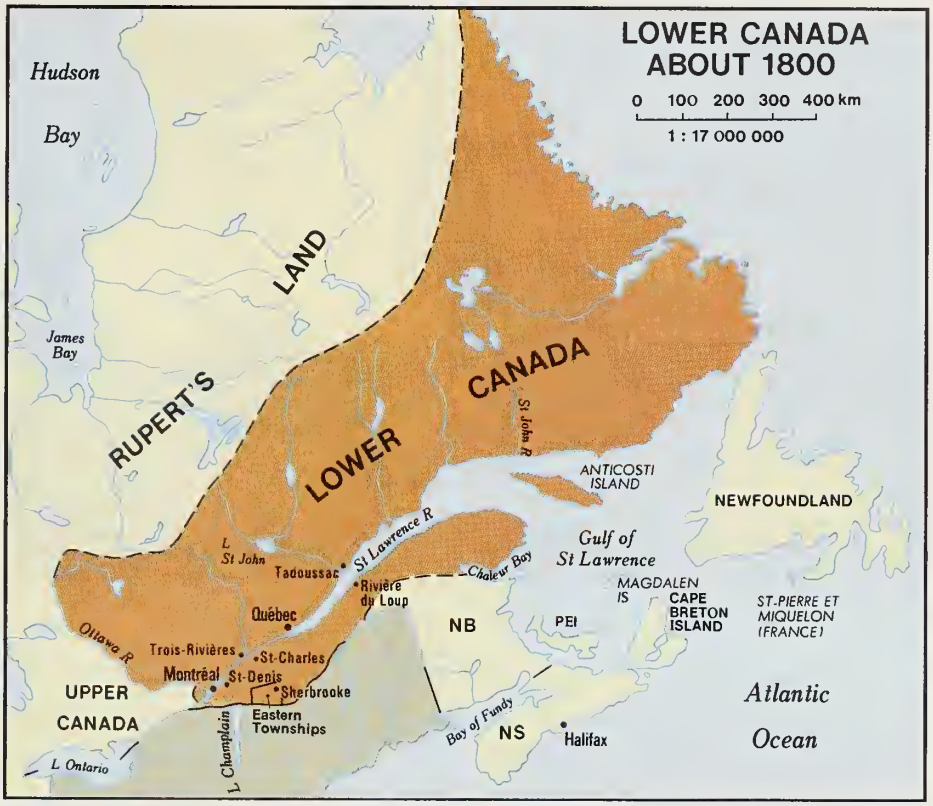
on surplus production in Upper Canada. This produced an urgent need for credit institutions and for massive investments in road and canal construction.

Overpopulation From the early 18th century, French Canadian population had grown without significant help from immigration. With a birthrate of about 50 births per thousand population and mortality of about 25 per thousand, the population doubled every 25-28 years. Post-Conquest British immigration hardly affected this demographic trend except for a limited time during the Loyalist wave, whereas land was so abundant and people so scarce that French Canada's vigorous increase continued until the end of the century. It was in the seigneur's interests to grant lands upon request in order to have the largest possible number of rent payers, but early in the 19th century this policy, combined with the high birthrate, led to decreasing accessibility of good lands; as well the seigneurs, prompted by the rising value of their forest products, began to limit the peasants' access to real estate. As the scarcity of land, real or artificial, became more widespread, a rural proletariat began to develop, which by 1830 made up about one-third of the rural population. French Canadian immigrants to the US (*see* FRANCO-AMERICANS) came largely from this group and from the impoverished peasantry.

After 1815, population pressure was intensified in the rural communities along the St Lawrence and Richelieu rivers by a massive wave of British immigrants looking for land and jobs. Peasants and the proletariat in rural Québec felt threatened by the strangers, who sought land in the Townships, where French Canadians had long thought their own excess population could settle. The rapidly rising urban anglophone population was even more alarming to them: in Québec City in 1831, Anglophones formed 45% of the population and topped 50% among the day labourers; in Montréal in 1842 the percentages were 61% and 63%, respectively. These factors helped sharpen the Francophones' feeling that their culture was in danger and helped strengthen the nationalist movement, tormented by class struggle (*see* FRENCH CANADIAN NATIONALISM).

Class Struggles and Political Conflicts The society that had developed in New France was one in which the military, nobility and clergy were dominant and the bourgeoisie was dependent on them. After 1760 the British military personnel, aristocrats and merchants replaced their francophone equivalents. But the development of class consciousness within the 2 bourgeoisies, the English and the French, helped set off a conflict between the middle class and the aristocrats over the introduction of parliamentary institutions. The outcome of this confrontation in 1791 showed both the progress of the middle class and the economic and social decline of the nobility. Towards the end of the century the power of the nobility was entirely dependent on the privileges and protection guaranteed by the heads of the colonial state.

Economic and demographic changes after 1800 produced a deterioration of social relationships, the emergence of new ideologies and a reorientation of the old ones. This was the context for a struggle among 3 classes for the leadership of society: the anglophone bourgeoisie, the French Canadian middle class and the clergy. The anglophone merchant bourgeoisie, the main beneficiary of the 1791 reform and of recent economic expansion, felt that its status and power were threatened by the widespread changes. The efforts of these merchants to have the St Lawrence R canalized and their desire to stimulate the construction of access roads into the Townships were parts of a larger program seeking to increase immigration, create banks, revise the state's fiscal policies and abolish or reform the SEIGNEURIAL SYSTEM and customary law. But these measures required political support from the francophone nationalists, who were on the rise and held a majority in the legislative assembly. Income from continued TIMBER DUTIES was uncertain since it depended, after the 1815 peace, on both the goodwill of this nationalist element and the failure of England to introduce free trade. Anglophone merchants dominated business circles in the cities (in 1831 they constituted 57% and 63% of the merchant class in Québec City and Montréal, respectively) and played a disproportionately large role in the countryside. Nevertheless, they felt vulnerable in a colony numerically dominated by Francophones. Not surprisingly, Anglophones tended to seek the political support of governors, colonial bureaucrats and even the government in London. Their attitude is explained by their inability to form a party capable of dominating the majority, slight though it was, in the Legislative Assembly. Their successive political defeats over 30 years forced them to defend the imperial connection and the constitutional status quo and to support conservative political ideas.



After the turn of the century, this bourgeoisie began to clash with the French Canadian middle class, in particular with the professionals who were then developing a national consciousness. These professionals, whose numbers were rapidly growing and who aspired to form a national elite, became sharply aware that major economic activities were increasingly controlled by Anglophones. Regarding this as the result of a serious injustice done their fellow Francophones, they tended to view the anglophone merchants and bureaucrats as the most dangerous enemies of the French Canadian nation. Their ideology, warmly welcomed among small-scale merchants in French Canada, became steadily more hostile to the activities on which anglophone power was based. The francophone petite bourgeoisie glorified agriculture, defended the COUTUME DE PARIS and the seigneurial system (which it wanted to see extended throughout the province) and opposed the BRITISH AMERICAN LAND COMPANY, loudly insisting that Lower Canadian territory was the exclusive property of the French Canadian nation.

To promote its interests, the French Canadian bourgeoisie fashioned the PARTI CANADIEN (which in 1826 became the Parti PATRIOTE). Party leaders explained economic disparities by the British control of the political machine and the distribution of patronage. They therefore developed a theory that, though it provided for political evolution along traditional British lines, also justified rule by the majority party in the legislative assembly. Party leader Pierre BÉDARD was the main architect of this strategy, which was inspired by a desire to apply the principle of ministerial responsibility. (Its obvious consequence was to transfer the bases of power to the francophone majority and to reduce the governor's powers.) In 1810, in the context of revolutionary and imperial wars, perpetual tension with the US and current ideas about colonial autonomy, these reformist plans seemed so radical that the suspicious Gov CRAIG arrested the editors of *Le Canadien*, suppressed this nationalist party organ and dissolved the legislative assembly.

After the WAR OF 1812 Papineau, the new leader of the decapitated party, realized that it was necessary to seek more limited results. He focused on the struggle over control of revenues and on complaints, with the immediate objective of sharing power with his party's opponents. Papineau hoped in this way to control the clergy and win over the Irish Catholics, thus warding off accusations of nationalist extremism; it is from this perspective that the leadership roles in the party of John Neilson and, later, E.B. O'Callaghan can be explained. Only after 1827 did the pressure of events and from the militants cause Papineau to become more radical, and the idea of an independent Lower Canada then began to take root. The desire initially to win power by ordinary political means was at the heart of this adjustment of political ideology. But the British model was replaced by the American model, which justified the elective principle for all posts that exercised power, from justices of the peace and militia officers to legislative councillors and even the governor.



Place d'Armes, Montréal (1830), line engraving and etching by R.A. Sproule (*courtesy Royal Ontario Museum*).

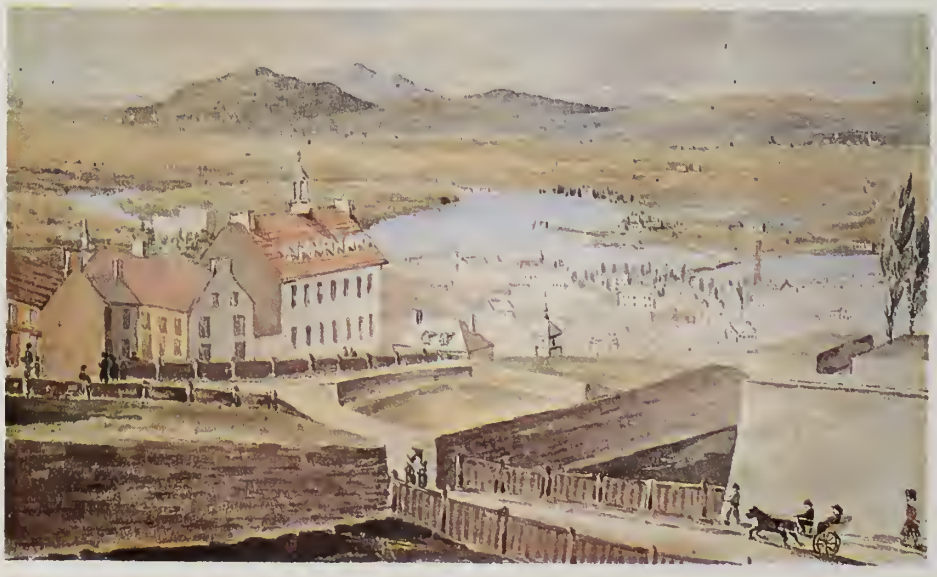
As the political struggle intensified, the Parti patriote gained strength in French Canadian circles, stirred up by nationalism, but lost popularity among Anglophones, who tended to align themselves with the anglophone merchants. Though they agreed on the main objective – national independence – Patriote militants disagreed about the kind of society that should follow their victory: the majority, which backed Papineau, wanted to continue the social *ancien régime*, whereas a minority hoped to build a new society inspired by authentic liberalism. These opposing views were to play a major role in the failure of the rebellions.

The clergy, a class solidly enthroned on a complex institutional network that generated great revenues, naturally became engaged in the struggle for power. Having seen the effects of the French Revolution and the intervention of the Protestant colonial state in Québec education at the turn of the century, Québecois clerics were already aware of the threat to their social influence. They became even more aware when conflict flared between the Parti canadien and the merchants' party, which was supported by the governor. The ecclesiastical leaders became convinced that a local group was using parliamentary institutions to achieve its revolutionary intentions. Consequently, during the crisis of 1810, Mgr PLESSIS asked his priests to support (with little success) the government's candidates. When the War of 1812 began, it is not surprising that the episcopacy strongly denounced the Americans and demanded, on pain of religious sanction, that the population actively defend its territory.

After 1815, reassured by peace and the more conciliatory attitude of the Parti canadien leaders, who opposed the Sulpician fathers (still French in origin) and supported the clergy's efforts to create a diocese in Montréal, clerical leaders began fighting for the restoration and extension of the privileges of their class. They sought control of primary education, perceiving that school was one of the main instruments of socialization. With Papineau's support the clergy won a dramatic but brief victory over the Protestant and state threat when the Parish Schools Act was passed in 1824.

The clergy gained new strength when Mgr Lartigue became bishop of Montréal and devoted himself to reorienting clerical ideology and strategy to fight the lay and Protestant threat. He was well suited to the role: he was one of the first priests to break with GALLICAN ideology and to be won over by ULTRAMONTANE and theocratic doctrine. He followed the new form of nationalism, now detached from its liberal roots and justifying the dominant role of the clergy in a Catholic society. He hoped to restore to the church full control over educational institutions and to bring the clergy closer to the people so as to deepen church influence. But after 1829 the Parti patriote decided to establish assembly schools (nurseries for future patriotes), sought to democratize the management of the parishes and adopted a liberal and republican rhetoric. A break between the clergy and the French Canadian middle class became inevitable.

The St-Charles R from above St John's Gate, Québec, Lower Canada (c1835), by an unknown artist (*courtesy Public Archives of Canada/C-40305*).



Rebellions of 1837-38 The 3-way power struggle became more violent in Mar 1837, when the British government, to break the political and financial deadlock, adopted the Russell Resolutions, which effectively rejected the Patriotes' demands. The Patriotes were not well enough organized to jump immediately into a revolutionary venture, so they developed a strategy that provided for the possibility that the state would refuse to yield to the pressure of a mass movement while it gave them time to prepare an armed insurrection to begin after winter set in.

The great parish and county assemblies began in May 1837 and spread agitation from parish to parish. For the present, action was supposed to stay within legal limits, but these assemblies, pushed by radicals, soon went beyond. Government leaders saw the uproar as a huge blackmail operation, but the better-informed clergy immediately understood the Patriotes' real objectives. By July 1837 Bishop Lartigue had given precise instructions for his priests in case of armed uprising. Agitation increased until the end of Oct, when the Patriotes held the "Assembly of the Six Counties" in St-Charles-sur-Richelieu. It was marked by a declaration of rights and by the adoption of resolutions suggesting a desire to overthrow the government.

Meanwhile, militant Patriotes had been extremely active in Montréal, where they set up the FILS DE LA LIBERTÉ, an association that publicly advocated revolution, held military drills and paraded through the streets amid great commotion. A Nov 6 battle between the Fils de la liberté and anglophone members of the DORIC CLUB led to government intervention, something long and anxiously sought by country dwellers who were being harrassed by the Patriotes. A few days later the government issued warrants for the arrest of the Patriote leaders, who hastily left Montréal and took refuge in the countryside.

Armed confrontation came well ahead of the Patriotes' intended timetable. Following an incident in Longueuil on Nov 16, the governor sent troops into the Richelieu Valley. On 23 Nov 1837 the Patriotes, led by Wolfred Nelson, took St-Denis, but 2 days later were defeated at St-Charles. Having scattered the last insurgent ranks S of Montréal, Gen Colborne attacked St-Eustache on Dec 14 and ended Patriote resistance.

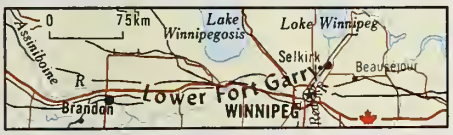
Papineau, supreme commander, had hidden in St-Hyacinthe before taking refuge in the US under an assumed name. Many refugees gathered in the US and, until Lord DURHAM tried to calm tempers, attempted to plan an invasion of Lower Canada. Their efforts were complicated by a rift within Patriote ranks between the radicals, such as Coté and Nelson, and the more conservative elements led by Papineau. When Durham left Canada in early Nov 1838, a second rebellion broke out, led by the radicals. Even though the revolutionary organization, through the efforts of the Société des frères chasseurs (HUNTERS' LODGES), spread throughout the territory, the Patriotes had no more luck than the year before. By about mid-Nov 1838 order had been re-established in the Richelieu Valley.

In 1837 Durham had exiled a few of the most seriously compromised political prisoners, but

was rebuked by London. In 1838, 850 suspects were arrested; 108 were brought before a court-martial and 99 were sentenced to death; only a dozen were hanged and 58 were deported to Australia. The main winners in the revolution were the clergy, with its special vision of a French, Catholic nation, and the anglophone bourgeoisie, with its plans for development through economic measures. In 1840 the ACT OF UNION was passed in Britain, providing for the 1841 unification of Upper and Lower Canada into the single PROVINCE OF CANADA.

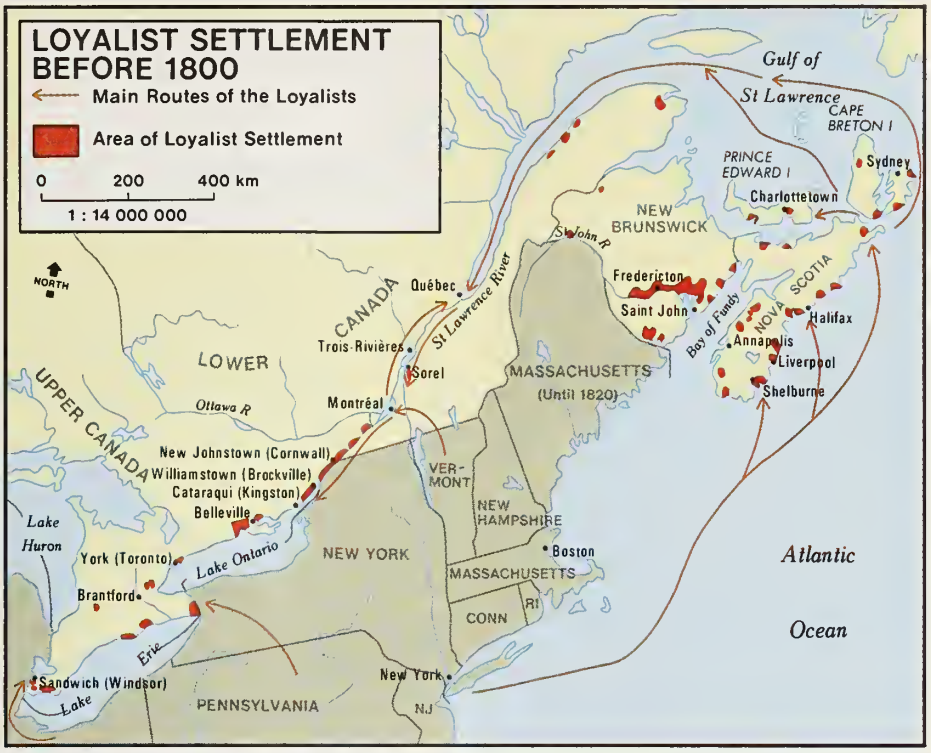
FERNAND OUELLET

Reading: Fernand Ouellet, *Lower Canada 1791-1840* (1980).



Lower Fort Garry, built 30 km down the Red R from Ft Garry [Winnipeg] during the 1830s as the HUDSON'S BAY COMPANY'S administrative centre for RUPERT'S LAND. It was hoped that the lower fort would be free from the spring flooding that beset the older community, and would house a more respectable class of citizen. But the original settlement was well located at the forks of the Assiniboine and Red rivers and even in the 1830s was developing as the natural centre of the RED RIVER COLONY. Although it never achieved the status originally intended, Lower Fort Garry served in a number of minor roles. During the Oregon crisis (*see* OREGON TREATY) in the 1840s a British army contingent was stationed at the fort; in 1871 some opponents of Louis RIEL rallied around Stoughton Dennis there; and during the winter of 1873-74 the NORTH-WEST MOUNTED POLICE trained its first recruits at the fort. It later served as the first provincial penitentiary and as an insane asylum. In the early 20th century it was a residence for HBC officials, and thereafter was leased to a country club. In 1951 the HBC gave the property to the Government of Canada. It was designated a National Historic Park and, after restoration carried out in the 1960s and 1970s, the fort is now one of the major HISTORIC SITES of Parks Canada.

C.J. TAYLOR



At every major fur-trade post there was a "Big House" which provided a commodious residence for the chief factor and his family. The "Big House" of Lower Fort Garry was a grand stone structure begun in the 1830s (*courtesy Hudson's Bay Company*).



Lowry, Clarence Malcolm, novelist (b at New Brighton, Eng 28 July 1909; d at Ripe, Eng 27 June 1957). Although he was not born in Canada, the years he spent in Dollarton, BC, (1940-54) were the happiest and most productive years of his chaotic life. Much of his later fiction is set in BC. All of Lowry's work is to a degree autobiographical. *Under the Volcano,* one of the great books of modern literature, was inspired by his months of alcoholic depression in Mexico (1936-38). From 1941 to 1944 he worked with his wife Margerie in their Dollarton shack tirelessly revising the manuscript, and in 1946 it was accepted for publication. In the character of the consul, a drunken diplomat without official duties, and in the infernal Mexican setting, Lowry found his perfect symbols. His supple and allusive style lends tragic dignity to the consul's sufferings, and gives the novel its unique combination of humour and horror. Much of Lowry's fiction (*Ultramarine,* 1933; *Lunar Caustic,* 1968; *Hear Us O Lord from Heaven Thy Dwelling Place,* 1961) is memorable, but it is *Under the Volcano* that has established Lowry as one of this century's great writers.

TRACY WARE

Reading: Douglas Day, *Malcolm Lowry* (1973).

Lowther, Patricia Louise, poet (b at Vancouver 29 July 1935; d there 24 Sept 1975). Lowther devoted herself to the promotion of poetry, lecturing in creative writing at UBC, and to the advancement of the NEW DEMOCRATIC PARTY, for which she was constituency secretary. She was elected cochairman of the League of Canadian Poets in 1974 and subsequently to the BC Arts Council. Widely anthologized, Lowther published 4 collections of poetry (*This Difficult Flowering* 1968, *The Age of the Bird* 1972, *Milk Stone* 1974, and *A Stone Diary* 1977) in which the 2 pivotal aspects of her work, socialist politics and the politics of sex, are mirrored. She is survived by 4 children and her husband Roy, who was sentenced to life imprisonment in 1977 for his wife's murder. The Pat Lowther Award is given annually by the League of Canadian Poets.

CATHERINE AHEARN

Loyalists, American colonists of varied ethnic backgrounds who supported the British cause during the AMERICAN REVOLUTION (1775-83). In 1789 Lord Dorchester (*see* CARLETON), governor-in-chief of BRITISH NORTH AMERICA, proclaimed that the Loyalists and their children should be allowed to append "UE" to their names, "alluding to their great principle, the Unity of Empire"; hence the phrase "United Empire Loyalist," or UEL. (The term applied initially in the Canadian colonies alone; it was officially recognized in the Maritimes only in the 20th century.) In determining who was eligible for compensation for war losses, Britain used a fairly precise definition: Loyalists were those born or living in the American colonies at the outbreak of the Revolution who rendered substantial service to the royal cause during the war, and who left the US by the end of the war or soon after. Those who left substantially later, mainly to gain land and to escape growing intolerance of minorities, are often called "late" Loyalists.

The Loyalists supported Britain for highly diverse reasons. Many evinced a personal loyalty to the Crown or a fear that revolution could bring chaos to America. Many agreed with the

rebels that America had suffered wrongs at the hands of Britain, but believed the solution could be worked out within the empire. Others, seeing themselves as weak or threatened within American society and in need of an outside defender, included linguistic and religious minorities, recent immigrants not fully integrated into American society, blacks and Indians. Sympathy for the Crown was a dangerous sentiment: those who defied the revolutionary forces could find themselves without civil rights, subject to mob violence or flung into prison. All the states finally taxed or confiscated Loyalist property.

During the Revolution over 19 000 Loyalists served Britain in specially created provincial corps accompanied by several thousand Indians. Others spent the war in such strongholds as New York City or in refugee camps such as those at Sorel and Machiche, Qué. Between 80 000 and 100 000 eventually fled, about half of them to Canada. The vast majority were neither well-to-do nor particularly high in social rank; most were farmers. Ethnically they were quite mixed, and many were recent immigrants. White Loyalists brought sizable contingents of slaves with them. Free blacks and escaped slaves who had fought in the Loyalist corps and as many as 2000 Indian allies, mainly Six Nations Iroquois from NY, settled in Canada.

The main waves of Loyalists came to what is now Canada in 1783 and 1784. The MARITIME PROVINCES became home for upwards of 30 000; most of coastal NS received Loyalist settlers, as did Cape Breton and St John's I [PEI]. The 2 chief settlements were in the Saint John R valley and temporarily SHELBURNE, NS. The Loyalists swamped the previous population of 20 000 Americans and French, and in 1784 New Brunswick and Cape Breton were created to deal with the influx.

Of about 2000 who moved to present-day Québec, some settled in the Gaspé on Chaleur Bay and others in the seigneury of Sorel at the mouth of the Richelieu R. About 7500 moved into what would become Ontario, most settling along the St Lawrence R to the Bay of Quinte. There were also substantial settlements in the Niagara Peninsula and on the Detroit R, with subsidiary and later settlements along the Thames R and at Long Point. The Grand R was the main focus of Loyalist Iroquois settlement. The Loyalist influx gave the region its first substantial population and led to the creation of a separate province, UPPER CANADA, in 1791. Loyalists were instrumental in establishing educational, religious, social and governmental institutions. Though greatly outnumbered by later immigrants, Loyalists and their descendants, such as Egerton RYERSON, exerted a strong and lasting influence. Modern Canada has inherited much from the Loyalists, including a certain conservatism, a preference for "evolution" rather than "revolution" in matters of government, and tendencies towards a pluralistic and heterogeneous society.

BRUCE G. WILSON

Reading: W. Brown, *The Good Americans* (1969); M.B. Fryer, *King's Men* (1980); B. Graymont, *The Iroquois in the American Revolution* (1972); Bruce G. Wilson, *As She Began* (1981); E.C. Wright, *The Loyalists of New Brunswick* (1955).

Loyola College, *see* CONCORDIA UNIVERSITY.

Luard, Richard George Amherst, army officer (b in Eng 29 July 1827; d at Eastbourne, Eng 24 July 1891). A British military officer, he was general officer commanding the Canadian Militia 1880-84, following active service in India, the Crimea and China. Scornful of the Militia's fancy dress and lack of expertise, he advocated expansion of Canada's tiny permanent force at the expense of the part-time soldiers in rural regiments. With displays of his fearsome temper at military gatherings, this policy led him into conflict with politically influential officers. Adolphe CARON, minister of militia and defence, perceived his attempts at departmental reform as interference with political patronage. Although new permanent-force units were raised in 1883, Luard resigned under pressure soon after.

O.A. COOKE

Luc, Frère, Recollet, painter, architect (b Claude François at Amiens, France May 1614; d at Paris 1685). He studied in Paris and Rome, received the title "king's painter" for his work in decorating the Louvre (1640-42), joined the Recollets (1644) as Frère Luc, and worked in NEW FRANCE from Aug 1670 to Oct 1671. He designed the chapel for the rebuilt Recollet monastry in Québec, now the oldest chapel in Canada and part of Hôpital-Général, and a wing of the SÉMINAIRE DE QUÉBEC (1677-78). Since works of art were generally imported from France at this time, he was most influential through his paintings for local churches, both during his sojourn in the colony and after his return to France. The *Assomption de la Vièrge*, which he painted in 1671 for the retable of the Recollet chapel, is his best-known work. He has been credited with a few portraits, including ones of Jean TALON and Bishop LAVAL, and the churches of Ste-Anne-de-Beaupré and of St-Philippe (Trois-Rivières) possess his colourful if sentimental VOTIVE PAINTINGS. Most accomplished paintings of the period have variously been attributed to him and, though recent research discredits many of these claims, the extent of his influence cannot be denied.

ROSEMARY SHIPTON

Lucan, Ont, Village, pop 1616 (1981c), inc 1872, is located in southwestern Ontario, 90 km NE of SARNIA and 22 km NW of LONDON. It was first settled 1829-30 by refugee BLACKS from the US and was known as the Wilberforce Colony. In 1832 settlers from southern Ireland arrived and the community was renamed Marystown. When the main line of the GRAND TRUNK RY was built through the village in 1860 it received its present name after a suggestion by a resident who had been coachman on the estate of Lord Lucan in Ireland. In recent years, because of its proximity to London, Lucan has prospered as a dormitory community for that city. The village has received much unwelcome notoriety because of its connection with the savage massacre of the DONNELLYS in 1880 on a nearby farm.

ORLO MILLER

Lucania, Mount, elev 5226 m, the third-highest mountain in Canada, is located 29 km E of the Alaska border and 50 km N of Mt LOGAN in the Yukon's St Elias Range. It was named by the duke of Abruzzi, who viewed it from Mt St Elias in 1897. Draped in snow and ice, Mt Lucania is joined to its neighbour to the NE, Mt STEELE, by a high saddle. Bradford Washburn and Bob Bates were flown to Walsh Glacier and made the first assent 9 July 1937, then proceeded over Mt Steele — that mountain's second ascent.

GLEN BOLES

Lucy Qinnuayuak, artist (b near Sugluk, Qué 1915?; d at Cape Dorset, NWT 10 Sept 1982). One of the most popular Inuit graphic artists, noted primarily for fanciful arctic birds, Lucy began to draw in the late 1950s at the time James HOUSTON started PRINTMAKING experiments at Cape Dorset. "We would draw our art in camp and then when a dog-team went to Cape Dorset to get supplies we would take our drawings and give them to Saumik" (ie, to Houston). Well over 100 of her drawings have appeared as prints; the stone for her early *Large Bear* (1961) was donated to the Tate Gallery, London, by admirer Sir Charles Gimpel and is displayed at the Scott Polar Research Institute, Cambridge. Widely collected, her work has appeared on an Olympic banner and in many exhibitions. *See* INUIT ART.

DOROTHY HARLEY EBER

Luge, *see* BOBSLEDDING.

Lumber and Wood Industries Canada's lumber and wood industries include manufacturers that convert logs (by mechanical processes of sawing, peeling, slicing or chipping) into lumber, veneer, plywood, particle board and wafer board, and that produce, as residual by-products, wood chips, sawdust and shavings. Lumber and plywood are the most significant products in volumes manufactured. Over 65 000 people are employed directly in MANUFACTURING lumber, plywood, veneer and wood-based panels. The market value of primary wood products in 1982 was $6.2 billion, of which 84% was attributed to lumber sales. Since nearly 70% of softwood lumber production is exported, this industry makes a significant contribution to Canada's BALANCE OF PAYMENTS.

The primary wood-products industry consumes about half the roundwood cut in Canada; the PULP AND PAPER INDUSTRY uses the remainder. Over 95% of logs used to manufacture lumber, plywood and other wood-based panels are softwoods (primarily CONIFERS); the rest are hardwoods (deciduous TREES). In Canada the principal softwood lumber species are DOUGLAS FIR, SPRUCE, PINE, HEMLOCK and western red CEDAR; BIRCH and MAPLE are the predominant hardwood species. Between 1970 and 1983, Canadian softwood lumber and plywood production rose dramatically (88% and 40%, respectively). In 1983, 98% of the 48 million m^3 of lumber manufactured in Canada was softwood (of which BC produced 65%). In that year, 2.1 million m^3 of plywood was manufactured from softwoods, with BC responsible for 85%. Hardwood lumber and plywood are produced mainly in Ontario and Québec.

About 30% of Canadian lumber production is consumed in the domestic market; 70-75% of exported lumber is purchased by the US. The European Economic Community and Japan are also important markets, with lesser volumes going to Australia, Africa and Latin America. More than 80% of the softwood plywood produced is used domestically; about 98% of exported plywood goes to Britain and other EEC countries. The US imports insignificant volumes because it has a strong domestic industry and imposes high tariffs on softwood plywood imports. About 60% of Canadian particle board and wafer board are consumed in Canada; the majority of exports goes to the US. This export volume is expected to increase in future.

During the period 1970 to 1983, the number of sawmills decreased from an estimated 1800 to 1250 because of the trend towards larger, more technically efficient manufacturing complexes. A significant innovation in this period was the development of high-volume, small-log processing systems.

Lumber and Plywood Manufacturing Merchantable timber is felled and cut into logs for transport to sawmills. Mechanical or hydraulic debarking is the first step in converting a sawlog into lumber. In conventional sawmills, large logs are placed on a moving log carriage and passed repeatedly through a band or circular saw, each pass producing boards that normally require further processing on edgers, resaws and trimsaws. In sawmills processing small logs, the primary unit may be a chipper-canter with integrated sawing units, or a system of multiple-band or circular saws, designed to operate at speeds up to 100 m per minute. About three-quarters of the lumber produced in Canada is further processed in planer mills that smooth the rough surfaces and dimension the pieces. Over half the lumber produced is dried to remove excess moisture, either in dry kilns for several days at temperatures sometimes exceeding 80°C, or by air for several months.

Plywood is wood reduced to thin sheets of veneer, glued together with the grain direction of adjacent sheets at right angles. This cross lami-

nation makes the panel stable and redistributes the inherent directional-strength properties. Plywood is an engineered product. Veneers are produced by holding a log firmly at each end in a lathe and rotating it against a knife that moves towards the axis of rotation. The veneer exits from the lathe knife in a continuous ribbon of wood that is clipped to desired widths or to eliminate defects. After drying the veneers are sorted into sets, each of which will form a plywood panel of the desired thickness and size. Alternate sheets are coated with glue, which forms a waterproof bond when subjected to high temperature and pressure in a hot press. The rough plywood panels are then trimmed and may be sanded.

To ensure uniform quality, lumber and plywood are graded into categories by standardized procedures. Most of the lumber produced in Canada is used in CONSTRUCTION, mainly for house building; it is classed as dimension lumber and is graded into width and use categories. Other classes of lumber include clears, factory lumber and shop lumber, used to manufacture high-quality moldings, panelling and flooring, or to obtain clear cuttings for components in such items as doors and windows. Softwood plywood is produced in 3 grades: sanded (for high-quality finishing), unsanded (for construction use), and unsanded and overlaid (for special uses). For general construction and other structural purposes, the most common type of panel is sheathing, the unsanded grade. About half the plywood used in Canada is for house building and agricultural construction; industrial uses take up another third; the balance is consumed in a multitude of miscellaneous uses.

Particle Board and Wafer Board Wood particle board is a panel product manufactured by bonding particles of wood together with an adhesive in a press. Since the product is manufactured from small pieces of wood, properties of the finished board, such as density, hardness and elasticity, can be engineered into the panel. The furnish for particle board is sawdust or planer shavings or solid wood flaked or chipped specifically for that purpose. The various wood elements are screened and separated by size and shape so that their integration in the finished product can be controlled. The particles are then dried by heat and circulation and mixed with thermosetting bonding agents. The mixture is then meshed together in a layup for final pressing under heat.

The most common type of particle board manufactured in Canada is the 3-layered, graduated mat-formed variety. By preparing the core and surface material separately, segregating the coarser materials into the centre and the finest particles on the surface, the manufacturer can create a board that can be sanded to an even, smooth surface, and that has the desired mechanical properties in each layer. The fibre lengths of the particles are distributed in a random pattern, so that internal stresses average to zero, resulting in an extremely stable finished product. Major uses of particle board are furniture and cabinet panels and cores, and floor underlay; minor uses include interior wall sheathing and mobile-home decking.

Wafer board is an engineered, structural panelboard made from large, thin wafers cut from roundwood. These wafers are mixed with waterproof phenolic resin and interleaved together in thick mats, which are then bonded together under heat and pressure. The result is a solid, uniform building panel with high strength and water resistance, properties that make wafer board suitable for most construction applications. Some examples of uses are wall and roof sheathing, subflooring and underlay, cladding and soffits. The panels are also widely used for farm structures, industrial packaging, crating and warehouse pallets. DAVID MILTON

Lumonics Inc, *see* ELECTRONICS INDUSTRY.

Lumsdon, Cliff, long distance swimmer (b at Toronto, Ont 1 Apr 1931). At age 6 Lumsdon joined the Lakeshore Swim Club in Toronto, coached by the famous Gus Ryder. In 1949 he claimed the first of 5 men's world marathon swimming championships by beating a field of 70 in the CNE 15-mile (24 km) swim with a time of 7 hrs 55 mins. He received the LOU MARSH TROPHY as Canada's athlete of the year in 1949. He continued to do well after 1954, when the shorter waterfront marathon was replaced by a 30-mile (48 km) swim across the lake. In 1956 he won the Atlantic City 26-mile (42 km) event and became the first to conquer the Juan de Fuca Strait. Later, he coached his daughter Kim and assisted Cindy Nicholas and other marathon swimmers. GERALD REDMOND

Lund, Alan, choreographer (b at Toronto 23 May 1925). A specialist in musical theatre, he trained in Toronto and first established a performance reputation as a dance team with his wife Blanche, appearing during WWII in the revue *Meet the Navy*. Turning to choreography in the 1950s, Lund contributed to various productions including *Spring Thaw*, the CANADIAN NATIONAL EXHIBITION Grandstand Show and at the STRATFORD FESTIVAL. In 1968 he became artistic director of the Charlottetown Festival, where he has directed Canada's most successful musical, *Anne of Green Gables*, and several others. His own *The Legend of the Dumbells* premiered there in 1977. Lund was given an honorary degree by UPEI and is a member of the Order of Canada. JILLIAN M. OFFICER

Lundy's Lane, site of a battle fought between American troops and British regulars assisted by Canadian fencibles and militia on the sultry evening of 25 July 1814, almost within sight of NIAGARA FALLS. The action swayed to and fro, as the troops attacked each other with reckless abandon in pitch darkness. The British regulars, mainly the Royal Scots and the 8th, 41st and 89th regiments of foot, were steadfast in defence and bold adversaries in attack. Sir Gordon DRUMMOND, the Canadian-born British field commander, was wounded; his second-in-command was captured. Nonetheless, by midnight the British and Canadians held the field as the Americans retired toward Ft Erie. Casualties were high on both sides, the Americans suffering more killed. The battle was the toughest and most bitterly contested of the WAR OF 1812. ROBERT S. ALLEN

Lunenburg, NS, Town, pop 3014 (1981c), inc 1888, shire town of Lunenburg County, is located on Lunenburg Bay, 90 km SW of Halifax. The centre of NS's fishing industry, it was known first as Merliguesche, and was home



to some 50 ACADIANS as late as 1749. In 1753 the British government settled 1453 "Foreign Protestants" here; recruited from southwestern Germany and the Montbéliard district of France and Switzerland, these mostly German-speaking people were intended to help counter the French and Catholic presence in NS. (The settlement was named for the royal house of Brunswick-Lüneburg, whence came King George I of England.) Each settler was granted a free town-and-garden lot and farm acreage in the county. The town's gridlike plan mirrored that of Halifax.

Despite initial hardships, by the late 18th century Lunenburg supplied Halifax with many agricultural products. Lunenburgers had also entered the offshore fishery, today the foundation of the local economy. They first fished off the Labrador coast, but with the introduction of new trawling techniques in the late 1860s, the town's schooner fleet turned to the GRAND BANKS of Newfoundland and the Western Bank, SW of Sable I. The "Lunenburg cure" of dried cod found steady markets in the West Indies, particularly Puerto Rico. "A boom of splendid proportions" (Lunenburg *Progress*, 1888) did not persist, however. The fish export trade became centralized in Halifax, where fast steamships left directly for the West Indies and US markets. Moreover, a preference appeared for fresh instead of dried fish. Local entrepreneurs, especially the Smith and Zwicker families, made adjustments to recapture lost trade. Beginning in the late 1920s, cold-storage equipment, processing plants and diesel-powered trawlers replaced cod-drying flakes and traditional schooners. Today, Lunenburg is the base for Atlantic Canada's largest fish-processing plant and fleet of deep-sea trawlers, owned by National Sea Products of Halifax, the successor to several Lunenburg-owned firms.

The fishery is celebrated annually in the NS Fisheries Exhibition and Fisherman's Reunion; and the Fisheries Museum of the Atlantic is found here. The famous racing schooner BLUENOSE was launched from a local shipyard. Several churches, including Canada's oldest Presbyterian (St Andrew's 1754) and Lutheran (Zion's 1772) and second-oldest Anglican (St John's 1753) congregation, as well as rich architectural



Lunenburg, NS, settled in the mid-18th century, is the base for Atlantic Canada's largest fish-processing plant and deep-sea trawler fleet (*photo by Jim Merrithew*).

tradition testify to Lunenburg's historical significance. L.D. McCANN

Reading: M.B. DesBrisay, *A History of Lunenburg County* (1895); Lunenburg Heritage Society, *A Walk Through Old Lunenburg* (1979).

Lupine [Lat *lupus,* "wolf," from belief that it robs the soil], annual or perennial herbaceous PLANT, genus *Lupinus* of family Leguminosae or Fabaceae. Worldwide, there are about 200 species with 2 principal areas of distribution: western mountains of N and S America, and the Mediterranean basin. In Canada, 28 species are recognized, most from southern Saskatchewan to BC; *L. arcticus* and *L. nootkatensis* reach western Arctic; *L. perennis* occurs in southern Ontario; the western species, *L. polyphyllus,* is naturalized in eastern Canada. Some cultivated lupines escape along roadsides. Palmately compound leaves (ie, leaflets radiate from central point) and showy flower spikes make lupines admirable ORNAMENTALS (eg, Russell hybrids). Some species are grown for fodder, green manure and food (eg, Balkan species, *L. albus,* in Europe and Africa). In Canada lupines are used as a cover crop in reforestation projects. Lupines grow on and enrich nitrogen-poor soils. Quinolizidine alkaloids make lupine seeds poisonous to livestock, although vegetative plants are not. When treated, seeds provide protein source for livestock. *See* POISONOUS PLANTS. J.M. GILLETT

Luscombe, George, director, producer, playwright (b at Toronto 17 Nov 1926). As artistic director of Toronto Workshop Productions (founded 1959), he is considered the founder of the "alternative" theatre movement in English Canada. Working as an actor with Joan Littlewood in England 1952-56, he was influenced by her experimentation with new performance styles and belief in a socially committed theatre. His productions are characterized by ensemble acting rather than a written script orientation — what he calls "group" theatre. At TWP he pioneered original Canadian scripts, adaptations of classics and collective creations. His most noteworthy productions, combining a lively theatricality with significant social commentary, include *Hey, Rube!* (1961), *Mister Bones* (1969), *Chicago 70* (1970), *Ain't Lookin'* (1980) and, particularly, *Ten Lost Years* (1974). ANTON WAGNER

Lutherans, adherents to the Christian church founded by 16th-century Protestant reformer Martin Luther, whose central doctrine, justification by grace through faith alone, concentrates on God's favour to man and not on man's actions. Because the understanding of that favour depends upon proclamation and interpretation of the Word, preaching is the Lutheran church's hallmark. Lutheranism also reduced the number of sacraments from 7 to 2: baptism and the Lord's Supper (*see* CATHOLICISM). An emphasis upon pure doctrine derived from Lutheran orthodoxy and the influence of pietism are post-Reformation shifts imported to Canada principally from the US. The doctrinal stance of the Lutheran Church is determined by the acceptance of the Scriptures as sovereign over church tradition and as normative for faith and life, and by subscription to the Lutheran Confessions, composed 1530-80. Century-long doctrinal disputes which have divided American Lutherans have also impeded inter-Lutheran merger in Canada.

With the exception of Baltic congregations in exile, Lutheran state church congregations abroad and a few Wisconsin Synod congregations, there are now 3 Lutheran jurisdictions in Canada: Lutheran Church of America (LCA), Evangelical Lutheran Church of Canada (ELCC) and Lutheran Church — Canada (LCC). LCA and ELCC are projecting merger in 1986. Matters of inter-Lutheran concern are handled through the Lutheran Council in Canada (fd 1967). Originally rural and small town in orientation, concentrated in NS, Ontario and the Prairies, the Lutheran churches were greatly affected by urbanization after WWII. Major strength now is around Kitchener-Waterloo, Winnipeg and Edmonton, with new missions in many cities. The slowness of Lutheran ethnic minorities to adjust to the dominant culture has to some degree inhibited Lutheran involvement in Canadian society.

Lutheran history in Canada has been determined by US affiliations. Congregations were established 1752 in Halifax, NS, and 1784 in Dundas County, Ont. From the beginning the mission suffered from lack of personnel and fiscal support from the parent US body; conflict with Anglicans; rivalry among the Lutheran denominations; and imposters posing as evangelical ministers. Confined principally to German settlements, churches associated with the New York Ministerium and the Pittsburgh Synod later found themselves competing with the Lutheran Church, Missouri Synod (LCMS). In the mid-19th century the Pittsburgh Synod created a Canada Conference, and in 1876 the Nova Scotia Conference. These and an English Conference became units of the General Council, then of the successor United Lutheran Church in America (ULCA) in 1918. In 1962 they combined into a single synod upon formation of LCA. Meanwhile, in 1879 LCMS had formed its Canada District (renamed Ontario District in 1922), and the nongeographic English District in 1911. The Canadian congregations of LCMS have been federated since 1958 as LCC.

In western Canada work began among Icelanders near Gimli, Man, in the 1870s, Germans in Winnipeg in 1888, Swedes in New Stockholm, Assiniboia (now Sask), in 1889, Norwegians in Vancouver in 1890 and Danes at Dickson, Alta, in 1903. By 1910 there were 3 German, 1 Swedish, 1 Danish, 1 Icelandic and 4 Norwegian Lutheran church bodies in the West, using at least as many languages. Except among Norwegians, the mergers of US parents did not follow ethnic lines. As a result, the German Manitoba Synod of the GC became a synod of ULCA in 1918; the Icelandic Synod joined this body in 1943 as a nongeographic synod; and these and the Canada Conference of the Swedish Augustana Synod became 2 synods (Man-Sask and Alta-BC) in LCA in 1962.

The Norwegian Lutheran Church and the Haugean Synod, the constituent units of the United Norwegian Lutheran Church, became in 1917 a district of the successor Evangelical Lutheran Church. This district, plus the Canadian District of the German Ohio Synod (later American Lutheran Church, 1930) and the Danish United Evangelical Lutheran church district, became a single district in the 1960 merger forming the American Lutheran Church. In 1967 this district became autonomous as ELCC.

Lutheran Church polity is nonepiscopal, LCA's recent introduction of "bishops" notwithstanding (the title reflects American administrative influence). The pastorate is the fundamental office of the church and the prerequisite for official functions. Ministerial recruitment is the responsibility of the church body; LCA and ELCC ordain women, but women's rights remain restricted in LCC.

Youth work is carried out through the Luther League (Walther League in LCC) and university-campus ministry through inter-Lutheran Student Centres. The best-known men's organization is the Lutheran Laymen's League of LCMS, which in N America sponsors such programs as radio's Lutheran Hour. Women's auxiliaries have been major supporters of foreign mission and service projects. Education has received high priority among Lutherans, not only through the SUNDAY-SCHOOL system and the earlier Saturday and Monday schools, but also through parochial schools, particularly in LCC; Bible schools such as those at Outlook, Sask, and Camrose, Alta, in ELCC; and high schools and junior colleges such as Luther College, Regina, and Concordia College, Edmonton. WILFRID LAURIER UNIVERSITY in Waterloo was formerly Waterloo Lutheran U. Theological education has been pursued for some 75 years at seminaries in Waterloo and Saskatoon. An LCC seminary opened in 1976 in St Catharines, Ont. Lutheran Life, a fraternal insurance society, provides scholarship support to Lutheran students and institutions. In the mid-20th century, health care mushroomed with the establishment of auxiliary hospitals and senior-citizens' homes.

WALTER FREITAG

Reading: V.J. Eylands, *Lutherans in Canada* (1945); J.E. Herzer, *Homesteading for God* (1946); C.R. Cronmiller, *A History of the Lutheran Church in Canada,* (vol 1, 1961); G.O. Evenson, *Advertising for Christ* (1974); Walter H.P. Freitag, *Prospect and Promise of Lutheran Unity in Canada* (1974); N. Threinen, *A Sower Went Out* (1982).

Lutin, elf or imp in French Canadian tradition who rides horses throughout the night, leaving them with plaits or knots in their hair, which are very difficult to remove. In some cases, it is believed that only a woman wearing a wedding ring can loosen the knots. NANCY SCHMITZ

Lyall, William, philosopher (b at Paisley, Scot 11 June 1811; d at Halifax 17 Jan 1890). He arrived in Halifax in 1850 as a minister trained in the classics. Most of his teaching (about 32 hours a week) was done at Dalhousie in Halifax. His major work, *Intellect, The Emotions and The Moral Nature* (1855), attempted to bring together the emotions and intellect in man. Lyall relied on commonsense realism and Augustinian Neoplatonism to achieve his goal. He argued that the emotions, of which love was most important, were a source of knowledge. This position influenced his ethical theory, which in turn was reflected in the moral tone of Maritime literary works of his day. ELIZABETH A. TROTT

Lyle, John MacIntosh, architect, urban planner, teacher, designer (b at Connor, Ire 13 Nov 1872; d at Toronto 19 Dec 1945). He attended the Hamilton School of Art and trained as an architect at the Yale School of the Arts before enrolling (1894) in the École des beaux-arts, Paris. Lyle's training was reinforced by 12 years' work



John Lyle integrated elaborate sculptured motifs in stone and other material into his buildings to express a unique Canadian style. Shown is a detail of a window splay, Bank of Nova Scotia, Calgary (*courtesy Geoffry Hunt*).

in New York for several large firms. Upon return to Canada in 1906 he was instrumental in disseminating the beaux-arts ideals to the architectural profession through Atelier Lyle's lectures at University of Toronto. His early works reflect the beaux-arts style — Royal Alexander Theatre (1906) and UNION STATION (1911-27) in Toronto — as do his later works — Memorial Arch, RMC, in Kingston (1923) and Bank of Nova Scotia in Ottawa (1923). Later in the 1920s, through an examination of Canada's architectural heritage, Lyle went on to develop a distinctively Canadian style. His integration of Canadian floral and faunal motifs into the design of his buildings parallels the artistic developments of the GROUP OF SEVEN. For example, in 1929 he designed 3 bank branches that codified his nationalistic feelings: Dominion Bank (Yonge and Gerrard, Toronto), Bank of Nova Scotia (8th Avenue SW, Calgary) and Bank of Nova Scotia (head office, Halifax). In these buildings he integrated elaborate sculptural motifs in stone, metal, plaster, fresco, glass and mosaic to express the Canadian heartland. In 1930 he built the Runnymede Library, Toronto, which combined colonial Georgian and early Québec styles.

Lyle's work in URBAN AND REGIONAL PLANNING made him a leader in the City Beautiful movement, and he developed visionary designs for Toronto's Civic Improvement League. His designs submitted to the Dominion Coin Competition (1936) influenced the adoption of animal and leaf motifs used in contemporary Canadian coinage. GEOFFREY HUNT

Reading: Geoffrey Hunt, *John M. Lyle: Toward a Canadian Architecture* (1982).

Lyman, John Goodwin, painter, author, teacher (b at Biddeford, Maine 29 Sept 1886; d in Barbados, West Indies 26 May 1967). Apart from trips to Canada in 1913 and 1927, he spent the years 1907-31 in Europe. He attended several art schools there but, while these provided him with basic technical competence, the Académie Matisse (1910) exercised a deep influence on his art and thinking. Upon his return to Canada, his "gentlemanly" life-style gave way to a commitment to improve artistic conditions. As a critic (the *Montrealer*, 1936-42) he showed an awareness of art's elusive quality and rather than dictate to people tried to help them respond to art. He saw the GROUP OF SEVEN as a reactionary institution standing in the way of progress, and was a key figure emphasizing internationalism in Québec. Though he often seemed to express formalist views about art, he never insisted on values of the medium alone, admitting the interplay of raw material and subjective states. Like Matisse, he emphasized the role of instinct and the expression of feelings. As an organizer (Eastern Group of Painters, Contemporary Arts Soc) Lyman sought to improve exhibiting conditions for artists. Here, however, as in his teaching (Atelier, McGill), he was careful not to become dogmatic. Lyman the artist is a controversial figure. Though many dismiss his role as a painter, his works reflect advanced formal concerns and a personal vision. Neither anecdotal nor picturesque, and simplified in form, they state the everlasting quality of things.

LOUISE DOMPIERRE

Lynch, John Joseph, Vincentian, first Roman Catholic archbishop of Toronto (b in County Fermanagh, Ire 6 Feb 1816; d at Toronto 12 May 1888). He was ordained in 1841 and served in Texas, Missouri and New York before going to Toronto in 1859. He was consecrated archbishop in 1870. Known for his strong defence of infallibility, he was a controversial figure. Many of his pastoral letters were published as was his book, *Questions and Objectives Concerning Catholic Doctrine and Practice* (1877). From 1873 to 1888, Lynch and Ontario Premier Oliver MOWAT had a strong and public political alliance known as the Lynch-Mowat *concordat*. In federal politics, he was less successful and wavered between the Liberals and Conservatives. An Irish nationalist, Lynch tried unsuccessfully throughout his life to persuade the British to grant Dominion status to Ireland. GERALD STORTZ



John Goodwin Lyman, *The Card Game*, oil on canvas. As a critic, Lyman considered the Group of Seven reactionary. His own work reflects more advanced formal concerns (*courtesy National Gallery of Canada*).

Lynx, medium-sized, carnivorous MAMMAL of family Felidae. Canada lynx (*Lynx canadensis*) is distinguished from N American BOBCAT by its tufted ears, large feet, long legs and lack of a white patch below the tail tip. The buff grey, indistinctly spotted fur is long behind the jaws, on the sides of the body and back of the hind legs. Males are larger than females and size ranges widely (5-13 kg). Lynx inhabit northern mainland N America and Newfoundland, and occur accidentally on Baffin I. Once found throughout Canada, they have now been eliminated from settled areas in the south. Their chief food is snowshoe hares, although other small mammals and birds are taken. Individuals become mature at one year. Females bear 1-4 (rarely 5) kittens about 63 days after breeding in Mar-Apr. Kittens are born in a den under a windfall or some natural shelter, and are brownish with blotched upper parts. They become independent in autumn of their second year, when fully grown. Lynx fur is prized by furriers, and overtrapping coupled with elimination from settled areas has seriously reduced the population. Eurasian lynx (*L. lynx*) occupies forested parts of northern and central Europe and northern Asia.

C.S. CHURCHER

Lyon, George Seymour, golfer (b at Richmond, Canada W 27 July 1858; d at Toronto, Ont May 1938). Lyon was undoubtedly one of Canada's most amazing athletes. At 18 he set a Canadian record in the pole vault. He played baseball, rugby and soccer successfully, was an excellent curler and lawn bowler, and he represented Canada at cricket (scoring 238 not out for his club, a Canadian record). At age 38 he took up golf and between 1898 and 1914 won the Canadian Amateur title 8 times. At age 46 he won the only Olympic gold medal awarded in golf, defeating US champion H. Chandler Egan 3-and-2 at St Louis, Mo (1904). One of his drives in the semifinal match was estimated at 299 m. In 15 tournaments for the Canadian senior championship, he won 10 times and came second on 4 occasions. GERALD REDMOND

Lyon, Sterling Rufus, lawyer, politician, premier of Manitoba (b at Windsor, Ont 30 Jan 1927). Lyon, elected to the Manitoba Legislature in 1958, spent the next 11 years as a minister in the Roblin-Weir PC administrations. Defeated by Walter WEIR in a bid to succeed Duff ROBLIN in 1967, he left politics 1969, but returned in an unsuccessful attempt at a federal seat in 1974. He became leader of the Manitoba Tories in 1975 and premier in 1977. His administration, despite its policy of restraint in government spending, did pass some progressive social legislation but was defeated in 1981. In Opposition, Lyon strenuously opposed the PAWLEY government's proposal to entrench Franco-Manitoban rights in the constitution. He resigned from the leadership in 1983. GEOFFREY LAMBERT

Lytton, BC, Village, pop 428 (1983e), inc 1945, is located on the Trans-Canada Hwy, 260 km NE of Vancouver, at the junction of the THOMPSON and FRASER rivers, in one of the dryest and warmest spots in Canada. The village is on the former site of a Thompson R Indian village called Camchin, or Thilkumcheen, meaning "great forks," and later of the HBC post Fort Dallas. In 1858 the settlement was named after Sir Edward Bulwer-Lytton, British colonial secretary. The area was important during the GOLD RUSH on the Fraser in the late 1850s and was a stopping point on the CARIBOO ROAD from the 1860s. A bridge over the Thompson built there in 1866 was nearly swept away in the great flood of 1894. Lytton today is supported by sawmilling, tourism and the CN and CP railways. Tourism has greatly increased the popular raft trips down the rapids of the Thompson R.

JOHN R. STEWART

Maass, Otto, educator, scientist (b at New York C, NY 8 July 1890; d at Montréal 3 July 1961). Maass was educated at McGill and Harvard (PhD 1919). In 1920 he joined McGill's staff and in 1923 became Macdonald Professor of Chemistry there, a position he retained until 1955. He was also chairman of the McGill Department of Chemistry (1937-55). Other positions he held were as director general of the Pulp and Paper Research Inst of Canada (1940-55); assistant to the president, NATIONAL RESEARCH COUNCIL (1940-46); director of the Directorate of Chemical Warfare and Smoke (1940-46); and chairman of various governmental committees during WWII.

Maass was instrumental in the establishment of the Defence Research Board and contributed to the eminence of the NRC. He established the first graduate school in science at McGill and there directed the work of 137 graduate students. He published more than 200 papers in such areas as calorimetry, critical-state phenomena, preparation and properties of pure hydrogen peroxide (first prepared by him and used today as a rocket fuel), basic study of cellulose and cellulose systems, and chemical pulping of wood. Awarded many honorary degrees and other awards, Maass was a member of the RSC (1940). A brilliant teacher, experimentalist and organizer, Maass was one of the great scientists in Canadian history. LEO YAFFE

Macallum, Archibald Byron, biochemist, physiologist, educator (b at Belmont, Canada W 7 Apr 1858; d at London, Ont 5 Apr 1934). Macallum was a pioneer of medical and biological research and teaching in Canada, best remembered for his contributions to the Faculty of Medicine of U of T and to the early years of the NATIONAL RESEARCH COUNCIL. Born on a farm, he taught school before going to U of T to graduate in natural sciences in 1880. With Professor Robert Ramsay WRIGHT, he carried out research while teaching high school, returning to U of T in 1883 to lecture in biology and work toward both a doctorate (Johns Hopkins, 1888), and a medical degree (U of T, 1889). As professor of physiology (1890-1908) and of the new science of biochemistry (1908-16), he included among his students Maud L. Menten and James Bertram COLLIP. In 1917 he became the first chairman of the wartime Advisory Council on Scientific and Industrial Research (later the NRC), and in 1920 went to McGill as professor of biochemistry, retiring in 1928 after a distinguished scientific career. Macallum's early research was on the microchemical distribution of inorganic ions (especially iron and potassium) within cells. Later, as an active member of the Biological Board of Canada (Fisheries Research Board), he carried out fieldwork at its marine stations, and developed his theory that the body fluids of animals represent living "fossil" evidence of the ancient ocean environments in which they had evolved. SANDRA F. MCRAE



Archibald Macallum, a pioneer of medical and biological research and teaching (*courtesy Public Archives of Canada/C-50659*).

McAskill, Angus, the Cape Breton giant (b in Harris, Scot 1825; d at Englishtown, NS 8 Aug 1863). The tallest nonpathological giant on record, at maturity he was 236 cm (7'9") tall, weighed 193 kg (425 lbs) and had a shoulder width of 112 cm and palms measuring 20 cm by 30 cm. He was born a normal baby in the Scottish Hebrides and moved with his family to St Anns, NS. Though many stories about him are apocryphal, he is known to have possessed prodigious strength and reputedly could lift 635 litre barrels and beams as long as 18 m. Having joined a travelling show he toured Lower Canada, the US, the West Indies and Cuba 1849-53. He then returned to Cape Breton and engaged in business until his death, which was attributed to "brain fever." EDWARD BUTTS

Macaulay, John, merchant, journalist, office holder, politician (b at Kingston, UC 17 Oct 1792; d there 10 Aug 1857). A prosperous merchant and an immensely capable, perceptive man, Macaulay came to attention as coeditor and owner of the *Kingston Chronicle* 1818-22. The paper gave, as his friend John Beverley ROBINSON put it, the "highest satisfaction to every well-wisher of *Church & State*." Supported by John STRACHAN, Macaulay soon became an influential adviser of Lt-Gov MAITLAND's administration. He served on a host of committees and commissions, the most important of which concerned internal navigation. His reports together with Robert NICHOL's report on internal resources provided the framework for a provincial strategy for economic development. In his columns he popularized the idea of development, especially canals. In 1836 he moved to Toronto upon his appointments as legislative councillor and surveyor general, serving until he became civil and private secretary to Lt-Gov Sir George ARTHUR in 1838. That year he took up the inspector generalship and held it until 8 June 1842. He remained a councillor until his death. Intensely private, fervently pious and somewhat diffident, he suffered almost unremitting affliction in his family life. ROBERT L. FRASER

McBride, Richard, lawyer, politician, premier of BC (b at New Westminster, BC 15 Dec 1870; d London, Eng 6 Aug 1917). He was educated in New Westminster and at Dalhousie U (LLB, 1890) and was first elected MLA in 1898. The personable McBride briefly (1900-01) served in the Cabinet of James DUNSMUIR and, after the government of E.G. PRIOR resigned, he formed the first BC administration based on party lines 1 June 1903. In the subsequent election, McBride and the Conservatives won a narrow majority. To restore financial stability his government cut expenditures and introduced new taxes; to secure socialist support, it made many minor reforms, especially of labour laws. By 1909 a booming provincial economy allowed McBride and his government to plan for a provincial university and to promise continued prosperity through such means as the construction of railways. In the 1909 and 1912 elections, the Conservatives almost completely eliminated the Opposition from the legislature.

McBride also won popular approval for his persistent agitation for "better terms" from the federal government. He campaigned for the Conservative Party in the federal elections of 1908 and 1911 and successfully delivered the BC vote. An ardent imperialist (KCMG, 1912) and friend of Winston Churchill, McBride enthusiastically supported the idea of a Canadian contribution to the imperial navy. When WWI began, BC was virtually undefended. On his own initiative, McBride had the province purchase 2 submarines, later sold to the federal government. By 1914, however, the province was economically depressed and in danger of having to meet heavy railway debts. Moreover, McBride paid scant attention to such popular reform movements as WOMEN'S SUFFRAGE and PROHIBITION. On 15 Dec 1915, McBride resigned as premier and accepted the position of BC's agent-general in his beloved London, where he also hoped to get treatment for Bright's disease, which ultimately took his life. PATRICIA E. ROY

MacBrien, James Howden, soldier, policeman (b at Port Perry, Ont 30 June 1878; d at Toronto 5 Mar 1938). MacBrien served in the militia, the NWMP and then the S African Constabulary 1901-06. A staff officer at the outbreak of WWI, he took command of the 12th Infantry Brigade in 1916. Chief of the general staff, Overseas Forces, 1919-20, he presided over the formation of the Dept of NATIONAL DEFENCE, retiring in 1927. He was a founder of the Canadian Aviation League and commissioner of the RCMP from 1931 until his death. W.J. MCANDREW



Angus McAskill, the Cape Breton giant, standing with a man of ordinary size. At maturity he was 236 cm (7'9") tall (*courtesy Public Archives of Nova Scotia*).

McCain, H. Harrison, executive (b at Florenceville, NB 3 Nov 1927). The son of an exporter of seed potatoes, McCain graduated from Acadia U and worked as a sales executive for Irving Oil Co. In 1957 he established a family-owned potato-processing company at Florenceville, NB, one of N America's major potato-growing regions. He is chairman of the board of McCain Foods Ltd, one of the largest firms of its kind in the world and the parent company of the McCain Group, whose holdings include a shipping wharf at Bayside, NB, 3 trucking companies and Thomas Equipment Ltd (which manufactures harvesting and industrial equipment). McCain's efforts at promotion have made his hometown the centre of a food empire with manufacturing facilities in 7 countries. MARY HALLORAN

McCalla, Arthur Gilbert, cereal chemist (b at St Catharines, Ont 22 Mar 1906). At U of A, McCalla was one of the elite students of Robert NEWTON; like the others, after taking a 2-year MSc degree under Newton, he was awarded a PhD (U of Calif, Berkeley, 1933) extraordinarily quickly, in only 2 years. He returned to Edmonton to join the university staff, where he remained throughout his career. He took his family to Sweden for advanced study 1939-40 and was trapped there by the German invasion of Norway. They had to return via Russia, on the Trans-Siberia Ry. McCalla was U of A's dean of agriculture 1951-59 and dean of graduate studies 1957-71. He sat on the National Research Council 1950-56 and was a member of its influential Prairie Regional Committee.
DONALD J.C. PHILLIPSON

MacCallum, Elizabeth Pauline, diplomat, scholar (b at Murash, Turkey 20 June 1895). The daughter of missionaries, MacCallum graduated from Queen's and Columbia and taught in the Yukon. After working for the Foreign Policy Assn in New York city and the League of Nations Soc in Ottawa, she joined the Department of External Affairs in 1942, serving as adviser to the delegation to the 1945 San Francisco Conference, which established the UN, and as Middle Eastern specialist at many general assemblies. Chargé d'affaires in Beirut in 1954, she was the first woman head of mission. After retiring, she spent 4 years in Turkey before returning to Ottawa. She has written extensively on Middle East and Balkan subjects. JOHN W. HOLMES

McCarthy, D'Alton, lawyer, politician (b near Dublin, Ire 10 Oct 1836; d at Toronto 11 May 1898). He came to Canada with his parents in 1847, and was educated in Barrie, Canada W. He was called to the Bar of Upper Canada in 1858, and was elected to Parliament as a Conservative 1876. He was re-elected in 1878 to the constituency of N Simcoe, which he represented continuously until his death. McCarthy was at the centre of the most heated political issues of his day. He was president of Canada's Imperial Federation League for 7 years, although he was forced to resign because of his support for unilingualism. He relentlessly opposed the use of the French language outside Québec, and voted against his leader over the JESUITS' ESTATES ACT. After the 1891 election he began to advocate reform of the protective tariff, a divergence from Tory policy that led in 1893 to a break with the party. During the 1890s he continued his vehement opposition to French-language schools and his support of Manitoba's eradication of denominational schools as a way of suppressing French instruction. Consequently, he and his McCarthyite League worked to defeat the federal Conservatives in the election of 1896. He was rumoured to be about to enter LAURIER's Cabinet at the time of his death. J.R. MILLER

Reading: J.R. Miller, "As a Politician He Is a Great Enigma," *Canadian Historical Review* LVII, 4 (1977).

McClelland, John Gordon, Jack, publisher (b at Toronto 30 July 1922). Educated at U of T, he joined the navy in 1941 and volunteered for duty on a motor torpedo boat; promoted captain of MTB 747 in 1944, he saw action in the English Channel. He joined MCCLELLAND AND STEWART (founded by his father John McClelland, Sr, in 1906), became executive VP in 1952 and president in 1961. He transformed the company into English Canada's best-known publishing house by encouraging, supporting and publishing Canadian writers such as Farley MOWAT, Irving LAYTON, Margaret LAURENCE, Leonard COHEN, Peter NEWMAN, Mordecai RICHLER, Pierre BERTON, Margaret ATWOOD, Brian MOORE and others. He published many Canadian BEST-SELLERS, such as Berton's *The National Dream* (1970) and Newman's *The Canadian Establishment* (1975). McClelland stepped down as president in 1982, but remained active as owner and chairman of the board.

McClelland and Stewart Limited, publishing company founded in 1906 by John McClelland and Frederick Goodchild as McClelland and Goodchild Limited. When George Stewart joined the firm in 1914, his name was added to the title, but the present form was adopted after Goodchild's departure in 1918. The company began as a library supply house, representing British and American firms, and went on to publish Canadian authors such as C.W. GORDON (Ralph Connor), Bliss CARMAN, D.C. SCOTT, Stephen LEACOCK, L.M. MONTGOMERY and F.P. GROVE. Jack MCCLELLAND, the founder's son, became executive vice-president in 1952 and president in 1961, and continued to develop a vigorous Canadian BOOK-PUBLISHING program that made a most notable contribution to the publishing and marketing of Canadian literature. Widespread publicity and concern was aroused by the announcement in 1971 that M & S was for sale. The Ontario government decided to provide a $1-million loan to prevent its sale to American interests. In 1984 the government again stepped in, freeing M&S from its debt obligation (some $4 million). This action depended on McClelland being able to raise over $1 million from the private sector; his success at this endeavour is an indication of the importance of M&S's contribution to Canadian culture. Through the New Canadian Library Series (est 1958) and Carleton Library Series (est 1963) the company made accessible classic works in Canadian literature, history and social sciences, and greatly aided the growth of Canadian studies. The company published the first 2 volumes in its Canadian Centenary Series — an 18-volume history of Canada — in 1963.

McClintock, Sir Francis Leopold, explorer (b at Dundalk, Ire 8 July 1819; d at London, Eng 17 Nov 1907). One of the British Navy's most experienced Arctic explorers, he participated in several expeditions to search for Sir John FRANKLIN. On the first of these (1848-49), he learned the techniques of northern sled travel which he later used to great effect. After 3 unsuccessful attempts, McClintock discovered the fate of Franklin and his men on his last voyage to the Arctic in 1857-59. McClintock rose to senior rank in the navy and retired from active service in 1882. DANIEL FRANCIS

McClung, Nellie Letitia, née Mooney, suffragist, reformer, legislator, author (b at Chatsworth, Ont 20 Oct 1873; d at Victoria 1 Sept 1951). From 1880 she was raised on a homestead in the Souris Valley, Man, and did not attend school until she was 10. She received a teaching certificate at 16 and then taught school until she married Robert Wesley McClung in 1896. In Manitou, where her husband was a druggist, she became prominent in the WOMAN'S CHRISTIAN TEMPERANCE UNION, of which her mother-in-law was provincial president. In 1908 McClung published her first novel, *Sowing Seeds in Danny*, a witty portrayal of a small western town. It was a national best seller and was followed by numerous short stories and articles in Canadian and American magazines. In 1911 the McClungs and their 4 children moved to Winnipeg, where their fifth child was born. The Winnipeg women's rights and reform movement welcomed Nellie as an effective speaker who won audiences with humorous arguments. She played a leading role in the 1914 Liberal campaign against Sir Rodmond ROBLIN's Conservative government, which had refused women suffrage, but moved to Edmonton before the Liberals won in Manitoba in 1915. In Alberta she continued the fight for female suffrage and for PROHIBITION, dower rights for women, factory safety legislation and many other reforms. She gained wide prominence from addresses in Britain at the Methodist Ecumenical Conference and elsewhere (1921) and from extensive speaking tours throughout Canada and the US, and was a Liberal MLA for Edmonton, 1921-26.



Nellie McClung, writer, reformer and women's advocate (*courtesy Public Archives of Canada/PA-30212*).

In 1933 the McClungs moved to Vancouver I, where Nellie completed the first volume of her autobiography, *Clearing in the West: My Own Story* (1935, repr 1976), and wrote short stories and a syndicated column. In all, she published 16 books, including *In Times Like These* (1915, repr 1975). Her active life continued: in the Canadian Authors Assn, on the CBC's first board of governors, as a delegate to the League of Nations in 1938 and as a public lecturer. Forgotten for a decade, she was rediscovered by feminists in the 1960s. Although some criticized her maternalistic support of the traditional family structure, most credited her with advancing the feminist cause in her day and recognizing the need for further progress, such as the economic independence of women (*see* WOMEN'S MOVEMENT).
M.E. HALLETT

Reading: Candace Savage, *Our Nell* (1979).

McClure, Robert Baird, medical missionary (b at Portland, Oreg 23 Nov 1900). The son of Canadian medical missionaries in China, Dr McClure went to Honan, China, in 1923, serving as surgeon and medical educator and helping to establish the Hwaiking rural medical system. When war broke out between Japan and China in 1937, he became field director for the International Red Cross in central China. From 1941 to 1946, he led the Friends Ambulance Unit in China, providing supplies, medical treatment, public-health services and mobile surgery to the war-ravaged country. With the end of foreign

missions in China, McClure provided medical service to the Palestinian refugees in Gaza 1950-54, and superintended the Ratlam hospital in India 1954-67. As always, he combined his surgery with public health and training for local medical personnel. After serving as the first nonordained moderator of the UNITED CHURCH OF CANADA 1968-71, he has spent his retirement in hospital work in Borneo and rural Peru and, in his eighties, has continued his fight for the welfare of the Third World. His strong will, independence and quick temper have exasperated generations of friends as well as critics; yet his heroic self-sacrifice on behalf of the distressed around the world makes him one of the true humanitarians of the 20th century. NEIL SEMPLE

McClure, Sir Robert John Le Mesurier, explorer, adventurer (b at Wexford, Ire 28 Jan 1807; d at London, Eng 17 Oct 1873). McClure obtained a lieutenancy for his 1836-37 service on *Terror* under George BACK in the ice of Hudson Bay. He served on Sir James Clark Ross's abortive Franklin rescue mission in 1848-49, and in 1850 was appointed commander of *Investigator* in the expedition led by Capt Richard Collinson, who was taking 2 ships to the Arctic via Bering Str. This commission brought McClure fame and success. He proved brave, lucky and inordinately ambitious. Arriving ahead of Collinson at Bering Str, he decided to continue on alone. From Aug to Oct 1850 he coasted E hundreds of kilometres to Cape Parry, wheeled N to Banks I and reached and wintered in Prince of Wales Str, the last link in the fabled NORTHWEST PASSAGE, which he undoubtedly discovered. Sir John FRANKLIN's earlier claim, for which all witnesses were dead, was only discovered by Sir Francis MCCLINTOCK in 1859.

McClure encountered great danger in Prince of Wales Str and in rounding Banks I in 1851. He was forced to winter in Mercy Bay and was frozen in. His crew was saved from starvation in 1853 by Capt Henry Kellett of the *Resolute* and finally returned to England in 1854. McClure ungenerously informed a parliamentary committee that he could have kept his men alive without Kellett's aid, thereby denying his rescuers a share in the £10 000 voted to the discoverers of the passage. McClure served on the China Station 1856-61 and died a vice-admiral.
L.H. NEATBY

McConachie, George William Grant, airline executive (b at Hamilton, Ont 24 Apr 1909; d at Long Beach, Calif 29 June 1965). McConachie's family moved to Edmonton in 1910 and he was educated there. In 1931 he acquired an aircraft and flew fish from northern lakes and barnstormed prairie communities. He cofounded, then became president of, Independent Airways, and founded United Air Transport (later called Yukon Southern Air Transport) in 1933. He pioneered airmail and passenger service between Edmonton and Whitehorse (1939) and performed aerial exploration for the Alaska Hwy and Canol projects. Canadian Pacific Railways bought out his firm and 11 others in 1941 and appointed him general manager of the western lines (1942) and president of CP Air (1947). He inaugurated CP Air passenger services to Australia, Japan and Hong Kong and by 1957 had added a further 25 000 km of flight paths. He was awarded the MCKEE TROPHY in 1945 for his pioneering efforts in forging air service to the North. ROBERT BOTHWELL

McConnell, John Wilson, publisher, businessman (b in Muskoka, Ont 1 July 1877; d there 6 Nov 1963). McConnell was the owner of the *Montreal Star,* the largest English-language newspaper in Québec, and as such was a force in the land. He went into business in Toronto as a young man. In 1900 he moved to Montréal as manager of Standard Wood Chemical Ltd, but in 1906 he went into finance as an investment broker. By 1914 he had control of the St Lawrence Sugar Refineries. He bought the *Montreal Star* in 1925 from Hugh GRAHAM, Baron Atholstan, and took control in 1838 on the latter's death. In 1939 he threw his paper's support to the Liberals and against Premier Maurice DUPLESSIS in the Québec general election; he thereafter remained close to Mackenzie KING. King offered him a Cabinet post during WWII, but McConnell refused. He was also a philanthropist of note, helping such artists as Maureen FORRESTER. J.L. GRANATSTEIN

McConnell, Richard George, geologist, explorer (b at Chatham, Canada E 26 Mar 1857; d at Ottawa, Ont 1 Apr 1942). In 1879 he graduated from McGill and began working for the GEOLOGICAL SURVEY OF CANADA in Québec. For some 30 years he studied geological phenomena in Canada, particularly in the W and NW. In 1882 he assisted G.M. DAWSON in exploring the southern Alberta Rockies as well as the Waterton Lks region, St Mary R and Cypress Hills. Five years later he explored a large portion of northern BC, the Mackenzie Valley and the Yukon Territory. In 1889-90 he conducted an extensive study of the Athabasca tar sands of northeastern Alberta and explored the Peace-Athabasca region. In 1914 he became federal deputy minister of mines, retiring in 1921. He was elected a fellow of the Royal Society of Canada in 1913.
ERIC J. HOLMGREN

McConnell, Robert Murray Gordon, jazz musician (b at London, Ont 14 Feb 1935). McConnell studied with Gordon Delamont in Toronto and then played valve trombone in the bands of Maynard Ferguson (New York, 1964) and Phil Nimmons (Toronto, 1965-69). As a prominent Toronto studio musician, McConnell formed the Boss Brass in 1968 to record pop song arrangements for radio programs by the Canadian Talent Library. By 1976 the band of 22 musicians had evolved into an uncompromising jazz ensemble, and McConnell was praised widely for his arranging ability. The Boss Brass, now considered one of the major big bands in jazz, although it performs only sporadically, has received Grammy nominations for several of its dozen recordings. MARK MILLER

McCowan, Daniel, naturalist, lecturer, writer (b at Crieff, Scot 20 Jan 1882; d at Cloverdale, BC 19 Feb 1956). After an early education in Scotland, he moved to Banff, Alta, where he soon acquired expertise on the local flora and fauna. His thousands of photographs of scenery, flowers, birds and mammals enabled him to travel widely, lecturing on nature in the Rockies, and he wrote extensively for several newspapers and popular magazines. His lectures on CBC Radio were among the first by naturalists. In addition to these early important contributions to the popularization of nature and thus conservation concepts in Canada, he published 6 nature and photography books, all illustrated with his own photographs: *Animals of the Canadian Rockies* (1936), *A Naturalist in Canada* (1941), *Outdoors with a Camera in Canada* (1945), *Hill-top Tales* (1948), *Tidewater to Timberline* (1951) and *Upland Trails* (1955). MARTIN K. MCNICHOLL

McCrae, John, physician, poet (b at Guelph, Ont 30 Nov 1872; d at Boulogne, France 28 Jan 1918). Educated at U of T, he was appointed fellow in pathology at McGill in 1900. He served in the SOUTH AFRICAN WAR as an artillery subaltern 1899-1900. The author of a number of medical texts, he also contributed poetry to various magazines. In 1914 McCrae enlisted in the CANADIAN EXPEDITIONARY FORCE as a medical officer. He died of pneumonia at the hospital of which he was in charge in 1918. "In Flanders Fields," his most enduring poem, was published in *Punch* in 1915. DAVID EVANS

McCreight, John Foster, lawyer, first premier of BC (b at Caledon, Ire 1827; d at Hastings, Eng 18 Nov 1913). Educated in England and Ireland, McCreight emigrated to practise law in Melbourne, Australia, but moved to Vancouver I in 1860, being admitted to the BC Bar in 1862. In Aug 1871 he entered the first provincial legislative assembly as a member for Victoria. Designated premier in Nov, he was defeated on a speech from the throne in Dec 1872. He continued as a private member, retiring in 1875. In 1873 he was made a QC and in 1880 a Supreme Court justice. After serving in the Cariboo, he moved to New Westminster, BC, in 1883, living there until his retirement in 1897. Soon after, he returned to England. SYDNEY W. JACKMAN
Reading: Sydney W. Jackman, *Portraits of the Premiers* (1969).

McCulloch, Thomas, educator, theologian, author (b at Ferenze, Scot 1776; d at Halifax 9 Sept 1843). One of the most prominent educators and theologians in the Maritimes, McCulloch was a prolific letter writer, as well as the author of books on theology and *Letters of Mephibosheth Stepsure.* Educated at Glasgow U and at Divinity Hall, Whitburn, McCulloch was a member of the secession branch of the Presbyterian Church. He set out for PEI in 1803 as an ordained minister but landed, because of bad weather, at PICTOU, NS. Here he accepted a call to the church and soon became involved in many other public activities. He founded Pictou Academy (incorporated 1816) but was unable to obtain government financial assistance or the privilege to confer degrees. The question of public support for all educational endeavours, not just the Anglican schools and colleges, became a lively political issue. McCulloch and his supporters founded a reform newspaper in Pictou, the *Colonial Patriot* (1827), in which they set forth their views. He expanded his educational interests by founding a theological college at West River, Pictou County. Some of McCulloch's theological students were granted degrees by Glasgow, an institution with which he maintained close connections throughout his life. McCulloch was an inspired and versatile teacher and was named first president of Dalhousie in 1838, a position he held until his death. During his busy life he devoted much time to his scientific interests and collected a large number of bird specimens, which came to the attention of John James Audubon who visited him in Pictou in 1833.

McCulloch's best-known fictional work, "Letters of Mephibosheth Stepsure" first appeared in serial form (22 Dec 1821-Mar 1823) in the *Acadian Recorder.* The letters were reprinted in 1862 and then in 1960 as *The Stepsure Letters.* In an effort to arouse his fellow Pictonians to improve their farming practices and style of life in general, he chided them in a humorous, satirical fashion. His writings influenced Thomas HALIBURTON's Sam Slick. He also wrote 2 highly moral tales, called *William and Melville* (1826),



John McCrae, poet and physician known for his poem "In Flanders Fields," shown with his dog Bonneau, *c* 1914 (*courtesy Public Archives of Canada/C-46284*).

about the fortunes and misfortunes of immigrants to the New World.

On the subjects of education and religion, McCulloch's works included *Popery Condemned by Scripture and the Fathers* (1808), *Popery Condemned Again* (1810), *The Nature and Uses of a Liberal Education* (1819) and *Calvinism: The Doctrine of the Scriptures* (1849). The titles of these substantial works provide some indication of McCulloch's dedication to his role as an educator and theologian in 19th-century NS. DOUGLAS LOCHHEAD

McCurdy, James Frederick, "father of biblical studies in Canada" (b at Chatham, NB 18 Feb 1847; d at Toronto 30 Mar 1935). A graduate of UNB he taught grammar school, then entered Princeton Seminary in 1868 to study biblical languages. He taught there 1871-82, but resigned when his "modernist" views on the Bible were attacked. After studying in Germany he was hired by U of T in 1885, and taught there until retirement in 1914. As head of the oriental languages department he made biblical studies an important and popular discipline in a secular university, and trained a generation of outstanding scholars who later taught in Canadian and other universities. His 3-volume *History, Prophecy and the Monuments* (1894-1901) won him international critical acclaim. JOHN S. MOIR

McCurdy, John Alexander Douglas, aviation pioneer (b at Baddeck, NS 2 Aug 1886; d at Montréal 25 June 1961). With F.W. BALDWIN and A.G. BELL he formed the Aerial Experiment Assn to test the feasibility of powered flight. He made more than 200 short flights in experimental aircraft in the US before flying the SILVER DART at Baddeck 23 Feb 1909 — the first controlled flight in the British Empire. McCurdy is also credited with making the first ocean flight, from Florida to Cuba, and with sending and receiving the first messages while aloft. He was assistant director of aircraft production for the Canadian government in WWII and was lieutenant-governor of NS 1947-52. He was awarded the MCKEE TROPHY (1959) on the 50th anniversary of the flight of the *Silver Dart*.

JAMES MARSH

McDermott, Dennis, trade unionist (b at Portsmouth, Eng 3 Nov 1922). McDermott came to Canada after WWII and in 1948 worked in Toronto as an assembler and a welder. In 1954 he became an organizer for the United Automobile Workers (UAW). Known as a social activist, he supported the United Farm Workers' campaigns in Canada on behalf of the California grape workers, and has participated in the Canadian Civil Liberties Assn. In 1968 he was elected UAW director for Canada and in 1970 international VP. He also became a general VP of the CANADIAN LABOUR CONGRESS, and in 1978 succeeded Joe MORRIS as president. In that job, he opposed wage controls and any infringement on collective bargaining for public or private sector employees, and chided the government about the high level of unemployment and the state of the economy. He has also served on the executives of the NDP in Ontario and federally.

LAUREL SEFTON MACDOWELL

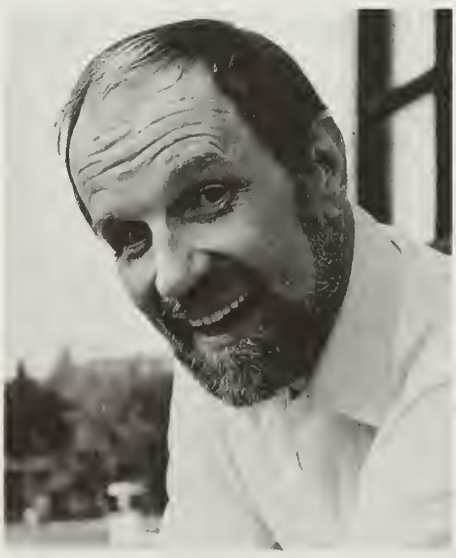
MacDonald, Angus Bernard, educator, co-operative leader (b at Glassburn, NS 21 Nov 1893; d at Ottawa 13 Sept 1952). Following study at Saint Francis Xavier U and at NS Agricultural Coll, MacDonald worked in government agriculture positions in NS and Ontario and studied at Ontario Agricultural Coll and U of T. He returned to NS in 1925 as inspector of schools for Antigonish and Guysborough counties. In 1930 MacDonald joined Saint Francis Xavier's extension department as associate director. A good administrator and powerful personality, he became a vitally important leader in the ANTIGONISH MOVEMENT, as the department's program came to be called. MacDonald also organized several credit unions and became managing director of the NS Credit Union League when it was formed in 1934. During 1943 he became involved with a reorganization of the Co-operative Union of Canada and in 1944 was appointed its national organizer. In 1945 he joined the CUC as general secretary (subsequently national secretary), a post he held until his death. MacDonald's accomplishments with the CUC included the sponsoring in Canada of CARE, the international aid program. IAN MACPHERSON

Macdonald, Angus Lewis, lawyer, professor, politician and premier of NS (b at Dunvegan, NS 10 Aug 1890; d at Halifax 13 Apr 1954). An officer in the Canadian Expeditionary Force (WWI), educated at Saint Francis Xavier, Dalhousie and Harvard, Macdonald was assistant deputy attorney general of NS 1921-24 and professor of Dalhousie Law School 1924-30 before being elected leader of the NS Liberal Party in 1930. Victorious in the election of 1933 during the GREAT DEPRESSION, Macdonald implemented old-age pensions and relief for the unemployed, and launched an inquiry (Jones Commission) into the effects of the tariff on the NS economy. In 1940 PM KING recruited him to become minister of defence for naval services. Macdonald presided over the creation of a wartime Canadian Navy and convoy service for the Allies. A conscientious administrator, he was a poor politician, putting defence priorities before party considerations in the CONSCRIPTION crisis. King triumphed over the conscriptionists and Macdonald resigned from the Cabinet in Apr 1945. He returned to NS and resumed the premiership, resisting the centralizing policies of the King governments but, sapped by overwork and illness, he was unable to restore the spark that had characterized his prewar government. When he died in 1954, Macdonald left a party that had languished too long in his shadow and a personal reputation in the NS Liberal Party second only to that of Joseph HOWE. MARGARET CONRAD

Reading: J. Hawkins, *The Life and Times of Angus L.* (1969).

Macdonald, Brian, choreographer (b at Montréal 14 May 1928). Macdonald was a radio whiz kid, child actor, swimmer and skater before entering McGill at 16. Inspired by the visit of Ballet Theatre (later American Ballet Theatre) in 1944, he began dance training. Leaving university, he became music critic for the *Montreal Herald* while continuing his training, and in 1951 he became a founding member of the NATIONAL BALLET OF CANADA. Two years later a severe injury ended his performing career and he returned to teach and choreograph in Montréal during a period of intense artistic activity in the city. His first major success was the 1957 McGill student revue *My Fur Lady*, which ran for 18 months. The ROYAL WINNIPEG BALLET has been commissioning works from him since 1958, and on a number of these, including *Rose Latulipe* (1966) and *The Shining People of Leonard Cohen* (1970), he has collaborated with composer Harry FREEDMAN. Macdonald has created many works for companies in Canada, Europe and the US. He was artistic director of the Royal Swedish Ballet 1964-67, the Harkness Ballet 1967-68, Batsheva Dance Theatre 1971-72 and Les GRANDS BALLETS CANADIENS 1974-77, where in 1984 he was resident choreographer. Of a driving and sometimes volatile personality, Macdonald has been associated with the BANFF CENTRE SCHOOL OF FINE ARTS since 1960 and has taught at the National Theatre School. He also directs or choreographs for TV, musicals, operas and operettas. Married to Annette AV PAUL, he won the Molson Prize 1983. *See* CHOREOGRAPHY.

JILLIAN M. OFFICER



Brian Macdonald began his career as a choreographer and teacher after his dancing career was ended by a severe injury (*courtesy Canapress*).

MacDonald, Donald, trade unionist (b at Halifax 12 Sept 1909). At age 17 MacDonald became a coal heaver on the Sydney docks. He joined the United Mine Workers and at age 21 became president of Local 4560. When the local struck in 1940 for a guaranteed weekly minimum wage, MacDonald was fired and blacklisted. The CO-OPERATIVE MOVEMENT, which he helped to organize in NS, gave him a job, and in 1941 he was elected CCF MLA from Cape Breton S. He was party leader in the legislature until 1945. In 1942 he joined the organizing staff of the CANADIAN CONGRESS OF LABOUR and rose to become its secretary-treasurer 1951. He played a major role in the merger negotiations which created the Canadian Labour Congress (1956) and served as its president from 1967 to his retirement in 1974. In 1972 he was the first non-European to be elected president of the International Confederation of Free Trade Unions.

LAUREL SEFTON MACDOWELL

Macdonald, Donald Stovel, politician, lawyer (b at Ottawa 1 Mar 1932). Elected to the House of Commons as member for Toronto Rosedale in 1962, Macdonald entered the Liberal Cabinet in 1968 and, as minister of energy, mines and resources between 1972 and 1975, resisted economic and provincial pressures to move to world oil prices. In Sept 1975 he became minister of finance and introduced WAGE AND PRICE CONTROLS. He resigned from Cabinet in 1977 to enter private law practice in Toronto. In 1983 Pierre TRUDEAU appointed Macdonald chairman of a royal commission on the economic union and development prospects for Canada. JOHN ENGLISH

MacDonald, Flora Isabel, politician (b at N Sydney, NS 3 June 1926). Between 1956 and 1965 she worked at the Progressive CONSERVATIVE PARTY headquarters, where she was executive secretary for 5 years. She was then national secretary of the PC Assn 1966-69 while working at Queen's. In 1972 she was elected MP for Kingston and the Islands and immediately became Conservative critic on Indian affairs and northern development in Robert STANFIELD's "shadow cabinet." She made an unsuccessful bid for the Conservative leadership in 1976, her promised support failing to materialize at the leadership convention polling stations. As an MP MacDonald has been outspoken on constitutional issues, on national defence, external affairs and reform of the penitentiary system. In the brief CLARK government (1979-80) she was secretary of state for external affairs, the first woman to hold such an important federal Cabinet post. After the Sept 1984 election, she became minister of employment and immigration in the MULRONEY cabinet. HARRIET GORHAM

Macdonald, Sir Hugh John, lawyer, politician, magistrate, premier of Manitoba (b at Kingston, Canada W 13 Mar 1850; d at Winnipeg 29 Mar 1929), the only surviving son of Sir John A. MACDONALD. Educated at University of Toronto, he was called to the Ontario Bar in 1872. In 1882 he moved to Winnipeg where he entered partnership with J. Stewart Tupper, eldest son of Sir Charles TUPPER. He saw active military service on 3 occasions: the 1866 Fenian invasion, the 1870 Wolseley Expedition and the 1885 North-West Rebellion. Elected for Winnipeg in the 1891 general election, he resigned in 1893. In 1896 he joined the short-lived Tupper government as minister of the interior. After the courts overturned his election, he became leader of the Manitoba Conservatives and led them to victory in 1899. Touted as successor to Tupper, he resigned as premier to run in Brandon against Clifford SIFTON in the 1900 federal election. He retired to private life after his defeat. Macdonald's shyness and nervousness in public made the path he chose even more difficult and it was his lot to be measured against his eminent father, and inevitably he was found wanting. HAL GUEST

MacDonald, James Edward Hervey, painter (b at Durham, Eng 12 May 1873; d at Toronto 26 Nov 1932). Among the GROUP OF SEVEN, of which he was a founder, J.E.H. MacDonald was one of the best trained, first at the Hamilton Art School from about 1887 and, after 1889, in Toronto lithography houses and at the Central Ontario School of Art and Design, where he studied with William CRUIKSHANK. In 1895 he joined Grip Ltd, and important commercial art firm, where he encouraged the staff (which included Tom THOMSON from about 1908) to develop as painters. MacDonald was a key member of the later Group. Lawren HARRIS recalled that a show of MacDonald's in 1912 at the Ontario Soc of Artists gave him his first recognition of the Group's "ethos."

MacDonald was Harris's greatest early friend among the Toronto painting community. Together in 1913 they went to the Albright Art Gallery in Buffalo, NY, to see the survey of Scandinavian landscape painting which was to influence their work. Around this time MacDonald introduced more colour into his dark panels. Algoma, N of Lk Superior, which he visited several times with Harris's help from 1919, became the country of his heart. His best paintings were done there, often of great vistas in a turbulent, patterned style. The sketch *Mist Fantasy, Sand River, Algoma* (1920, National Gallery of Canada) shows how he used the sketches he made in Algoma: the finished canvas (now in the Art Gallery of Ontario), with its long ribbons of mist, was noted by a later critic as the height of MacDonald's way of stylizing form. In 1924 he made the first of 7 trips to the Rockies, another favourite painting place.

MacDonald's palette was dark, tough and rich, like A.Y. JACKSON's, but his colouring was more fiery and his style more elegant. His sense of composition was oriented towards his meditation on design, a subject in which he was a master (MacDonald was the greatest calligrapher of the period and a designer of consequence). Like other members of the Group, he loved Chinese and Japanese art.

Among other tasks he performed was the decoration of St Anne's Church, Toronto (1923), and teaching at the ONTARIO COLLEGE OF ART. He also wrote poetry after a nervous breakdown in 1917. He was an eccentric gardener and enjoyed playing on a set of chimes made of old plough points and other bits of iron. One of his favourite authors was Henry David Thoreau, for whom he named his son, illustrator Thoreau MACDONALD. JOAN MURRAY

Reading: Paul Duval, *The Tangled Garden* (1978).

Macdonald, James Williamson Galloway, "Jock," artist, educator (b at Thurso, Scot 31 May 1897; d at Toronto 3 Dec 1960). Educated in Scotland, he enlisted in 1915, and was wounded in France in 1918. He entered the Edinburgh Coll of Art, graduating with a diploma in design and an art specialist's teaching certificate in 1922. He was employed as a designer and educator in England, and was appointed head of design at the Vancouver School of Decorative and Applied Arts in 1926. He began to paint in oils under the tutelage of Fred VARLEY in a style strongly influenced by the GROUP OF SEVEN. Although he painted landscapes throughout his life and drew inspiration from nature, his best paintings show his struggle to find an abstract form of expression. Among the first abstract artists in Canada, he immersed himself in painting the experience of his environment at NOOTKA SOUND on NW Vancouver I in 1935-36. One of the most important teachers in modern Canadian art history, he and Varley founded the innovative BC Coll of Arts (1933-35). He taught at the Provincial Institute of Technology at Calgary (1946-47) and, from 1947 until his death, at the Ontario Coll of Art, Toronto. Numerous Canadian artists acknowledge the impact he had on their development. Instrumental in founding the Calgary Group in 1947, he was a key figure in the influential Ontario abstract group PAINTERS ELEVEN, and was active in most Canadian art societies. He is best remembered for his free-flowing abstract watercolours and the often majestic paintings of his last years — without question his masterpieces. J. ZEMANS



J.E.H. MacDonald's *Mist Fantasy* (1922), oil on canvas, with its long ribbons of mist, has been called the height of the artist's way of stylizing form (*courtesy Art Gallery of Ontario/gift of Mrs S.J. Williams in memory of J. Elinor Williams, 1927*).

Macdonald, Sir John Alexander, lawyer, businessman, politician, first prime minister of Canada (b at Glasgow, Scot 10 or 11 Jan 1815; d at Ottawa, Ont 6 June 1891). He was the dominant creative mind which produced the BRITISH NORTH AMERICA ACT and the union of provinces which became Canada. As the first prime minister of Canada, he oversaw the expansion of the Dominion from sea to sea. His government dominated politics for a half century and set policy goals for future generations of political leaders.

Macdonald was brought to Kingston, UC, by his parents when he was 5 years old and he grew up and attended school there and in rural Lennox and Addington and Prince Edward counties. At age 15 he began to article with a prominent Kingston lawyer. Both at school and as an articling student he showed promise. At 17 he managed a branch legal office in Napanee by himself, and at 19 opened his own office in Kingston, 2 years before being called to the Bar of UC. Macdonald's early professional career coincided with the rebellion in UC and subsequent border raids from the US. He was in Toronto in Dec 1837 where, as a militia private, he took part in the attack on the rebels at Montgomery's Tavern. In 1838 he attracted public notice by defending accused rebels, including Nils von Schoultz, leader of an attack on Prescott.

He remained in the practice of law for the rest of his life with a series of partners, in Kingston until 1874 and then in Toronto. His firm engaged primarily in commercial law; his most valued clients were established businessmen or corporations. He was also personally involved in a variety of business concerns. He began to deal in real estate in the 1840s, acquired land in many parts of the province, including commercial rental property in downtown Toronto, and was appointed director of many companies, mainly in Kingston. For 25 years (mostly while he was PM) he was president of a Québec City firm, the St Lawrence Warehouse, Dock and Wharfage Co, and in 1887 became the first president of the Manufacturers Life Insurance Co of Toronto. Macdonald's personal life was marked by a number of misfortunes. His first wife, his cousin Isabella Clark, was an invalid during most of their married life. His first son died at the age of 13 months. His second marriage, to Susan Agnes Bernard, was saddened by the chronic illness of his only daughter Mary.

Macdonald entered politics at the municipal level, serving as an alderman in Kingston 1843-46. He took an increasingly active part in Conservative politics and in 1844 (at age 29) was elected for Kingston to the Legislative Assembly of the PROVINCE OF CANADA. Parties and government were in a state of transition, a mod-



Sir John A. Macdonald, 1st prime minister of Canada, 1867-73 and 1878-91. Macdonald was a shrewd and ingenious politician who had great faith in the future of Canada (*courtesy Public Archives of Canada/C-10144*).

ern departmental structure had begun to evolve but RESPONSIBLE GOVERNMENT had not yet been conceded, and the role of the governor was still prominent. In this context Macdonald's political views proved cautious; he defended the imperial prerogative and state support of denominational education, and opposed the abolition of primogeniture. Above all, he emerged as a shrewd political tactician who believed in the pursuit of practical goals by practical means. His obvious intelligence and ability brought him his first Cabinet post as receiver general in 1847 in the administration of W.H. DRAPER.

Macdonald remained in Opposition until the election of 1854, after which he was involved in the creation of a new political alliance — the Liberal-Conservative Party — in which the Conservatives were attached to the existing alliance of Upper Canadian Reformers and the French Canadian majority political bloc. Once returned to office, he assumed the prestigious post of attorney general of UC. On the retirement, which he helped to engineer in 1856, of Conservative leader Sir Allan MACNAB, Macdonald succeeded him as joint-premier of the Province of Canada, along with Étienne-Paschal TACHÉ.

During the years 1854-64 Macdonald faced growing opposition in his own section of the province to the political union of Upper and Lower Canada. The Reform view, voiced by George BROWN of the Toronto *Globe*, complained that the legitimate needs and aspirations of UC were frustrated by the "domination" of French Canadian influence in the government of Macdonald and George-Étienne CARTIER. By 1864 the political and sectional forces in the province were deadlocked and Macdonald reluctantly accepted Brown's proposal for a new coalition, to include the Upper Canadian Reformers, designed to solve the constitutional difficulties through the adoption of a federal system, applied if possible to all the colonies of British North America. While conceding the necessity of a federal arrangement to accommodate strong racial, religious and regional differences, Macdonald's preference was for a strong, highly centralized, unitary form of government. Macdonald took the leading part in the drafting of a federal system in which the central government held unmistakable dominance over the provincial governments. His great constitutional expertise, ability and knowledge received immediate recognition from the Imperial government. Created Sir John A. Macdonald, KCB, he was chosen to take office as first prime minister of Canada on 1 July 1867.

During his first administration, 1867-73, he became a "nation builder." To the original 4 provinces were added Manitoba, the North-West Territories (present-day Sask and Alta), BC and PEI. The INTERCOLONIAL RY between Québec City and Halifax was begun and plans were made for a transcontinental railroad to the Pacific coast. These undertakings involved unprecedented expenditures of public funds and did not proceed without incident. Manitoba entered the union following an insurrection led by Louis RIEL against the takeover of the area by the Dominion government, thereby forcing Macdonald's government to grant provincial status much sooner than had been intended and to accept a system of separate schools and the equality of the French and English languages. Macdonald's involvement in the negotiations for a contract to build the CANADIAN PACIFIC RAILWAY to BC involved him eventually in the PACIFIC SCANDAL; during the 1872 election large campaign contributions had been made to him and his colleagues by Sir Hugh ALLAN, who was to have headed the railway syndicate. Macdonald claimed that his "hands were clean" because he had not profited personally from his association with Allan, but his government was forced to resign and in the election of 1874 was defeated. Some of these political problems stemmed from the fact that he, like many of his contemporaries, was at times a heavy drinker. At the time of the election of 1872 and of the negotiations with Allan it is clear that there were periods of time of which he later had no recollection. His drinking subsequently become more moderate.

Fortunately for Macdonald his defeat coincided with the onset of a business depression in Canada which gave the Liberal administration of Alexander MACKENZIE a reputation for being ineffectual. In 1876, at the instigation of a group of Montréal manufacturers, Macdonald began to advocate a policy of "readjustment" of the tariff — a policy which helped him to return triumphantly to power in 1878. He remained prime minister for the rest of his life. The promised changes in tariff policy, introduced in 1879 and afterwards frequently revised, in close collaboration with leading manufacturers, became Macdonald's NATIONAL POLICY, a system of protection of Canadian manufacturing through the imposition of high tariffs on foreign imports, especially from the US. Appealing to Canadian nationalist and anti-American sentiment, it became a permanent feature of Canadian economic and political life. However, the economy as a whole continued to suffer slow growth, and the effects of the policy were uneven.

The great national project of Macdonald's second administration was the successful completion of the transcontinental CPR, which proved an extremely difficult and expensive undertaking requiring extensive government subsidization. Macdonald played a central role in making the railroad a reality. He was involved in awarding the contract to a new syndicate headed by George STEPHEN, which called for a government subsidy of $25 million and 25 million acres (10 million ha) of land, and on 2 occasions, in 1884 and 1885, he agreed to introduce legislation for the further financial support of the railroad. Its completion in Nov 1885 made feasible the future settlement of the West.

The physical linking of the Canadian community was accompanied by the first steps towards eventual autonomy in world affairs. Macdonald did not foresee Canadian independence from Britain but rather a partnership with the mother country. He himself represented Canada on the British commission which negotiated the TREATY OF WASHINGTON of 1871; in 1880 the post of Canadian high commissioner to Britain was created; and Finance Minister Charles TUPPER represented Canada at the Joint High Commission in Washington in 1887.

The last stage of Macdonald's public career was plagued by difficulties. The NORTH-WEST REBELLION, at a time when he himself was superintendent general of Indian affairs, and the subsequent execution of Riel in 1885 greatly increased animosity between French-speaking and English-speaking Canadians and cost Macdonald political support in Québec, where Riel was regarded as a martyr to the forces of Anglo-Saxon imperialism. A series of successful legal challenges to the powers of the central government, mainly emanating from Ontario Premier Oliver MOWAT, resulted in a federal system much less centralized than Macdonald had intended. The federal power of DISALLOWANCE, freely used at first, was virtually abandoned in the face of provincial opposition.

Macdonald's contribution to the development of the Canadian nation far exceeded that of any of his contemporaries, yet he was not by nature an innovator. Confederation, the CPR, the protective tariff were not his ideas, but he was brilliant and tenacious in achieving his goals once convinced of their necessity. As a politician he early developed shrewdness and ingenuity. He kept a remarkable degree of personal control over the functioning of the party and was adept in using patronage for political advantage. He was a highly partisan politician, partly because he genuinely believed it essential to maintain certain political courses — especially the British connection and legal-parliamentary tradition in Canada against the threat of American political and economic influences. Macdonald was an Anglophile but he also became a Canadian nationalist who had great faith in the future of Canada. His nationalism was primarily central Canadian and English Canadian; his concern with Québec was largely political. He accepted the existence of a unique French Canadian community and especially a French Canadian claim to a due share of government patronage, but after Cartier's death in 1873 he did not share equal political power with a strong "Québec lieutenant" nor did he give senior Cabinet positions to French Canadian politicians. His overriding national preoccupations were unity and prosperity. An 1860 speech summed up his lifelong political creed and political goals: "one people, great in territory, great in resources, great in enterprize, great in credit, great in capital."

J.K. JOHNSON

Reading: D.G. Creighton, *John A. Macdonald*, 2 vols (1952-55); J.K. Johnson, ed, *Affectionately Yours, the Letters of Sir John A. Macdonald and his Family* (1969); P.B. Waite, *Macdonald* (1975).

Macdonald, John Sandfield, lawyer, politician, premier of Ontario (b at St Raphael, UC 12 Dec 1812; d at Cornwall, Ont 1 June 1872). "Sandfield" served as a subsurname for Macdonald's Highland Scottish family. After brief schooling, he articled in the offices of A. McLean and W.A. Draper, prominent Conservatives. He was called to the bar in 1840 and opened practice in Cornwall. The following year he was drafted by local Conservatives and successfully contested the Glengarry seat for the first Assembly of the United PROVINCE OF CANADA. He was unique in that he served in all 8 parliaments of the United Province. Annoyed by the intransigent position of old-line Tories, he identified increasingly with Governors SYDENHAM and BAGOT. He supported Bagot's Council of Reformers in 1842 and followed his new associates into opposition when they clashed with Governor METCALFE in 1843. Thenceforth, he would remain a Reformer. From 1849 to 1851 he served as Robert BALDWIN's solicitor general for Canada W. When Francis HINCKS became Reform premier, he passed over Sandfield, who, though bitter, accepted election in 1842 as Speaker of the Assembly — a post he filled with great distinction. During political maneuvres of 1854, which led to the formation of a Liberal-Conservative ministry under Sir A.N. MACNAB, he severely criticized Lord ELGIN for alleged improprieties and thus became a leading figure in the disrupted Reform opposition, a role he shared with George BROWN. The 2 Reformers became bitter antagonists, however, with Brown championing REP BY POP and a centralized federation and Sandfield advocating the "double majority," a requirement that the Cabinet hold the confidence of majorities from both Upper and Lower Canada, which would have ensured that the duality of the province would be more fully represented.

When the government of G.-É. CARTIER fell in 1862, Lord MONCK called on Sandfield to form a Reform administration. Associating himself with the moderate L.V. SICOTTE, Sandfield, who served also as attorney general west, attempted to govern the increasingly divided province on the basis of his constitutional formula, but was thwarted by the Upper Canadian separate-school crisis. Reorganized with A.A. DORION as his associate and with more Rouge and Grit involvement, his ministry struggled on until it fell in Mar 1864. It was Sandfield who then introduced the idea of a coalition. Yet the GREAT COALITION of June 1864, which brought together John A. MACDONALD, Cartier and Brown, isolated Sandfield, who opposed both the concept of FEDERALISM and the notion of union with the Maritimes. He particularly feared Toronto domination of his St Lawrence Valley region. He denounced the federal plan as being too conservative and its process of implementation as arbitrary and even unconstitutional. Nevertheless, being basically a Reform-minded pragmatist, by early 1867 he gently bowed to the inevitable.

John A. Macdonald became prime minister and helped engineer the selection of Sandfield as the first premier of Ontario. "Hunting in pairs," the 2 Macdonalds won the concurrent federal and provincial elections. Sandfield's ministry was of considerable distinction, frugal yet creative, and despite opposition assertions to the contrary he was no puppet of the prime minister. By 1871, however, he was gravely ill and, after an inconclusive election that was followed by the desertion of a few coalition Reformers, he resigned that Dec. In his place, Edward BLAKE inaugurated 34 years of Liberal rule.

BRUCE W. HODGINS

Reading: Bruce W. Hodgins, *John Sandfield Macdonald* (1971).

MacDonald, Thoreau, illustrator, designer, painter (b at Toronto 21 Apr 1901). Thoreau MacDonald was self-taught but worked with his father, J.E.H. MACDONALD. Colour blindness forced him to work mainly in black and white. His illustrations, particularly for the Ryerson Press and the magazine *The* CANADIAN FORUM, typify a whole period of Canadian illustration in the 1920s and 1930s. Certain technical mannerisms characterize his work: skies are always a series of parallel horizontal lines; clouds are simplified amoeboid shapes; trees look like the skeletons of conch shells; and his animals recall the art of the ancient Near East, appearing full face or, more usually, in profile. In general his subjects recall his father's, but he favoured Ontario farmland. He was one of the first artists in Canada to study factories and construction, but his work is most memorable for his delight in nature.

JOAN MURRAY

Macdonald, Sir William Christopher, manufacturer, philanthropist (b at Glenaladale, PEI 1831; d at Montréal 9 June 1917), son of Donald Macdonald, president of the Legislative Council of PEI. Educated at Central Academy, Charlottetown, Macdonald began his career as a Montréal commission merchant. Within a few years he became a tobacco manufacturer, founding the Macdonald Tobacco Co and amassing a large fortune. A man with neither family nor frivolous tastes, Macdonald became the greatest educational philanthropist of his generation. He was a generous benefactor of McGill and Ontario Agricultural Coll (now U of Guelph) and founded and endowed Macdonald College at Ste-Anne-de-Bellevue, Qué, and Macdonald Hall at Guelph, Ont. With James ROBERTSON, he financed a number of elementary-school innovations: the Macdonald Manual Training Movement, the Macdonald Rural Schools Fund and the Macdonald Consolidated School Project. Knighted in 1898, he was for many years chancellor of McGill.

ROBERT M. STAMP

MacDonald, Wilson Pugsley, poet, poetaster, performer (b at Cheapside, Ont 5 May 1880; d at Toronto 8 Apr 1967). MacDonald was a barnstorming versifier with unbending faith in his own greatness. He graduated in 1902 from McMaster, and his first collection of poems, *Song of the Prairie Land*, appeared in 1916. Many others, which he himself hawked at his "recitals," followed at intervals. Best known are *The Miracle Songs of Jesus* (1921) and *A Flagon of Beauty* (1931). It is surprising the extent to which MacDonald was often taken seriously as an artist, and equally surprising that genuine poems or hints of them can sometimes be discovered in his collections by those willing to wade through his vapid romanticism and pre-modernist conventions. Some satirical light verse may also stand re-examination. *Wilson MacDonald's Western Tour*, edited by Stan Dragland (1976), includes some of the poet's correspondence with his long-suffering publishers. There were once Wilson MacDonald Poetry Societies in several cities, sustained no doubt by the bombast of MacDonald himself, and at least one such group still survives.

DOUG FETHERLING

Macdonald College, *see* AGRICULTURAL EDUCATION.

McDonald Commission, *see* INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE, ROYAL COMMISSION OF.

Macdonell, Alexander, Roman Catholic bishop (b at Fort Augustus, Glengarry, Scot 17 July 1762; d at Dumfries, Scot 14 Jan 1840). Ordained in 1787, Macdonell spent the next few years in the Scottish Highlands. In 1793 he persuaded the British government to establish a Catholic corps, the Glengarry regiment, of which he was chaplain. In 1802 the regiment was disbanded. Two years later, with a government promise of 200 acres to every soldier who emigrated, Macdonell and a large group of settlers left for Glengarry County, Upper Canada.

Central in the religious and political life of the colony, Macdonell was appointed vicar general in 1807 and vicar apostolic in 1820, and was consecrated bishop of Kingston or Regiopolis in 1826. During his tenure thousands of IRISH immigrants arrived, and by 1840 there were 34 priests and 48 parishes in Upper Canada for which Macdonell had secured financial assistance from the local and British governments. A firm conservative, Macdonell was a legislative councillor from 1831 and soon came under fire from the Reform movement. Macdonell died while in Britain to solicit funds for Regiopolis College and recruit more Catholic emigrants. Buried in St Margaret's Convent, Edinburgh, his remains were brought to St Mary's, Kingston, in 1861.

CURTIS FAHEY

Reading: J.E. Rea, *Bishop Alexander Macdonell and the Politics of Upper Canada* (1974).

MacDonell, Miles, soldier, governor of Assiniboia (b in Scot *c*1767; d at Pt Fortune, LC 28 June 1828). Emigrating with his family to New York in 1773, Miles eventually followed them to Upper Canada, where he began farming. He was appointed a captain in the Royal Canadian Volunteers in 1796, but after the corps' disbandment in 1802, he came to Lord SELKIRK's atten-

tion in 1804. Selkirk supported his unsuccessful efforts in 1806-07 to raise a force of Glengarry Fencibles, and backed his ultimate appointment as sheriff of the Home District in 1807. Called to England by Selkirk in 1810, he was appointed first governor of ASSINIBOIA in 1811, and led the initial party of settlers to the RED RIVER COLONY in 1812. His belligerent attitude exacerbated conflict between the colony and the NORTH WEST CO, and he suffered severe emotional instability. Arrested and sent to Montréal in 1815 by the Nor'Westers, he was back in Assiniboia as governor in 1817, but soon returned to Montréal. His last years were spent in semiretirement on his farm near Osnaburgh, UC. J.M. BUMSTED

Macdonnell, Daniel James, Presbyterian minister (b at Bathurst, NB 15 Jan 1843; d at Fergus, Ont 19 Feb 1896). After graduating from Queen's U in 1858, Macdonnell taught school before studying theology in Scotland and Germany. Called to a church in Peterborough in 1866 and to St Andrew's, Toronto, in 1870, he became renowned as one of the most influential preachers in late Victorian Canada. An original theological thinker and friend of philosopher G.P. YOUNG, Macdonnell publicly voiced his doubts about certain Calvinistic doctrines. He was tried for heresy in 1876 and acquitted 2 years later. JOHN S. MOIR

McDougald, John Angus, "Bud," financier (b at Toronto 14 Mar 1908; d at Palm Beach, Fla 15 Mar 1978). An intensely private man fascinated by power, Bud McDougald developed ARGUS CORPORATION into one of Canada's dominant corporate entities. The son of a wealthy Toronto financier, McDougald began his career as a clerk for Dominion Securities at age 18. He quickly worked his way up through the corporate structure while at the same time developing outside financial activities. He left DS in 1945 to form a partnership with E.P. TAYLOR in a promotional company, Taylor, McDougald and Company Ltd. Ten years later he was made a director of Argus Corp, a holding company set up by Taylor to control his industrial interests. In 1969 McDougald became chairman of Argus which by then controlled 6 of Canada's leading industrial concerns, a position which saw him safely ensconced as a dominant member of Canada's BUSINESS ELITE. CHRISTOPHER G. CURTIS

McDougall, Elizabeth, née Boyd, frontier woman (b in Grey County, Canada W 1853; d at Calgary 31 Mar 1941). McDougall is less known for her own activities than for aiding her Methodist missionary husband John MCDOUGALL. She was the first white woman in the Alberta foothills, arriving at Morley in 1873 after a particularly hazardous journey during which she often drove the wagon across the plains. The couple lived among and worked to convert the STONEY on their reserve for 25 years. When her husband travelled as a church superintendent, McDougall went with him by canoe and dogsled, despite having 6 children. In 1898 she moved to Calgary where she became president of the Southern Alberta Pioneer Women and Old Timer's Assn. Speaking to the group, she voiced her conviction that frontier women had made possible their husbands' activities, citing the large number of bachelors who had found it necessary to leave the prairies when unsupported by the labour and sympathy of women. ELIANE LESLAU SILVERMAN

McDougall, John Chantler, Methodist minister, missionary (b at Owen Sound, Canada W 27 Dec 1842; d at Calgary 15 Jan 1917). Educated at Victoria Coll, Cobourg, 1857-60, and ordained in 1874, McDougall served for many years as missionary to the Indians of western Canada, continuing the work he began under his father's tutelage before his ordination. He served the federal government in both the 1869-70 and 1885 rebellions and drew government attention to the plight of the Indians after the disappearance of the buffalo. He retired in 1906 and lived in Calgary for the remainder of his life. He wrote several books including *George Millward McDougall* (1888) and *Forest, Lake and Prairie* (1895). ERIC J. HOLMGREN

McDougall, Pamela Ann, diplomat, public servant (b at Ottawa 9 May 1925). After studying chemistry at Mt Allison and U de Paris, McDougall joined the Department of EXTERNAL AFFAIRS in 1949. She served at the embassy in Bonn, W Germany, as political adviser to the Canadian commissioners in Vietnam; in the high commission in New Delhi, India, as deputy head of the Far Eastern Division in Ottawa; and as ambassador to Poland (1968-71). From 1971 to 1974 she was in the Privy Council Office as assistant secretary to the Cabinet, and in 1976 she became chairman of the Tariff Board. Her report as royal commissioner on conditions of foreign service was presented in 1981. JOHN W. HOLMES

MacDougall, Sir Patrick Leonard, military officer, author (b at Boulogne-sur-Mer, France 10 Aug 1819; d at Kingston Hill, Eng 28 Nov 1894). Adjutant general, Canadian militia 1865-68, MacDougall had served in Canada from 1844 to 1854 and had written *Emigration* (1848), proposing a railway from Halifax to Québec. In *Forts versus Ships* (1862), he underlined the importance of British control of the Great Lakes. During the difficulties with the FENIANS, he organized isolated volunteer companies into battalions and formed mobile brigades. From 1878 to 1883 MacDougall commanded the British troops remaining in N America. O.A. COOKE

McDougall, William, lawyer, politician, first lieutenant-governor of the North-West Territories (b near York [Toronto] 25 Jan 1822; d at Ottawa 29 May 1905). A member of the Assembly of the Province of Canada (1858-67), he was commissioner of crown lands, 1862-64, and provincial secretary, 1864. He attended all 3 CONFEDERATION conferences and as minister of public works in John A. MACDONALD's government (1867) introduced the resolution that led to the purchase of RUPERT'S LAND. He was appointed lieutenant-governor of the area in 1869, and was repulsed by Louis RIEL's men, who prevented him entering the territory he had come to govern. This failure, and the fact that he had been a Clear Grit in his early political life but had switched to the Conservatives in 1867 (which had earned him the tag "Wandering Willie"), destroyed his political credibility. Although continuing in politics (Ontario MPP, 1875-78; MP, 1878-82), he was given few political plums. FRITS PANNEKOEK

McDowall, Robert, pioneer Presbyterian minister (b at Balston Spa, near Albany, NY 25 July 1768; d at Fredericksburgh, Canada W 3 Aug 1841). In 1790 the Dutch Reformed Church sent McDowall as a missionary to what is now southern Ontario. Invited to be a permanent minister in the Bay of Quinte area, he settled near Bath, in 1798 after completing his theological education at Schenectady, NY. McDowall formed several congregations between Belleville and Brockville, performed some 2500 baptisms and 1300 marriages in the next 40 years, and also made missionary trips. He was elected first moderator of the Presbytery of the Canadas in 1819. JOHN S MOIR

McDowell, Charles Alexander, physical chemist (b at Belfast, Ire 29 Aug 1918). McDowell came to Canada in 1955 as head of the chemistry department of UBC. In his 26-year tenure, he built up this department to a point at which it could sometimes be counted the largest in N America, with great breadth in its activities. His sensitivities to physicochemical sophistication and fashionable trends in science led to a concentration in his department of big-machine methods for studying molecular structure. This field includes his own substantial research in mass spectrometry, magnetic resonance and photoelectron SPECTROSCOPY. Unlike many scientists, he seems able to pursue science itself and the politics of SCIENCE as an essential unity. He was president of the Chemical Inst of Canada, 1978-79. In 1981 UBC promoted him to the rarely awarded rank of university professor. LIONEL G. HARRISON

MacEachen, Allan Joseph, professor, politician (b at Inverness, NS 6 July 1921). After serving as head of the dept of economics and social sciences at Saint Francis Xavier U he entered federal politics; since 1953, except for 1958-62, he has represented Inverness-Richmond (later Cape Breton Highlands-Canso) in the Commons, gaining wide recognition for looking after his constituency. After 1963 his prestige grew steadily; for 2 decades he has been recognized as the federal Liberal leader in Nova Scotia. He has headed a succession of departments including finance and external affairs. During 2 stints as government leader in the Commons (1967-68 and 1970-74) he proved an able tactician, though his Nov 1981 budget was highly controversial and evoked considerable criticism. For most of the time from 1977 to 1984 he was deputy PM and always a leading party strategist. A close confidant of Pierre TRUDEAU, he helped devise the strategy that brought down the CLARK government in 1979 and he helped plan the 1980 Liberal victory. He did not run in the 1984 federal election and was appointed to the Senate in that year. J. MURRAY BECK

MacEachern, Angus Bernard, Roman Catholic bishop of Charlottetown (b at Kinlochmoidart, Scot 8 Feb 1759; d at Canavoy, PEI 22 Apr 1835). In a missionary career spanning 5 decades, MacEachern firmly rooted Catholicism in pioneer PEI and NB. He came to the Island a young missionary in 1790 to join his emigrant family, but his duties compelled him to crisscross the priest-poor Maritime region endlessly. Fluency in English, French and Gaelic enabled him to minister effectively to his scattered Scots, Irish and Acadian flock. Charm and tact won the respect of civil authorities. As titular bishop of Rosen, MacEachern became vicar general for much of the Maritimes in 1819, but by the mid-1820s was convinced that the only cure for the region's spiritual ills was independence from the sprawling, neglectful archdiocese of Québec. In 1829 the diocese of Charlottetown, comprising PEI, NB and the Magdalen Is, was created, with MacEachern its first bishop. The next year he saw Catholic Emancipation, a cherished dream, promulgated. In 1831 he founded St Andrew's College at his home in St Andrew's, PEI, to provide preliminary training for prospective seminarians. Much beloved by his people, MacEachern acquired near-mythic stature in his lifetime. G. EDWARD MACDONALD

Reading: F.W.P. Bolger, "The First Bishop," in *The Catholic Church in Prince Edward Island* (1979).

McEachran, Duncan, teacher, administrator (b at Campbelltown, Scot 27 Oct 1841; d at Ormstown, Qué 24 Oct 1924). He graduated from Edinburgh Veterinary Coll in 1861 and came to Canada in 1862 to practise in Woodstock, Canada W. He lectured at the Upper Canada Veterinary Coll at McGill in 1866, the name being changed to Faculty of Comparative Medicine and Veterinary Science in 1889. He served as professor and dean until it closed in 1903. McEachran established contagious-disease-control programs for Canada in 1875 and was chief veterinary inspector 1884-1902. He was succeeded by J.G. RUTHERFORD, who took over disease control and founded the Health of Animals Branch of the federal Dept of Agriculture. McEachran estab-

lished the first animal-disease quarantine station at Lévis, Qué. R.G. THOMSON

MacEwan, John Walter Grant, author, historian, lieutenant governor of Alberta (b at Brandon, Man 12 Aug 1902). Educated at schools in Brandon and Melfort, Sask, MacEwan graduated from Ontario Agriculture Coll in 1926 and from Iowa State Coll in 1928. He was professor of animal husbandry at U Sask and department head from 1928 to 1946, and dean of agriculture, U Man, from 1946 to 1951. He was the Liberal candidate in the federal by-election in Brandon in 1951 but was defeated. He moved to Calgary and was elected alderman in 1953, 1955, 1957 and 1959; he was mayor from 1963 to 1966. Elected MLA in 1955, he became Alberta Liberal leader in 1958, but was defeated in the election of 1959; he resigned the leadership in 1960. Between 1936 and 1984 he published 4 agricultural texts (2 collaborations) and 28 books on historical subjects, averaging latterly a book a year. He was lieutenant-governor of Alberta from 1966 to 1974. R.H. MACDONALD

McEwen, Clifford MacKay, "Black Mike," fighter pilot, air vice-marshal (b at Griswold, Man 2 July 1896; d at Toronto, Ont 6 Aug 1967). He was credited with 22 victims while flying with 28 Squadron RAF in Italy in 1918. He joined the Canadian Air Force and reached the rank of air commodore in 1941, commanding training formations and 1 (Maritime) Group, RCAF in St John's, Nfld. In 1944 he took command of 6 (Bomber) Group in Yorkshire, Eng, and flew missions over Germany. His forceful leadership made his formation one of the most successful in Bomber Command. He retired 27 Apr 1946, becoming a consultant to aircraft manufacturers and a director of Trans-Canada Airlines. BRERETON GREENHOUS

MacEwen, Gwendolyn, writer (b at Toronto 1 Sept 1941). A sophisticated, wide-ranging and thoughtful writer, she began her career with the poetry collection *The Drunken Clock* (1961). Through many other, larger poetry collections — especially *The Rising Fire* (1963), *A Breakfast for Barbarians* (1966) and *The Shadow-Maker* (1969, Gov Gen's Award) — she displays a commanding interest in magic and history as well as an elaborate and penetrating dexterity in her verse-craft. Her fiction includes 2 novels, *Julian the Magician* (1963) and *King of Egypt, King of Dreams* (1971), and a collection of stories, *Norman* (1972). In addition, she has published plays, a translation, a children's book and a travel narrative, *Mermaids and Ikons: A Greek Summer* (1978), which reminds us of the international outlook and gift for languages obvious in her novels and sometimes in her poems.

McEwen, Jean, painter (b at Montréal 14 Dec 1923). Essentially self-taught, he worked in Paris in the early 1950s. Returning to Montréal, he was committed to nonfiguration, influenced by French impressionism and American abstract expressionism. Though McEwan has always employed a hieratic symmetrical composition, his works are experiments in sensual colour, light and gesture. Recipient of several Canadian awards and international honours, he was president of the Non-Figurative Artists' Assn of Montréal in the early 1960s, and has received several Canadian awards and international honours. A "lyrical abstractionist," he celebrates the potential of colour through a knowledgeable and skillful use of paint.
SANDRA PAIKOWSKY

McGee, Thomas D'Arcy, politician, journalist, poet, historian (b at Carlingford, Ire 13 Apr 1825; d at Ottawa 7 Apr 1868). Probably the most eloquent FATHER OF CONFEDERATION, D'Arcy McGee was one of the few Canadian politicians to be assassinated.

Most of D'Arcy McGee's short life was spent outside Canada. He emigrated from Ireland to the US at age 17 and took over the editorship of the *Boston Pilot* 2 years later. He returned to Ireland in 1845 and helped edit the nationalist newspaper *Nation*. After he participated in the rebellion of 1848, he fled to the US. McGee spent the next 10 years editing newspapers in the US. Preoccupied with the welfare of hundreds of thousands of IRISH immigrants, he became discouraged by lack of support for his many projects. McGee moved to Montréal in the spring of 1857 at the request of the Irish community and began another newspaper, *New Era*, advocating a "new nationality." He called for the federation of British N America, a transcontinental railway, the settlement of the West, a protective tariff and the development of a distinctive Canadian literature.



The Irish radical D'Arcy McGee was an eloquent spokesman for Canadian Confederation. He was assassinated, likely by a Fenian extremist. Photo *c*1868 *(courtesy Public Archives of Canada/C-21543).*

McGee was elected to the Legislative Assembly of the Province of Canada from Montréal in 1858. He worked at first with George BROWN and the Reform Party but broke with them, and in 1863 joined the government of John A. MACDONALD and George-Etienne CARTIER as minister of agriculture, immigration and statistics. He was in the "Great Coalition" leading up to Confederation and attended the Charlottetown and Québec conferences. By 1866, however, he had alienated many Irish voters and was dropped from the Cabinet. In addition to editing newspapers and working actively in politics, McGee was an excellent public speaker, published over 300 poems and wrote many works on Irish history. He was bitterly opposed to the FENIANS and their plans to obtain Irish independence by revolution and the conquest of Canada. When he was assassinated a week before his forty-third birthday, it was generally believed that a Fenian conspiracy was involved. ROBIN BURNS

Reading: E.J. Phelan, *Ardent Exile* (1951); T.P. Slattery, *The Assassination of D'Arcy McGee* (1968) and *"They Got to Find Me Guilty Yet"* (1972).

McGibbon, Pauline Emily, née Mills (b at Sarnia, Ont 20 Oct 1910). After years of volunteer positions, including national president of the IMPERIAL ORDER OF THE DAUGHTERS OF THE EMPIRE (1963-65), president of the Alumni Assn (1953-54) and chancellor (1971-74) of U of T, McGibbon held her first salaried position as Ontario's lieutenant-governor (1974-80). She was the first woman lieutenant-governor in Canada. Although she attributed her success to a sense of humour and love of people, she acknowledged that her appointment would have been impossible but for the WOMEN'S MOVEMENT. At the end of her term, she was appointed chairperson of the National Arts Centre and a director of Massey Hall. McGibbon served as a director of several films. MARGARET E. MCCALLUM

MacGill, Helen Gregory, née Helen Emma Gregory, feminist, reformer, judge (b at Hamilton, Canada W 7 Jan 1864; d at Chicago, Ill 27 Feb 1947). She was the first woman graduate of Trinity Coll, Toronto (BA, MA), and, although never a career woman, she wrote and published all her life. As a reporter, she travelled alone across the Canadian West to Japan, marrying her first husband en route. Widowed young, she married James MacGill in 1903 and spent the remainder of her life in Vancouver. MacGill served for 23 years as judge of the Juvenile Court there; she was the first woman appointed judge in the region (1917) and the third in Canada. The Court itself had been created because of the pressures for reform exerted by women's groups in which MacGill was active, such as the Women's University Club of Vancouver. Elsie Gregory MacGill's biography *My Mother the Judge* (1981) — also in part an autobiography — is a valuable document of the WOMEN'S MOVEMENT.
NAOMI BLACK

McGill University, Montréal, was founded in 1821. To meet demands for public education, the Royal Institution for the Advancement of Learning was established in 1801. In 1813 merchant James McGill died, leaving his estate outside Montréal and an endowment of £10 000 for a college, naming the Royal Institution as trustee. It acquired a charter for "the University of McGill College" in 1821. McGill's heirs contested his will; the trustees, on gaining the estate, adopted in 1829 the Montreal Medical Institution, a teaching arm of the Montreal General Hospital (also chartered in 1821), as the new university's Faculty of Medicine. The litigation regarding the endowment was finally settled in the trustees' favour, and the nondenominational McGill College was built on the founder's farm. A faculty of arts was established in 1843.



Pauline McGibbon, lieutenant-governor of Ontario 1974-80 and later chairperson of the National Arts Centre *(courtesy National Film Board/Photothèque).*

Enrolment: McGill University, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
12 932	4 129*	3 284	1 156

* Includes medical interns and residents

In 1852 the Royal Institution merged with McGill University. The governors appointed as principal John William DAWSON, a young Nova Scotia geologist, and his driving genius began to build McGill into an internationally renowned institution. His interest in public education led to the establishment of McGill Normal School. He also formulated a scheme for affiliated schools and colleges across Canada, which taught the McGill curriculum. Further, he established the tradition of enlisting the sympathies of wealthy benefactors, notably the MOLSON family, Lord Strathcona (*see* SMITH) and Sir William MACDONALD. McGill received minimal public funding until the early 1960s.

Dawson's successor, William Peterson, supported McGill's inclination towards the medical, biological and physical sciences. In 1898 he brought Ernest RUTHERFORD from Cambridge U to a full professorship of physics. Peterson encouraged H.M. TORY to found McGill College in Vancouver (now UNIVERSITY OF BRITISH COLUMBIA). He persuaded Macdonald to found Macdonald College in Ste-Anne-de-Bellevue as a constituent of McGill, to further agriculture, food science and teacher training.

During the principalship of Sir Arthur CURRIE, Canada's brilliant WWI corps commander, the McGill graduate school began to share with Toronto the development of postgraduate studies in Canada. Medicine remained pre-eminent, with such names in the interwar years as J.B. COLLIP and Wilder PENFIELD; chemistry was tremendously encouraged by Otto MAASS and physics by J.S. Foster. The McGill Social Science Project, begun 1930 by Leonard MARSH, strongly influenced Canada in the development of the welfare state.

Cyril James, principal 1940-62, led the fight for federal funding of universities. During his tenure an immense flood of returning veterans swelled enrolment, which increased from about 3400 in 1939 to over 8000 in 1948. After the war humanistic studies increased, and now every aspect of human culture is actively studied on campus. In the 1960s and 1970s McGill survived the "student revolt" and came to terms with reviving FRENCH CANADIAN NATIONALISM. McGill is a constituent of the provincial university network, but has considerable freedom in maintaining its tradition of excellent education and research. The university comprises 12 faculties: medicine, arts, law, education, engineering, dentistry, agriculture, music, management, science, religious studies, and graduate studies and research. STANLEY B. FROST

Reading: Stanley B. Frost, *For the Advancement of Learning*, 2 vols (1980-84).

McGillivray, Duncan, fur trader (b in Inverness-shire, Scot *c*1770; d at Montréal 9 Apr 1808), brother of William and Simon MCGILLIVRAY. One of a family of boys attracted into the Canadian FUR TRADE by their uncle Simon MCTAVISH, McGillivray joined the NORTH WEST CO sometime before 1793. He traded out of posts on the N Saskatchewan R for most of his career and may have made an early crossing of the Rocky Mts. In 1802 he returned to Montréal where he became an agent for the NWC, travelling to the summer rendezvous at FORT WILLIAM each year until his death. DANIEL FRANCIS

McGillivray, Simon, merchant (b at Stratherrick, Scot 1783; d at London, Eng 9 June 1840), brother of William and Duncan MCGILLIVRAY.



William McGillivray, chief director of the North West Co. He led a company of voyageurs during the War of 1812 and assisted Gen Brock in the capture of Detroit (*courtesy Public Archives of Canada/C-167*).

Owing to physical disability, he did not enter the Canadian FUR TRADE actively like his brothers. Instead he turned to the financial end of the business, working in London, Eng, and Montréal for subsidiaries of the NORTH WEST CO. In 1821 he was instrumental in bringing about the union between the NWC and the HBC. His association with the fur trade and Canada ended in 1830. DANIEL FRANCIS

McGillivray, William, fur-trade merchant (b Scot *c*1764; d at London, Eng 16 Oct 1825). Attracted to the fur trade by his uncle, Simon MCTAVISH, McGillivray was a wintering partner in the NORTH WEST CO for several seasons. From 1794 he represented the Montréal end of the business at the annual rendezvous at GRAND PORTAGE [Minn]. Eventually he became superintendent of the northwestern trade, and when his uncle died in 1804, McGillivray was made chief director of the NWC. During the War of 1812 he commanded a company of voyageurs, assisting Gen BROCK at the capture of Detroit. As leader of the NWC, he presided over a period of intense competition with the HBC that ended when the companies united in 1821. Afterward, he was a director of the newly organized company. FORT WILLIAM, the NWC depot at the head of Lk Superior, was named after him. DANIEL FRANCIS

Reading: M.W. Campbell, *Northwest to the Sea: A Biography of William McGillivray* (1975).

McGilvray, Charles Duncan, veterinarian, teacher, administrator (b at Glasgow, Scot 25 Oct 1872; d at Guelph, Ont 17 Apr 1949). After studying at the Ontario Veterinary Coll and in Chicago, Ill, he served as chief veterinary inspector for Manitoba with the federal Dept of Agriculture 1903-18. He was principal of OVC (Toronto and Guelph) 1918-45. With J.G. RUTHERFORD, McGilvray helped to improve veterinary education in Canada through a report to a national conference on the topic in 1918. He raised the standards of veterinary education and expanded the application of VETERINARY MEDICINE to species other than equine. R.G. THOMSON

McGregor, James, Presbyterian minister (b in Comrie Parish, Scot 1759; d at Pictou, NS 1830). Ordained in 1780 by the General Associate Synod (Antiburgher) of Scotland, McGregor was sent as an unpaid missionary to PICTOU, where he remained as minister until his death. Under extremely difficult physical conditions, he made several missionary tours of NS, PEI and NB between 1791 and 1805. Founder of the first Canadian Auxiliary Bible Society, he revised Gaelic publications for the British and Foreign Bible Society and was the author of 2 pamphlets and a volume of Gaelic poetry. JOHN S. MOIR

MacGregor, James Gordon, physicist (b at Halifax 31 Mar 1852; d at Edinburgh, Scot 21 May 1913). Educated at Dalhousie U, MacGregor was awarded a Gilchrist scholarship in 1874 and studied under Peter Guthrie Tait at Edinburgh and Gustav Wiedeman at Leipzig. When he received a doctorate from London in 1876, he had already had 4 papers published in the *Proceedings* of the Royal Society of Edinburgh. In 1879 Dalhousie offered him its newly established chair of physics. During his 22 years there he published about 60 papers on several aspects of the electrical and thermal properties of solutions and was elected to both the Royal Soc of London and the Royal Soc of Edinburgh. He helped found the ROYAL SOCIETY OF CANADA and was a charter member. In 1888 he published *An Elementary Treatise on Kinematics and Dynamics*. He succeeded P.G. Tait at Edinburgh in 1901. YVES GINGRAS

MacGuigan, Mark Rudolph, academic, politician (b at Charlottetown 17 Feb 1931). A graduate of St Dunstan's Coll and U of T, he taught law at U of T, Osgoode Hall and U of Windsor, where he was also dean. In 1968 he was elected to Parliament for Windsor, succeeding Paul MARTIN, and in 1980 PM TRUDEAU appointed him minister of external affairs. From 1982 to 1984 he was minister of justice. In 1976 he ran unsuccessfully for the leadership of the Ontario provincial Liberals and in 1984 was an unsuccessful candidate for the leadership of the national Liberal Party. He then retired from politics to become a judge of the federal Court of Appeal. ROBERT BOTHWELL

McHenry, Earle Willard, "Mac," professor, scientist, author (b at Streetsville, Ont 25 Jan 1899; d at Toronto 20 Dec 1961). McHenry's initial discipline was chemistry; however, an interest in nutrition emerged when he was appointed lecturer in the dept of physiological hygiene at U of T. Ultimately a separate dept of public-health nutrition was established in 1946 with McHenry as professor and head (1946-61). His interest in nutrition encompassed both basic research and the nutritional health of the general public. He was the first president of the Nutrition Soc of Canada (est 1957), and was an outspoken, articulate contributor to several governmental committees on nutrition education and policy in N America. McHenry wrote 2 books, *Basic Nutrition* and *Foods without Fads*, which expressed his commonsense philosophy towards nutrition and his impatience with unscientific thinking. At his death he was coediting the 3-volume *Nutrition: A Comprehensive Treatise*. M.J. BAIGENT

Machinery and Equipment Industry includes establishments that produce pumps and compressors, rolling-mill and metalworking equipment, FORESTRY equipment, MINING equipment, farm machinery, CONSTRUCTION equipment and SERVICE INDUSTRIES equipment. The largest resource INDUSTRY users of machinery in Canada are mining, forestry, petroleum and ELECTRIC-POWER generation. In mining, machinery is used for ore extraction, crushing, smelting and refining. In forestry, machines are involved in tree harvesting, PULP AND PAPER manufacturing and LUMBER production. The PETROLEUM INDUSTRY uses equipment to explore, drill, extract, transport and refine oil and natural-gas products. There is a large machinery element in all types of electrical power plants, including hydro, thermal and nuclear.

Among Canadian manufacturing industries, the largest purchasers of machinery and equipment are the metalworking industries, including steelmaking, the AUTOMOTIVE INDUSTRY

and the machinery industry itself. Other large user industries are food processing, packaging and air and water purification. Machinery and equipment are made in foundries, machine and welding shops and assembly plants. Support facilities include laboratories for INDUSTRIAL RESEARCH AND DEVELOPMENT and for testing and quality control, as well as design offices. It was not until the 1850s, when a RECIPROCITY treaty opened the booming US market to Canadian manufacturing industries, that machinery and equipment production moved from small forges and metalworking shops to the early versions of today's large plants. It is estimated that, at the time of Confederation (1867), about 30 to 40 firms were manufacturing machinery and equipment for other industries; by 1967 there were 15 Canadian machinery firms 100 years or older. Some, such as Dorr-Oliver Canada Ltd in Orillia, Black Clawson-Kennedy Ltd in Owen Sound and Babcock-Wilcox Canada Ltd in Cambridge, are now among the country's largest. The earliest companies manufactured primarily steam engines, hydraulic turbines, pumps, woodworking machinery, machine tools and flour-mill, cement-making and sawmill machinery. The plants were initially powered by waterwheels, water turbines or steam engines.

At the end of the 19th century, the advent of large thermal and hydroelectric power plants, with their far-flung distribution systems, started a new phase in machinery manufacturing. Factories were located near markets and transportation networks. The availability of large, efficient electric motors permitted the design of more powerful machinery.

As its customer industries proliferated and expanded, machinery manufacturing grew. WWI accelerated the demand for more and newer types of machinery, giving the industry maturity and a permanent place in Canada's economy. It expanded until the GREAT DEPRESSION of the 1930s, when all sectors encountered nearly a decade of minimal growth. With WWII, enormous demands were again imposed on the industry. The boom was followed in 1945 by a period of conversion and expansion for production of peacetime materials and goods for the domestic market and for the immense rebuilding requirements in Europe. These events called for new machinery on an unprecedented scale. Annual plant shipments of Canadian machinery and equipment grew from $60 million in 1938 to $460 million in 1950. The industry enjoyed a continuous and above-average growth rate until 1982, when it followed the rest of the Canadian economy into a severe recession. Industry sales in 1981 were $6.1 billion (8.8% of all Canadian nonfood manufactured products). In the recession of 1982, production fell to $4.86 billion.

The Modern Industry

Between 1975 and 1981 Canadian machinery and equipment production grew steadily, from $2.55 billion to $6.1 billion. The growth (6.6% annually) was a consequence of increasing industrialization in the world generally and in the Canadian economy in particular. In addition, Canadian MEGAPROJECTS provided a large domestic market and served as a base of expertise for exports.

Between 1975 and 1981 exports accounted for 65% of the industry's real growth. Increasing exports were necessary to sustain growth because the indigenous Canadian market is too small, even for manufacturers who concentrate on producing machinery for larger Canadian industries. Conversely, a country with Canada's small population cannot manufacture the entire range of machinery and equipment needed by all its industries. In fact, in recent years Canadian machinery and equipment manufacturers have never managed to capture more than about one-third of the domestic market. A 1977 study of the 17 largest Western industrial nations by the Organization for Economic Cooperation and Development showed that Canada had the lowest machinery self-sufficiency in the group (32%). By comparison, figures for some of the other countries were Italy 60%, West Germany 70%, France 74%, the US 91% and Japan 95%.

Location of Plants About 64% of the machinery and equipment industry (by dollar value of plant shipments) is found in Ontario; Québec has 20%; the Prairie provinces 9%; BC 6%; and the Maritimes 1%.

Ownership It is estimated that in the early 1980s, about 225 firms in the Canadian machinery sector, accounting for about 60% of its total output, were subsidiaries of American parent companies. Only about 25% came from Canadian-controlled companies. FOREIGN INVESTMENT has provided ready access to the technical, financial and marketing resources of parent corporations. It has also created an outflow of profit capital and, in some cases, restricted company activity.

Work Force Machinery and equipment manufacturing is a labour- and technology-intensive industry, employing large numbers of engineers and skilled tradesmen such as machinists, fitters, millwrights, welders, tool and die makers, instrument and electrical workers, and electronics technicians.

The industry work force has grown, but in less than direct proportion to the value of its shipments because of productivity improvements. Employment increased from 13 500 in 1949 to 24 000 in 1954. Tremendous growth in the late 1950s and the 1960s raised employment to 112 000 by 1967, and by 1981 the total had reached 132 000. During the 1982 recession 23% of the work force was laid off, almost twice the national average, and by 1983 the work force was down to 102 000. These figures are for those directly employed; the industry creates an approximately equal number of jobs among material and component suppliers and subcontractors. About 20 different unions are involved in the industry, although some plants are not unionized. The 3 major unions are the International Assn of Machinists and Aerospace Workers, the United Steelworkers of America and the United Auto Workers.

Associations The Machinery and Equipment Manufacturers Assn of Canada was established in 1955 in Ottawa to provide a forum for technical, economic, educational and other deliberations, and for representation to the government, the public and the media. J.R. ROMANOW

Machray, Robert, Church of England priest, bishop (b at Aberdeen, Scot 17 May 1831; d at Winnipeg 9 Mar 1904). Educated at King's College, Aberdeen, and Sidney Sussex College, Cambridge, he received prizes in mathematics, philosophy and divinity. He was ordained in 1855, served in English parishes and was dean of Sidney Sussex College 1859-62. He succeeded David ANDERSON as bishop of RUPERT'S LAND and was consecrated in June 1865. During his years there he helped extend and consolidate the church's work and built up St John's College, Winnipeg. He became first metropolitan of the new ecclesiastical province of Rupert's Land in 1875, with the title of archbishop, and first primate of Canada in 1893. He died in office.
F.A. PEAKE

McIlwraith, Thomas, businessman, ornithologist (b at Newton, Scot 25 Dec 1824; d at Hamilton, Ont 30/31 Jan 1903). He is best known for his 1886 treatise on Ontario birds, the first major annotated provincial bird book in Canada. McIlwraith came to Canada in 1853 and became a successful Hamilton businessman and alderman. He published several papers on birds in Canada West, and was credited with instructing wildlife artist Allan BROOKS in the proper preparation of bird skins. He was one of 25 founders of the prestigious American Ornithologists' Union and served on its council. The name of the McIlwraith Field Naturalists of London, Ont, honours his memory.
MARTIN K. MCNICHOLL

McIlwraith, Thomas Forsyth, anthropologist (b at Hamilton, Ont 9 Apr 1899; d at Toronto 29 Mar 1964). McIlwraith graduated from McGill and Cambridge and, as field assistant at the National Museum of Canada, conducted research on the Northwest Coast, 1922-24. In 1925 he joined U of T and was a professor and head of the dept of anthropology from 1936 to 1952. At U of T, McIlwraith built a department in which archaeological, linguistic, physical and ethnological anthropology all found a place. His own research interests lay in ethnology and later in the effects of change on Canadian native peoples. In 1939 he edited (with C.T. Loram) *The North American Indian Today* and in 1948 published the *Bella Coola Indians*. Chairman of the Social Science Research Council, president of the Royal Canadian Institute and the RSC, fellow of the Royal Institute of Great Britain and Ireland, he remained a continuing research associate of the National Museum and the Royal Ontario Museum. TOM MCFEAT

MacInnis, Grace Winona, née Woodsworth, politician (b at Winnipeg 25 July 1905). Following in the footsteps of her father, J.S. WOODSWORTH, and husband Angus, Grace MacInnis became a key member of the CO-OPERATIVE COMMONWEALTH FEDERATION and later the NEW DEMOCRATIC PARTY, as well as a respected MLA in BC (1941-45) and an MP (1965-74). A backroom politician *par excellence*, she was influential within provincial and national party circles, leading one reporter to call her in 1949 the true leader of the CCF executive. In BC and Ottawa she worked hardest for low-income housing, consumer rights and women's equality. She also took great interest in international affairs, serving as Canada's representative during a number of international conferences. For her contributions MacInnis received several awards, including the Governor General's "Persons Award" (1979), marking the 50th anniversary of the PERSONS CASE. In 1953 MacInnis published *J.S. Woodsworth: A Man to Remember*. SUSAN WALSH

MacInnis, Joseph Beverly, physician, diver, poet (b at Barrie, Ont 2 Mar 1937). After completing his MD at U of T (1962) and interning at Toronto General Hospital (1963), he lectured at U of Penn (1964), but he has spent most of his career on underwater projects. He was the life-support physician for a man-in-sea project (1964), directed 75 dives at the Linde Research Lab (1965) and was a consultant to Sealab III (1967) and to the American Medical Assn *Journal* (1966).

In 1969 MacInnis developed an underwater contained environment in Georgian Bay and then designed a transparent non-corrosible undersea refuge. In 1972, at Resolute Bay, this became the first manned station under ice, as one of 10 arctic underwater expeditions (1970-74), including the first under the North Pole. MacInnis has participated in many diving expeditions, including a 700-foot dive (213 m) from the first lock-out submarine (1968), and an arctic dive in which BREADALBANE, a ship sunk in 1853, was discovered off Beechey I (1980). His interest in merging arts with science has found expression in *Underwater Images* (1971), in which his own photographs of underwater life are accompanied by his poems, and in several films and TV programs. A film, *Deep Androsia*, received a Gold Medal of Excellence at the International Film Festival, Santa Monica (1965). Many of his dives are documented in his book *Underwater Man* (1974). MARTIN K. MCNICHOLL

McIntosh, John, farmer, apple breeder (b in Mohawk R Valley, NY 1777; d at Dundela, Canada W 1845). After a family disagreement, McIntosh immigrated to Iroquois, Upper Canada, in 1796. In 1811 he moved to the site of Dundela, where in clearing the forest he discovered about 20 apple trees in a previously cleared area. He transplanted several, one of which produced a superior fruit that he cultivated with mixed success. In 1835 his son Allan learned the art of grafting and the family began to produce the apples on a major scale. The vigorous, hardy and productive trees produced the popular dessert fruit of wide climatic and cultural tolerance, first known as "Granny" and later "McIntosh Red." The original tree lived until about 1910, bearing fruit for over 90 years until 1908. MARTIN K. MCNICHOLL

McIntosh, William, fur trader (b at Grand Rapids, US 1784; d 16 Feb 1842). By 1816 a wintering partner in the NORTH WEST CO, he had previously been positioned at Lesser Slave Lk (1803) in the Peace R country (1805) and at Ft Vermilion (1815). He was arrested at Grand Rapids in 1819 along with several other senior NOR'WESTERS by the governor in chief of the HUDSON'S BAY CO. McIntosh pretended illness, feigned suicide and escaped to Ft William. In the 2 preceding years he had completely disrupted HBC attempts to capture the Athabasca country, driving one of their officers to near starvation.

After the 1821 union of the NWC and HBC he served as chief trader and after 1823 as chief factor, variously at Nelson House (1825-1829), Cumberland House (1829-1832) and Dunvegan (1832-1834). He retired in 1837 after 2 furloughs. Although McIntosh served the HBC for 16 years, his prominence in the wars between the 2 fur-trade giants may have engendered the hatred of Sir George SIMPSON, the governor of the HBC. In his private "Character Book" Simpson described McIntosh as "A revengeful cold blooded black hearted Man whom I consider capable of anything that is bad: possessing no abilities beyond such as qualify him to cheat an unfortunate Indian and to be guilty of a mean dirty trick: Suspicious, Cruel & Tyrannical without honour or integrity." FRITS PANNEKOEK

McIvor, George Harold, businessman, public servant (b at Portage la Prairie, Man 1894). Starting in the grain business at 15, McIvor rose from work at a country elevator to the Winnipeg Grain Exchange. In 1935 he joined John I. McFarland as assistant chief commissioner of the CANADIAN WHEAT BOARD. He became chief commissioner of the board in 1937, the post held until 1958 when he became chairman of Robin Hood Flour. He was closely linked to C.D. HOWE and was blamed by many for Howe's unpopular policies during the wheat glut of the mid-1950s. ROBERT BOTHWELL

Mackay, Angus, prairie agriculturist (b near Pickering, UC 10 Jan 1841; d at Indian Head, Sask 10 June 1931). Mackay is reputedly the man who introduced "summer fallow," which some historians consider more important than any other discovery in allowing successful agriculture on the Canadian prairies. A farmer's son and a farmer, Mackay moved west at age 40 and took up virgin land at Indian Head. The prairie farmer's main problem is drought. Mackay appears to have discovered independently about 1885 that cultivating land and leaving it fallow for a year allows it to store moisture and yield a good crop the next year. In 1888 Mackay was appointed to create the first Dominion Experimental Farm in the Canadian West. He became the chief propagandist for summer fallow and a powerful influence in western agriculture. DONALD J.C. PHILLIPSON

McKay, Arthur Fortescue, painter (b at Nipawin, Sask 11 Sept 1926). He studied at the Provincial Institute of Technology and Art, Calgary, 1946-48; Académie de la grande chaumière, Paris, 1949-50; Columbia U, and Barnes Foundation, Merion, Pa, 1956-57. He first began to teach at the U Sask, Regina, in the early 1950s and served as director of its School of Art 1964-67. One of the REGINA FIVE, he was influenced in the 1960s by Barnett Newman at the Emma Lake Workshops and was included in Clement Greenberg's 1964 "Post-Painterly Abstraction" exhibition. McKay is most noted for his scraped enamel "mandalas" which utilize circular and rectangular formats to create highly contemplative images reflecting his interest in Zen Buddhism. In the 1970s he continued to paint abstractions but also reintroduced the landscape in his work. NORMAN ZEPP

MacKay, Elmer MacIntosh, politician (b at Hopewell, NS 5 Aug 1936). Educated at Acadia and Dalhousie, MacKay was called to the NS Bar in 1961 and practiced law in Pictou County. Elected a Conservative MP for Central Nova in a 1971 by-election, he was a tenacious and vocal Commons critic of Liberal governments, taking particular aim at security questions. He was minister of regional economic expansion and the political minister for NS in the 1979-80 Joe CLARK government. An early and prominent supporter of Brian MULRONEY's successful campaign to become PC chief in 1983, he resigned his seat so that the new leader could run for Parliament. MacKay was re-elected in Central Nova in 1984 and became solicitor general in the Mulroney government. NORMAN HILLMER

Mackay, George Leslie, Presbyterian missionary (b at Zorra, Oxford County, Canada W 22 Mar 1844; d in Formosa (Taiwan) 2 June 1901). A graduate student in Edinburgh, Mackay decided to become a missionary after hearing Alexander Duff, the "apostle to India," call for foreign evangelism. He was sent to mainland China in 1871 by the Canadian Presbyterian Church but settled in Tamsui, Formosa. Although natives destroyed several of his churches, his knowledge of elementary medicine won him respect. Nicknamed "the black-bearded barbarian," Mackay built a hospital, a girls' school and Oxford College, and established 60 mission stations in 20 years. JOHN S. MOIR

McKay, James, trader, guide, entrepreneur, politician (b at Edmonton House, NWT 1828; d at St James, Man 2 Dec 1879). Son of a Scottish boat-brigade guide and Métis mother, McKay spoke English, French, Ojibwa, Cree and Sioux. A massive, powerful man, he was Hudson's Bay Co postmaster and clerk 1853-60 before starting his own business, freighting, trading, carrying mails, running a stagecoach from Winnipeg to Edmonton, and outfitting and guiding hunters and travellers. On the Council of Assiniboia from 1868-69, McKay played a moderating part at the time of the first RIEL rising. He served Manitoba as president of the Executive Council, Speaker of the Legislative Council and minister of agriculture, and was on the Council of the North-West Territories 1873-75. As adviser for Treaties No 1, 2 and 3 and commissioner for Treaties No 5 and 6, he played a crucial role. McKay converted from Presbyterianism to Catholicism and his marriage to a daughter of John Rowand brought him wealth and social status. His home, Deer Lodge, became a meeting place for the Indian and Métis and elite newcomers from Ontario. His career linked the old fur-trading, buffalo-hunting West to the new order of business, settlement and organized government. IRENE SPRY

MacKay, Robert Alexander, political scientist, diplomat (b in Victoria County, Ont 2 Jan 1894; d at Ottawa 25 Nov 1979). MacKay served overseas in WWI and studied at U of T and Princeton. Professor of government and political science at Dalhousie 1927-47, he also served on the Rowell-Sirois Commission on Federal-Provincial Relations. Wartime assistant in the Dept of External Affairs, he rejoined External in 1947. In addition to his work as a negotiator of union with Newfoundland, he was deputy undersecretary, permanent representative to the UN (1955-58) and ambassador to Norway (1958-61). He taught political science at Carleton 1961-72. His publications include *The Unreformed Senate of Canada* (1926); with E.B. Rogers, *Canada Looks Abroad* (1939); and *Documents on Canadian Foreign Policy 1945-1954* (1971). JOHN W. HOLMES

Mackay Case (1980) In *Mackay* v *the Queen,* Pte R.C. Mackay, accused of trafficking in drugs and of being found in possession of drugs, invoked in his defence the principle of equality before the law found in the CANADIAN BILL OF RIGHTS of 1960, because the prescribed penalty was higher for a service person than for a civilian. The Supreme Court of Canada enunciated the principle that, based on the Constitution Act, 1867 (s91.7), Parliament could, for a valid federal purpose, provide a more severe penalty for a serviceman than for a civilian and for the same reasons could provide that these cases should be conducted by a military attorney before a court martial. GÉRALD-A. BEAUDOIN

McKee Trophy, award given annually for contribution to the advancement of Canadian aviation. It was donated by J. Dalzell McKee, an American sportsman pilot, who completed the first flight of a seaplane across Canada in 1926. The selection was made by a committee established by the Dept of National Defence. It was first awarded 1927, retired in 1968, and transferred to the custody of the Canadian Aeronautics and Space Institute in 1971 for representation. Among recipients are C.H. DICKINS (1928), W.R. MAY (1929), G.W.G. MCCONACHIE (1945) and C.C. AGAR (1950). T.M. Reid (1942, 1943) and P.C. GARRATT (1951, 1965) are the only 2-time winners. JAMES MARSH

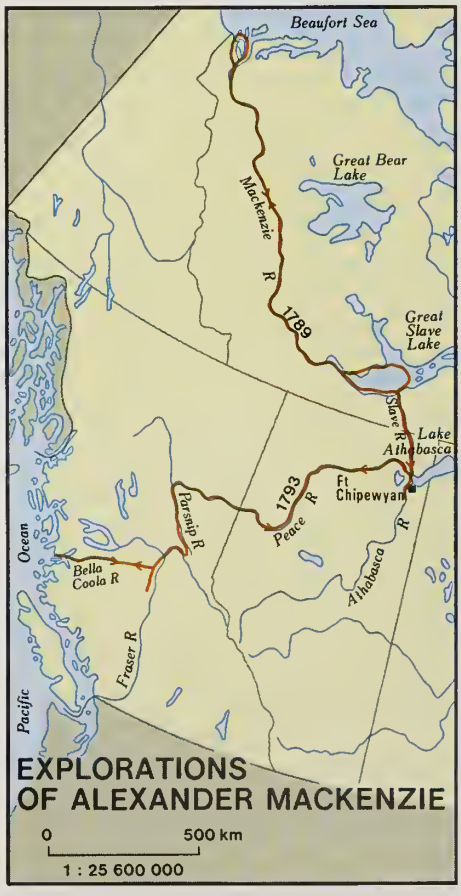
McKellar, Andrew, astrophysicist, molecular spectroscopist (b at Vancouver 2 Feb 1910; d at Victoria 6 May 1960). McKellar received the MBE in 1947 for his work in WWI as a research officer in the RCN. He was astronomer at the Dominion Astrophysical Observatory in Victoria 1935-39 and 1945-60, and was internationally regarded as one of Canada's greatest astronomers. His 73 scientific publications include evidence that the source of energy of cool carbon stars is a nuclear reaction involving carbon and nitrogen, and the deduction that the temperature of interstellar gas is 2.3° Kelvin. It was more than 20 years before his result was confirmed and used to support the theory of the explosive creation of the universe. His final paper, a biography and a list of his publications appear in the *Journal of the Royal Astronomical Society of Canada* 54 (1960). E.H. RICHARDSON

Mackenzie, BC, District Municipality, pop 5890 (1981c), area 20 285 ha, inc 1966, is situated in northern BC on the shores of the man-made Williston Lk Reservoir in the ROCKY MT TRENCH. It was created by the flooding of the Peace, Finlay, Omenica and Parsnip rivers caused by damming the Peace R at the W.A.C. Bennett Dam. Governed by a mayor and 6 aldermen, Mackenzie (after Alexander MACKENZIE) was a preplanned, instant town designed to exploit the region's rich natural resources. The local economy features the reserves of the Mackenzie Forest Dist, which support 2 pulpmills and 5 sawmills, and the minerals of the Rocky Mt Trench. Mackenzie quickly gained all the services of typical Canadian towns and today has schools, churches, an arena, swimming pools, a ski hill, a library, an arts and craft centre, a hospital and numerous clubs and organizations. ALAN F.J. ARTIBISE

Mackenzie, Ada, golfer (b at Toronto, Ont 30 Oct 1891; d at Richmond Hill, Ont 25 Jan 1973). Mackenzie paved the way for women to take GOLF seriously by founding the first club restricted to women, the Ladies' Golf and Tennis Club, in Thornhill, Ont, in May 1925. Mackenzie's own play set high standards. She won the Ont Ladies' Amateur title 9 times and the Canadian Ladies' Open Amateur 5 times. In 1933 she was chosen Canadian athlete of the year. LORNE RUBENSTEIN

Mackenzie, Sir Alexander, fur trader, explorer (b at Stornoway, Scot 1764; d near Dunkeld, Scot 12 Mar 1820). Mackenzie's father took him to New York in 1774, and in 1778, because of the Revolutionary War, he was sent to school in Montréal. There in 1779 he entered the employ of the fur-trading firm of Finlay and Gregory, later Gregory, MacLeod and Co. In 1784 he became a partner and spent the years 1785-87 in charge of the post at ILE-À-LA-CROSSE. In 1787 Gregory, MacLeod and Co coalesced with the NORTH WEST CO and Mackenzie became a partner in the larger concern.

He was assigned to the post on the Athabasca R as second-in-command to Peter POND, who had explored the region extensively and would be leaving it in the spring. Pond was convinced that Cook's R (Cook Inlet, Alaska) on Capt COOK's chart was the mouth of the large river that flowed westward out of Great Slave Lk, and that it would provide a travel route to the Pacific. This association with Pond was decisive; Mackenzie later declared that "the practicability of penetrating across the continent" was the "favourite project of my own ambition," and this resulted in the 2 remarkable expeditions upon which his fame rests. He and Pond had founded FT CHIPEWYAN on Lk Athabasca, and he set out from it in 1789 to test Pond's theory, but found that the river (the MACKENZIE R) led to the Arctic, not the Pacific. Undaunted, he planned a second expedition. Having wintered at Ft Fork, on the upper waters of the Peace, he headed westward in May 1793. Crossing the divide from the watershed of the Peace to that of the Fraser, he was advised by Indians to complete his journey to the Pacific overland, instead of following the Fraser to its mouth. The last stage of this first crossing of the full width of N America was down the Bella Coola R. The speed and efficiency with which Mackenzie travelled were astonishing; he brought both his crews home safely and in spite of numerous contacts with Indians never fired a shot in anger.



Mackenzie left the West in 1795, and after serving as a partner in McTavish, Frobisher and Co, which managed the NWC, he went to England in 1799. His *Voyages* were published in 1801 and he was knighted in 1802. His ambition was to form a trading concern that would span the continent and involve a union of the NWC and the HBC, but his efforts to bring it about failed. He married in 1812 and retired to an estate in Scotland. W. KAYE LAMB

Reading: W. Kaye Lamb, ed, *The Journals and Letters of Sir Alexander Mackenzie* (1970).

Mackenzie, Alexander, builder, newspaper editor, 2nd prime minister of Canada, 1873-78 (b near Dunkeld, Scot 28 Jan 1822; d at Toronto 17 Apr 1892). Immigrating to Canada in 1842, Mackenzie eventually settled in the Sarnia area, working in the building trade with his brother. In the early 1850s he became editor of a Reform newspaper, the *Lambton Shield*, and a supporter of George BROWN. He was first elected to the Legislative Assembly of the PROVINCE OF CANADA in 1861. He backed CONFEDERATION but refused the presidency of the Council when Brown left the coalition in 1865. Mackenzie was elected to the House of Commons, and subsequently to the Ontario legislature in 1867. He sat in the Ontario legislature until dual representation was abolished and sat in the Commons until his death.

In 1873 Mackenzie formed the first Liberal administration in Canada after Sir John A. MACDONALD's government was brought down by the PACIFIC SCANDAL. A hardworking man of exceptional integrity but little imagination, Mackenzie served as his own minister of public works, and his attempt to build a transcontinental railway on a self-financing basis met with some success but little public approbation. Many felt his diligence in his portfolio detracted from his leadership in the Commons. Macdonald's party defeated Mackenzie's in the 1878 elections, which were fought on the issue of the NATIONAL POLICY proposed by the Tories.

Mackenzie remained leader of his party for only 2 more years when failing health or a threatened party revolt led him to step down in favour of Edward BLAKE. He refused several offers of a knighthood, and wrote several books in his retirement, including *The Life and Speeches of George Brown* (1882). J.M. BUMSTED

Reading: D.C. Thomson, *Alexander Mackenzie, Clear Grit* (1960).

Mackenzie, Sir Alexander, lawyer, businessman (b at Kincardine, Canada W 30 June 1860; d at Kincardine, Ont 12 July 1943). Son of a Scottish farmer, Mackenzie left school at 17 and articled with a Toronto legal firm, being called to the bar in 1883. In 1899 Z.A. LASH, Canada's pre-eminent corporate lawyer, sent Mackenzie to oversee the legal arrangements of the São Paulo Tramway, Light and Power Co in Brazil. Fluent in Portuguese and conversant with the Brazilian legal and political systems, in 1904 he joined the Rio de Janeiro Tramway, Light and Power Co and served both companies as resident VP until their merger into Brazilian Traction in 1912. When F.S. Pearson, Brazilian Traction's founder, drowned on the *Lusitania* in 1915, Mackenzie assumed the presidency, and under his leadership Brazilian Traction became Canada's largest single overseas investment. He retired in 1928, remaining a company director. In 1919 he was knighted for his services in bringing Brazil into WWI. DUNCAN MCDOWALL



Alexander Mackenzie, 2nd prime minister of Canada, 1873-78. His attempt to build the transcontinental railway as a self-financing enterprise met with little public support (*courtesy Public Archives of Canada/C-20052*).

Mackenzie, Chalmers Jack, engineer, research manager (b at St Stephen, NB 10 July 1888; d at Ottawa 26 Feb 1984). He was the single most important figure in the postwar growth of Canadian science. He was trained in civil engineering at Dalhousie and Harvard and served in the Canadian army in WWI (MC 1918) before moving to Saskatchewan (where he had worked 1910-15). Part-time lecturing at the U of Sask led to his becoming dean of engineering 1921-39. During this period he organized important research in protecting concrete buildings from attack by "alkali salts" in the soil, supervised the design and construction by his students of a



C.J. Mackenzie, who was president of the NRC, 1944-52, and of the Atomic Energy Control Board, 1948-61 (*courtesy National Research Council*).

highway bridge in Saskatoon, and served as chairman of the Town Planning Council.

Mackenzie was appointed to the NATIONAL RESEARCH COUNCIL in 1935, and his abilities were recognized by NRC Pres A.G.L. MCNAUGHTON who personally chose him as acting president in 1939. Mackenzie was thus the government's chief scientist in WWII and became the right-hand man of C.D. HOWE in planning postwar SCIENCE POLICY. His war work included the ten-fold expansion of the NRC Laboratories, top-secret war gas, aviation, radar and atomic bomb research, membership on the US-British-Canadian Combined Policy Committee, allocating uranium supplies, and even the chore of telling Winston Churchill that "Habakkuk," the British PM's pet project of an iceberg-aircraft carrier, was impossible.

Mackenzie was NRC president in his own right 1944-52, president of ATOMIC ENERGY OF CANADA LTD 1953-54 and president of the Atomic Energy Control Board 1948-61. In the postwar years he and E.W.R. STEACIE laid the foundations of the Canadian scientific system as it is today. He had a hand in the GOUZENKO investigations, the NRC's entry into basic research through Gerhard HERZBERG and others, governmental responses to the Russian atomic bomb (1949) and Sputnik (1957), the foundation of the DEFENCE RESEARCH Board and MEDICAL RESEARCH COUNCIL, the expansion of NRC university grants to equal its internal budget, the Industrial Research Assistance Programme of 1962, the enlargement of CANADA COUNCIL grants 1963-69, and he served as chancellor of Carleton U 1954-68. Though nominally retired in 1961, Mackenzie remained a member of the Advisory Panel on Science Policy to 1963, acting as chairman during Steacie's terminal illness; in 1964 he provided a "second opinion" for the government about the science policy reforms proposed by the Glassco Royal Commission Report of 1963, which were implemented in 1964-70, and he maintained an office at the NRC until his 90th year. He received many honours and awards including the CMG (1943), US Medal of Merit (1947), Companion of the Order of Canada (1967) and fellowship in the Royal Soc of Canada and that of London.

DONALD J.C. PHILLIPSON

Mackenzie, Ian Alistair, politician (b at Assynt, Scot 27 July 1890; d at Banff, Alta 2 Sept 1949). After sitting in the BC Assembly 1920-30, the gregarious Mackenzie entered Parliament in Ottawa. He was minister of national defence, 1935-39, overseeing the rearmament of Canada's armed forces. Although a superb constituency politician, he was not (as the BREN GUN SCANDAL illustrated) an effective minister, and he was swept aside upon the outbreak of war. As minister of pensions and national health, 1939-44, Mackenzie pushed for the expansion of social benefits. He was not sufficiently influential, however, to seize leadership of the social reform movement. As BC's representative in the Cabinet, he was the key figure in the decision to intern JAPANESE Canadians. Minister of veterans affairs, 1944-Jan 1948, Mackenzie entered the Senate in 1948.

NORMAN HILLMER

McKenzie, Kenneth George, neurosurgeon (b at Toronto 13 June 1892; d there 11 Feb 1964). After graduating with an MB from U of T in 1914, he saw medical service overseas during WWI. Following a period of general practice, he studied for a year with Dr Harvey Cushing in Boston before joining the staff at the Toronto General Hospital. The first neurosurgical unit in Canada, which he founded there in 1923 and directed until 1952, became widely recognized for its excellent care and training. President of the Harvey Cushing Soc 1936-37 and the Soc of Neurological Surgeons 1948-49, he made many contributions to his field, including a scheme for training general surgeons to treat head injuries; new methods of treating torticollis, chronic subdural hematoma and acoustic neuroma; the use of skull tongs for traction of patients with spinal fractures; a technique for dividing the vestibular nerve in Ménière's disease; and a long-term analysis of the results of frontal lobotomy. These contributions are recorded in his published papers, but his greatest influence was as a master surgeon and an exemplary teacher.

WILLIAM FEINDEL

McKenzie, Robert Tait, educator, sculptor, orthopedic surgeon, author (b at Almonte, Canada W 26 May 1867; d at Philadelphia, Pa 28 Apr 1938). He was a student at McGill 1885-92, and became well-known for rehabilitative methods he developed as a medical officer during WWI. He later joined McGill as a lecturer in anatomy and a gymnastics instructor. He became equally famous for his sculpture. His early models — *Violent Effort, Breathlessness, Fatigue* and *Exhaustion* — were praised by artistic and scientific authorities; his statuette *The Sprinter* graced US President Theodore Roosevelt's desk at the White House. Among McKenzie's later works were *The Joy of Effort, Brothers of the Wind,* numerous medallions and many statues and war memorials throughout Great Britain, Canada and the US. He restored the Mill of Kintail outside Almonte, and the mill's museum contains more than 70 of his works. He was director of physical education at the U of Pennsylvania 1904-30.

GERALD REDMOND

MacKenzie, Roderick Andrew Francis, priest, scholar (b at Liverpool, Eng 15 Nov 1911). He came to Peterborough, Ont, with his family in 1924, then entered the Society of Jesus at Guelph, Ont, in 1928. After several years' study and teaching, he was ordained in Montréal in 1941. He completed doctoral work in sacred scripture at the Pontifical Biblical Institute, Rome, 1946-49. From 1950 to 1963 he taught Old Testament studies at Regis College, Toronto. He was rector of the Pontifical Biblical Institute 1963-69, and continued as professor there until 1975. During that time he was *peritus* (consultant) at Vatican Council II and was a member of the council on the liturgy and of the commission for a new version of the Latin Bible. He returned to Regis College in 1975. Among his many activities he has been president of the International Organization for Old Testament Studies (1965-68), associate editor of the *Catholic Biblical Quarterly* (1952-63) and consultant for the *New Catholic Encyclopaedia* (1961-63). In addition to numerous articles, reviews and commentaries, he has written *Introduction to the New Testament* (1961), *Faith and History in the Old Testament* (1963), *The Psalms: A Selection* (1966) and *Sirach* (1983).

D.M. STANLEY, S.J.

Mackenzie, Sir William, railway entrepreneur (b in Eldon Twp, Peterborough County, Canada W 17 or 30 Oct 1849; d at Toronto 5 Dec 1923). Though he was both a leader and local politician, his chief interest was business. He was a gristmill and sawmill owner in his native Kirkfield, Ont, and then a railway contractor 1874-91 in Ontario, BC, Maine and the North-West Territories. In 1891 he became part owner of the Toronto Street Ry, the first of many such investments on 3 continents. In 1899 he helped found a company later called Brazilian Traction. With Donald MANN, in 1895 Mackenzie had begun to assemble prairie railway lines and charters that would form the nucleus of the CANADIAN NORTHERN RY Completed in 1915 from Halifax to Victoria, it was one of 3 Canadian transcontinental railways. In 1911 both Mackenzie and Mann were knighted. National and personal economic difficulties resulted in the nationalization of the Canadian Northern in 1918. Eventually, with the Grand Trunk and Intercolonial railways, it became part of the CANADIAN NATIONAL RAILWAYS system. Mackenzie's career personifies the optimism and energy of the Canadian economic boom, 1896 to 1913.

R.B. FLEMING

Reading: H.V. Nelles, *The Politics of Development* (1974); T.D. Regehr, *The Canadian Northern Railway* (1976); G. Stevens, *History of the Canadian National Railways* (1973).

Mackenzie, William Lyon, journalist, politician (b at Dundee, Scot 12 Mar 1795; d at Toronto 28 Aug 1861). Mackenzie, as journalist, MLA, first mayor of Toronto and a leader of the REBELLIONS OF 1837, was a central figure in pre-Confederation political life. He arrived in UPPER CANADA in 1820 and, after a few years in business at Dundas, moved to Queenston. In May 1824 he published the first issue of the *Colonial Advocate,* which immediately became a leading voice of the new Reform movement.

To be closer to the provincial Parliament, Mackenzie moved his operation to York [Toronto] in the fall of 1824. His forthright and forceful manner together with his ardent denunciation of the FAMILY COMPACT contributed much to his popularity, and in 1828 he was easily elected to the House of Assembly for York County. In 1832 he visited England to present his political supporters' grievances before the imperial government. The sympathetic hearing he received outraged Upper Canadian conservatives. Moreover, Mackenzie's venomous attacks on the local oligarchy brought reprisals in the form of libel suits, threats and physical assaults, as well as an attack on his printing office, which left his press wrecked and the type thrown into the lake.

The diminutive Scot's scathing attacks on his opponents also led to his repeated expulsion from the Assembly, although he was consistently re-elected by his rural constituents. In 1834, when the Reformers won a majority on the newly created Toronto City Council, he was elected its first mayor. At the end of 1834, he was elected to the provincial Parliament again. However, he was defeated at the polls in 1836, and in Dec 1837 an embittered Mackenzie led an abortive armed revolt. With the rebellion's collapse, he escaped to the US, where he continued to work for the "liberation of Upper Canadians" until he was jailed for breach of the neutrality laws. He spent the next 10 years in exile in the US, eventually finding employment as a correspondent for the *New York Daily Tribune.*

During exile he wrote several books, includ-



William Lyon Mackenzie, fiery journalist who in Dec 1837 led an abortive armed revolt against the Upper Canadian establishment (*courtesy Public Archives of Canada/ C-1993*).

ing *The Sons of the Emerald Isle* (1844), *The Lives and Opinions of Benjamin Franklin Butler and Jesse Hoyt* (1845) and *The Life and Times of Martin Van Buren* (1846). Mackenzie returned to Canada in 1849 following a government pardon. Undaunted, he quickly resumed both his journalistic and his political careers, serving with characteristic energy as MLA for Haldimand until retirement in 1857 and occasionally publishing a political squib usually entitled *Mackenzie's Weekly Message*. The fiery and principled Scot died at his home on Bond St, now one of Toronto's historic sites and museums. VICTOR L. RUSSELL

Reading: D. Flint, *William Lyon Mackenzie* (1971); Victor L. Russell, *The Mayors of Toronto, 1834-1899* (1982).

Mackenzie-Grease Trail extends approximately 320 km in the QUESNEL-Bella Coola region of central BC. In 1982, under an agreement between the BC and federal governments, it became a designated and protected historical-trail corridor. The trail is nationally significant because it formed a final link in the crossing of N America. Alexander MACKENZIE followed it in 1793 in his search for the Pacific. For several hundred years previously, the trail was a main trade route of several Indian tribes including the Bella Coola, the Chilcotin and the CARRIER. The name "grease" originated from the processed oil of the oolichan, a smelt-like fish, which was a principal trading item of the Bella Coola tribe. Much of the trail is in its original condition; it comprises back-country roads, horse trails and hiking routes. Under the government agreement, the trail will be upgraded so that its unique history can be shared by hikers of today. BART DEEG

Mackenzie Inuit aboriginally occupied the western Canadian arctic coast from Barter I in the W to Cape Bathurst in the E, as well as the northern portion of the Mackenzie R Delta. Numbering about 2000 during the 19th century, they formed the densest Inuit population in arctic Canada. They were divided into 5 regional groups of 200-1000, each with a way of life adapted to the resources of its own area. The group W of the Mackenzie R spent the summer fishing and hunting caribou, and the winter sealing; those at Cape Bathurst in the E hunted the large bowhead whale during the summer and seals during the winter. The largest group lived in the Mackenzie Delta, centered at the village of Kittigazuit at the mouth of the main river channel. Here, people gathered during the summer to hunt beluga feeding in the shallow estuary. The area was a natural trap for beluga, which were driven upstream onto shoals by groups of up to 200 hunters in kayaks; a single hunt might kill several hundred small whales, providing food and fuel for winter use. The remainder of the year was spent in fishing, hunting caribou and sealing. During winter the people moved to smaller settlements of a few houses each. Winter houses were built of driftwood logs, heavily banked with turf insulation, heated and lighted by stone or pottery lamps burning whale oil, and each accommodated about 6 families. Social organization was family-based; most marriages were monogamous, although polygamy was practised by wealthy individuals. Families or individuals owned such items as houses, tents, KAYAKS and UMIAKS. There is some evidence that the regional groups had hereditary chiefs, with the office passed through the male line. Little is known about the aboriginal religion, but it was based on shamanism, and important religious festivities occurred when the population gathered during the period of total darkness in December.

Archaeology indicates that the ancestors of the Mackenzie Inuit have lived in the area for approx 1000 years, having derived from a Thule population that moved eastward from Alaska about 1000 AD. Through the following centuries they maintained trading and cultural ties with the Alaskan Inuit to the W, and were the most easterly group to share in the relatively rich Alaskan Inuit way of life. The Mackenzie Inuit became involved in the European FUR TRADE during the 19th century, at first by indirect trade with the Russian posts in Alaska and later with posts established in the Mackenzie Delta. During the late 19th century they became heavily involved with the American whalers who began to hunt and winter in the area. Because of a series of epidemic diseases, their population had been reduced to less than 10% of aboriginal levels by 1900, and their territory had been taken over by Alaskan Inuit and Europeans who moved into the area as trappers. The descendants of the Mackenzie Inuit now live in the communities of Inuvik, Tuktoyaktuk and Paulatuk, where they form a minority of the local Inuit populations. *See also* NATIVE PEOPLE: ARCTIC. ROBERT McGHEE

Reading: R. McGhee, *Beluga Hunters* (1974); Nuligak, *I, Nuligak*, trans M. Metayer (1966).

Mackenzie King Island, 5048 km^2, is one of the central islands in the QUEEN ELIZABETH IS of the Arctic Archipelago. Low-lying, with only occasional points over 300 m, it consists of lowlands and plateaus developed on horizontal or gently folded sedimentary rocks. The general absence of resistant strata is responsible for the lack of salient features. Only on harder sandstone do more prominent landforms, like the Leffingwell Crags, develop. Material at the surface, being derived from the fine-grained underlying bedrock, is particularly susceptible to solifluction; and Mackenzie King I has some of the best examples of this process in the Arctic. In 1915, mistaking a strait for a bay, STEFANSSON mapped Borden and Mackenzie King islands as one — an error uncorrected until a 1947 RCAF aerial survey. DOUG FINLAYSON

Mackenzie Mountains Named after PM Alexander MACKENZIE, they are a northern continuation, 800 km long, of the eastern system of the ROCKY MTS, composed almost entirely of folded sedimentary strata. They consist of several ranges trending in a NW-SE orientation, straddling the greater part of the NWT-Yukon boundary. The main core, the Backbone Ranges, is a mass of peaks and ridges reaching a maximum height, in Mt Sir James MacBrien, of 2764 m, the highest peak in the NWT. The Mackenzie Mts lie in the precipitation shadow of the SELWYN MTS farther W and are relatively dry. The timberline is low, leaving their slopes bare and rock covered. DOUG FINLAYSON

Mackenzie-Papineau Battalion, collective designation for some 1300 Canadian volunteers who served in International Brigades recruited to assist the communist-supported Republican government against Franco's Fascists during the Spanish Civil War (July 1936-Mar 1939). There was also an actual battalion, named after the leaders of the REBELLIONS OF 1837, mustered into the XVth "English-Speaking" International Brigade on 1 July 1937, in Albacete, Spain. Other Canadians joined the Abraham Lincoln Battalion, the British Battalion, and other units, including medical and transportation detachments. Dr Norman BETHUNE, undoubtedly the most famous Canadian there, created and led a blood transfusion service.

The "Mac-Paps" fought in 5 major campaigns, including the assault on Fuentes de Ebro on 13 Oct 1937, the defence of Teruel in Dec-Jan, the "Retreats" in Mar-Apr 1938, and a counterattack across the Ebro R in the last summer of the war. The battalion was led by Edward Cecil-Smith, the military commander and a Toronto labour journalist, and Saul Wellman, a New York union organizer and the unit's political commissar. When the Mac-Paps withdrew from the conflict in Sept 1938, it is said, only 35 men were left on their feet. Although celebrated by well-wishers on their arrival home in early 1939, the survivors, half the original number, received no official welcome. In Apr 1937 the Canadian government had passed the Foreign Enlistment Act, outlawing participation by Canadians in foreign wars, and the Customs Act, which provided for government control over arms exports. The Mac-Paps were an official embarrassment, and so languished in obscurity until the 1970s when a number of books, films and plays appeared to document their history. VICTOR HOWARD

Reading: V. Hoar, *The Mackenzie-Papineau Battalion* (1969).

Mackenzie River, 4241 km long (to head of the Finlay R), next to the Mississippi R the longest river in N America. Its total DRAINAGE BASIN of 1.7 million km^2 is the largest of any river in Canada and its mean discharge of 9910 m^3/s is second only to that of the St Lawrence. The river's peak discharge occurs in June, but its flow is generally uniform because of the flat barren lands E of the river and the many large lakes in the system. The lakes and rivers of the Mackenzie and its tributaries are open from mid-June to Nov 1 in the northerly areas.

The river's sparsely populated basin is one of the few great unspoiled areas of the world. The main headwaters are the Peace R and the ATHABASCA R, while the main stream issues from the shallow swamps and mudbanks of the West Arm of GREAT SLAVE LK. It flows W to Ft Providence and Head-of-the-Line, where scows, canoes and YORK BOATS were hauled upstream. At FT SIMPSON the turbulent LIARD R pours its muddy waters into the S bank. Near the N Nahanni R the Mackenzie trends WNW through a rolling plain and deflects N past an escarpment of the Mackenzie Mt range, which lies parallel to the river. The Redstone and Keele rivers and other streams cut through the mountains and pour into the lowlands through deep canyons. At FT NORMAN the clear, cobalt waters of Great Bear R enter over a shallow gravel bar. Past NORMAN WELLS the Mackenzie continues through weedy channels and beneath ribbed cliffs, widening to 5 km, its path braided among countless islands. At Sans Sault Rapids a rocky promontory juts into midstream, and rough water endangers navigation. Past Ft Good Hope the river widens and constricts again, between limestone cliffs called The Ramparts, then resumes its meandering NW, its channels clogged with islands and shifting sandbars. The Arctic Red R enters 270 kms from the sea, and at Point Separation the delta begins.

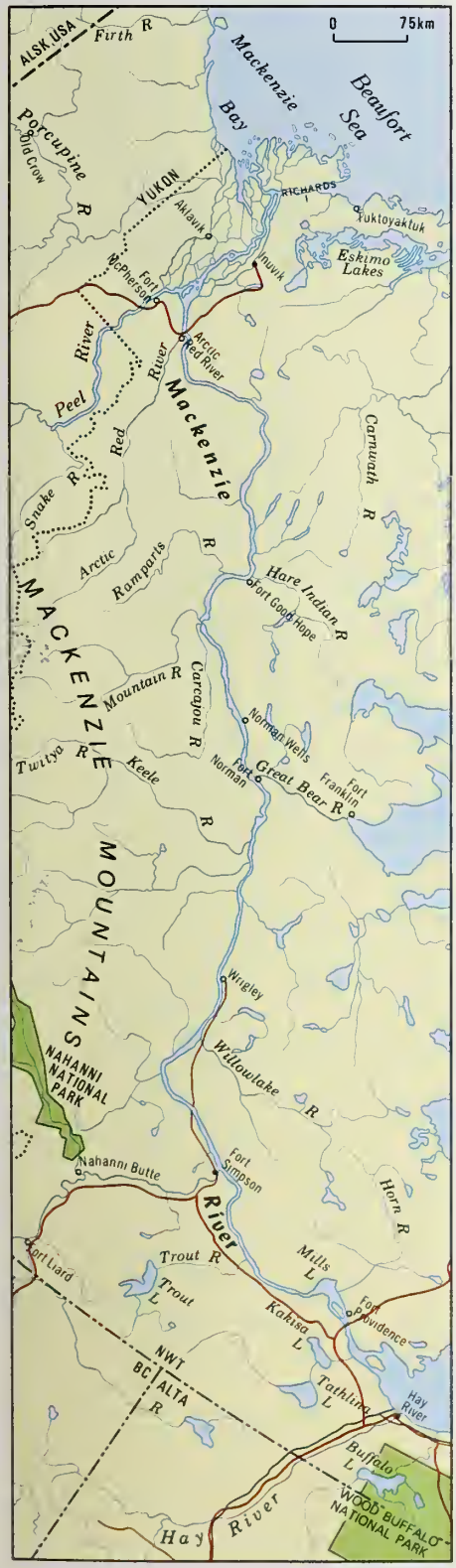
Delta The Mackenzie Delta is a vast fan of low-lying alluvial islands, covered with willow and alder, thinning northward. It is a maze of channels, cutoff lakes and circular ponds,



The Mackenzie Delta, a vast fan of low-lying alluvial islands, and a maze of channels, cutoff lakes and circular ponds (*photo by John deVisser*).

which are home to a large muskrat population. The delta is 160 km across, bordered by the Richardson Mtns in the W and the Caribou Hills in the E. Below Point Separation the river splits into 3 main, navigable channels: East Channel, which flows past AKLAVIK; Peel Channel in the W; and Middle Channel, which carries the main outflow into the BEAUFORT SEA. TUKTOYAKTUK, NE of the delta, is the transfer point for river and ocean cargo, its harbour open from July to late Sept.

Lowland The Mackenzie R Lowland is a great northward extension of the central plains. On the W side rise the Mackenzie Mts, and on the eastern edge lie the rocky outcrops of the Canadian SHIELD. The valley is underlain by sedimentary rock, but its surface is mostly glacial gravel, sand and clay. The plains of MUSKEG are broken by stunted spruce and fir, bog, swamp and lakes. Much of the terrain is underlain by PERMAFROST, which presents a challenge to construction of buildings and transportation.





History In 1778 Peter POND traversed Methye Portage [PORTAGE LA LOCHE], connecting the FUR-TRADE ROUTES of Hudson Bay with the Mackenzie Basin. Alexander MACKENZIE came in 1789, following the full length of the river aptly named for him. Other traders followed, establishing posts along the way. From the 1820s supplies were carried by York boats. The first steamer plied the Athabasca R in 1884, and in 1886 operated N of Ft Smith. From 1920 to 1940 flat-bottomed stern-wheelers plied the river, but after 1945 they were replaced by tugs and barges. The tugs are now equipped with radar and depth sounders.

The lowland is still sparsely populated. The fur-trade economy dominated until the mining rushes of YELLOWKNIFE and GREAT BEAR LK and the Canol Project of WWII. Fur remains important to the local residents, but mining became dominant until the recession of the 1980s. Most mining was concentrated in the E, in the Shield. The key centres are Yellowknife (gold), Echo Bay — formerly Port Radium — (uranium), Uranium City, Flat R (tungsten), Pine Point (lead-zinc), Norman Wells (oil and gas) and Faro. Great potential for future development lies as the S end in the Athabasca tar sands and at the N in the Beaufort Sea. The fine clay soil would support agriculture, but climate prevents it. The only waterpower sites are on the Snare and Talston rivers, supplying local power, but controversial development is under way on the Slave R. The river and the delicate environment of the NORTH were brought to the national consciousness during the debate over the MACKENZIE VALLEY PIPELINE.

JAMES MARSH

Mackenzie Valley Pipeline, proposed PIPELINE for the transport of natural gas and later oil from the Arctic Ocean to Alberta. The proposal of a pipeline corridor from the NORTH was put forward by the federal government in the 1970 Pipeline Guidelines and provoked a spate of engineering and environmental studies, public-policy reviews and economic analyses unequalled in Canadian history.

Detailed proposals were promulgated by 2 consortiums. Canadian Arctic Gas Pipeline Ltd, composed of 27 Canadian and American producers (including Exxon, Gulf, Shell and TRANSCANADA PIPELINES), proposed a route from the Prudhoe fields in Alaska, across the northern Yukon to the Mackenzie Delta and then S to Alberta. Foothills Pipe Line Ltd, formed by Alberta Gas Trunk Line and West Coast Transmissions, proposed a shorter route from the Mackenzie Delta to Alberta. The Arctic Gas pipeline would have been the longest in the world (3860 km) and the greatest construction enterprise ever undertaken. In either case, the engineering problems of building a pipeline over PERMAFROST were monumental (both proposals entailed refrigerating the gas) and the impact on the North would have been significant.

A federal ROYAL COMMISSION, led by Judge Thomas BERGER, was appointed in 1974 to consider the proposals and their social and economic impact on the North. The commissioners held community hearings across the North, dealing with the concerns of native people and environmentalists. The commission concluded that a pipeline from the Mackenzie Delta to Alberta was feasible, but should proceed only after fur-

ther study and planning and after settlement of native LAND CLAIMS. However, the commission was adamantly opposed to the building of a line across the delicate environment of the northern Yukon. Amid controversy and uncertain economic conditions, both plans were shelved.The commission itself became a *cause célèbre* because of its broad interpretation of its mandate and its illumination of the complex problems facing northern development. JAMES MARSH

Reading: Minister of Supply and Services, *Northern Frontier, Northern Homeland*, Report of the Mackenzie Valley Pipeline Inquiry 1 (1977); P.H. Pearse, *The Mackenzie Pipeline* (1974).

Mackerel (Scombridae), family of pelagic (open-sea) FISHES of class Osteichthyes. The family also includes TUNAS, albacores, skipjacks, bonitos and ceras. The name mackerel, more commonly used for members of genus *Scomber*, is also applied to fishes of genus *Auxis* (bullet and frigate mackerels), genus *Scomberomorus* (Spanish mackerels) and family Gempylidae (snake mackerels). Three species of true mackerels, genus *Scomber*, occur in the temperate waters of the Atlantic and Pacific oceans. Two of these occur in Canada's coastal waters: in the Atlantic, the chub and Atlantic mackerels; in the Pacific, the chub mackerel. The Atlantic mackerel is an elongate, streamlined fish, resembling a miniature tuna. Few exceed 52 cm in length. Located behind the widely spaced dorsal fins and the anal fin are 5 small finlets on the dorsal and ventral surfaces. The chub mackerel (*S. japonicus*) resembles the Atlantic mackerel but is smaller. Swiftly swimming mackerel form huge schools in surface waters off coasts facing the open sea. They are highly migratory: those in Canadian Atlantic waters move inshore and northward along the coast as far as Labrador in summer; southward and offshore in late fall. This population is thought to overwinter in deep waters between Sable I and Cape Cod. In Canadian waters, spawning occurs from late May to July. An average-sized female may produce up to 500 thousand buoyant eggs. Mackerel feed primarily on PLANKTON, eating a wide variety of small organisms. The chub mackerel supports a fishery in California waters but not in Canadian. Atlantic mackerel is an important food fish on both sides of the Atlantic and is used fresh, frozen, smoked and salted. In Canadian waters, it is fished commercially from the Bay of Fundy to Labrador, primarily by purse seines, but also by weirs and trap nets. Mackerel are also prized by anglers, particularly in US waters. W.B. SCOTT



The Atlantic mackerel (*Scomber scombrus*) is fished commercially from the Bay of Fundy to Labrador (*courtesy National Museums of Canada/National Museum of Natural Sciences*).

Mackieson, John, physician, office-holder (b at Campsie, Scot 16 Oct 1795; d at Charlottetown 27 Aug 1885). A pioneer of the PEI medical profession, Mackieson was most distinguished by his work with the insane. A physician when he arrived in PEI in 1821, he served in a number of public-health posts before being appointed medical superintendent of the PEI lunatic asylum in 1848. His treatment of patients exhibited humanity and an understanding of new techniques, but persistent underfunding caused conditions to deteriorate at the hospital and ultimately his administration was denounced. Forced to resign in 1874, Mackieson was nevertheless cleared of charges of neglect. Subsequently the improved facilities he had sought were built. P.E. RIDER

Mackinaw Boat, a strong flat-bottomed boat, pointed at each end and with a hold in the middle, was used by fur traders during the French regime for running downstream. It was later adapted for open water by the addition of 2 sails and a steering oar. By the 1870s a distinctive type, 6.7 m to 8.7 m long and schooner rigged, had evolved in the Strait of Mackinaw, and gave its name to the vessel. A further development called the Collingwood skiff was widely used throughout GEORGIAN BAY for gillnetting and pleasure sailing until the advent of the outboard motor. JAMES MARSH

McKinney, Louise, née Crummy, women's rights activist, legislator (b at Frankville, Ont 22 Sept 1868; d at Claresholm, Alta 10 July 1931). McKinney achieved national renown as one of the 5 appellants, the "Famous Five," in the PERSONS CASE. Her ambition was to become a doctor. She became a teacher instead, leaving that work to organize for the WOMAN'S CHRISTIAN TEMPERANCE UNION. In 1903 she helped organize its North-West Territories branch, remaining president of its successor, the Alberta and Saskatchewan Union, for 20 years. A Methodist Sunday school teacher, she urged that TEMPERANCE education be introduced into schools, and she was a strong proponent of women's rights. McKinney brought her convictions to the Alberta legislature in 1917, where she also urged social-welfare measures for immigrants and widows. ELIANE LESLAU SILVERMAN

McLachlan, Alexander, farmer, poet (b at Johnstone, Scot 12 Aug 1818; d at Orangeville, Ont 20 Mar 1896). He immigrated to Upper Canada in 1840 and spent most of his life farming in western Ontario. It was his poetry, however, that brought him fame; he was known as the "Robert Burns of Canada." He published 5 volumes of poetry, much of which focused on such Canadian themes as the courage of the settlers, their way of life, and the beauty of the Canadian landscape. He was part of the first wave of self-conscious nationalism that swept Canadian literature after Confederation. THOMAS B. VINCENT

McLachlan, James Bryson, labour leader (b at Ecclefechan, Scot 9 Feb 1869; d at Glace Bay, NS 3 Nov 1937). Born into a family of cotton weavers and farm labourers, McLachlan graduated from the Lanarkshire coalfields to become the fiery leader of the Nova Scotia coal miners and a popular spokesman for labour radicalism in Canada. Influenced by social critics such as Thomas Carlyle and labour leaders such as Keir Hardie, McLachlan believed it was the mission of the working class to "redeem the world from the chaos of capitalism." Immigrating to Cape Breton in 1902, McLachlan challenged the conservative policies of the Provincial Workmen's Association, and was elected secretary-treasurer of District 26, United Mine Workers of America, on its formation in 1909. Blacklisted from the mines, McLachlan was instrumental in the achievement of collective bargaining in the Nova Scotia coal industry during WWI. In the strikes of the 1920s he was known for his imaginative tactics, including the "strike on the job" and the "100 per cent strike." Never defeated in a union election, McLachlan remained an officer of the miners' union until July 1923, when he was removed by UMW president John L. Lewis for promoting a sympathetic strike in support of Sydney steelworkers. Convicted of seditious libel in Oct 1923, he was sentenced to 2 years in Dorchester penitentiary but was released in Mar 1924. He returned home to become editor of the *Maritime Labor Herald*, which he had helped establish in 1921, and later edited the *Nova Scotia Miner* (1929-35). He belonged in turn to the Socialist Party of Canada, the Independent Labour Party of Nova Scotia and the Communist Party of Canada, running 6 times for the provincial and federal parliaments and polling almost 9000 votes at the peak of his influence in 1921. Nationally he was prominent as president of the Workers' Unity League, 1930-36. McLachlan was known for his fierce dedication to the workers' cause, and his "economic gospel," borrowed from Isaiah, is inscribed at his grave: "Open thy mouth, judge righteously, and plead the cause of the poor and needy." DAVID FRANK



J.B. McLachlan, fiery leader of the Nova Scotia coal miners and popular spokesman for Canadian labour radicalism (*courtesy David Frank*).

MacLaren, Donald Roderick, fighter pilot, businessman (b at Ottawa 28 May 1893). MacLaren joined the RFC in 1917, served in 46 Squadron in France, and was credited with 54 "kills" (48 aircraft and 6 balloons) in less than 8 months, an unparalleled record. He was briefly director of air services for the CAF, but left in 1919 to enter commercial aviation. From 1945 until his retirement in 1958, he was executive assistant to the president of Trans-Canada Airlines. BRERETON GREENHOUS

McLaren, Norman, director of animated films (b at Stirling, Scot 11 Apr 1914). He followed John GRIERSON to the NATIONAL FILM BOARD in 1941 and remained there, except for 2 UNESCO missions (to China in 1949 and to India in 1952). He participated in the series *Chants populaires* (1944-46) and produced *Begone Dull Care*, set to the music of Oscar PETERSON (1949). Constantly innovative, McLaren tried techniques such as drawings scratched directly on film, cutout animation, painting directly on film, etc. During the COLD WAR in 1952, using a technique of stop-motion cinematography called pixilation, he made *Neighbours*, a political fable on the futility of using violence to resolve conflict. After this — his ultimate ideological statement — his films concentrated more on aesthetics and technique than on content. His work earned him increasing international recognition, and for over 30 years he produced roughly one film per year. Some of the more interesting examples are *Blinkity Blank* (1954), the didactic *Rythmetic* (1956), the absurd humour of *Il était une chaise* (1957) and the fantasy of *Le Merle* (1958). Many of his films were co-directed by Evelyn Lambart. In *Lines Vertical* (1960), *Lines Horizontal* (1962) and *Mosaic* (1965), he opted for an austere, abstract style and exercises in which technology took precedence. He began a series of films about ballet and the beauty and harmony of movement with *Pas de*

deux (1967); it was followed by *Ballet Adagio* (1972) and *Narcissus* (1983). He also produced more didactic films on the art of animation, such as *L'Écran d'épingles* (1973) and *Animated Motion* (1977). McLaren's creative genius has made him Canada's leading director of animated film. PIERRE VÉRONNEAU

McLarnin, Jimmy, boxer (b at Belfast, Ire 19 Dec 1907). McLarnin moved at age 3 to Vancouver and started boxing at 12. As a 16-year-old pro in 1923-24 he went undefeated in 19 bouts. He started boxing regularly in Los Angeles, then moved to New York where he was called the "Irish Hero." He won the world welterweight championship in 1933 by knocking out "Young" Corbett III at 2:37 of the first round. His most famous fights were with world-renowned Barney Ross. He lost his title to Ross in 1934, won it back the same year, then lost again in 1935. He retired in 1936. In 77 fights he won 63 (knocking out 20), lost 11 and drew 3 A.J. "SANDY" YOUNG

McLauchlan, Murray, singer, songwriter, guitarist (b at Paisley, Scot 30 June 1948). McLauchlan came to Canada at age 5. At 17 he was making the rounds of Toronto's Yorkville coffee houses and in 1966 first appeared at the Mariposa Folk Festival. American singer Tom Rush recorded 2 of his songs in 1968, "Child's Song" and "Old Man's Song." In 1971 he started recording for True North Records and in 1972 his "Farmer's Song" established him across Canada as a popular singer with both folk and country audiences. With the formation of his band, The Silver Tractors (1975), he attempted to shift his music more towards rock, but the move did not pay off as international success continued to elude him and his popularity in Canada waned. In 1983 he returned to his folk and country roots, and to commercial success, with the album *Timberline,* and also produced a critically acclaimed series for CBC Radio. McLauchlan won Juno awards in 1973, 1976, 1977 and 1979. RICHARD GREEN

McLaughlin, Isabel, painter (b at Oshawa, Ont 10 Oct 1903). An important early modernist in Canada, she is preoccupied with design, bright colour and the study of tangible space, and her paintings are highly subjective. Her friends and mentors have included Arthur LISMER; painter Yvonne McKague Housser, with whom she studied at the Ontario College of Art; Lawren HARRIS; and A.Y. JACKSON She studied in Paris in 1929 and Vienna in 1930, with Emil Bisttram in 1938, and twice with Hans Hofmann in the period 1947-52. Her development has been characterized by constant self-renewal and by an awareness of her own roots. Her *Tree* (1935) received notoriety in the press and the respect of peers such as Pegi Nicol MACLEOD. In 1939 McLaughlin was elected president of the Canadian Group of Painters, the first woman to head an important Canadian art society. JOAN MURRAY

McLaughlin, Robert Samuel, industrialist (b at Enniskillen, Ont 8 Sept 1871; d at Oshawa 6 Jan 1972). After a 3-year apprenticeship in the carriage business owned by his father, Robert McLaughlin, and work in similar establishments in New York, McLaughlin entered into partnership with his father and brother George in the McLaughlin Carriage Works, Oshawa (1892). When fire destroyed the company's Oshawa factory (1899), 15 municipalities offered financial assistance for relocation near them, but the company stayed in Oshawa, in return for a $50 000 loan repayable "as convenient." In 1908 McLaughlin began producing Buick car bodies for William Durant, owner of the Buick Motor Car Co in Flint, Michigan. When Durant moved on to Chevrolets, McLaughlin began producing them too (1915). The business was purchased by General Motors in 1918, and incorporated as GENERAL MOTORS OF CANADA, with McLaughlin as president. He also served as VP of the American parent. By the mid-1920s, the Oshawa plant had 3000 employees and produced more cars for the Canadian and Commonwealth market than the rest of the country combined. McLaughlin retired from active management of the company in 1942, becoming chairman of the board, a position he held until 1967. In recognition of his support for Canadian educational and medical facilities, including the McLaughlin Planetarium in Toronto, and his work in the Boy Scout movement, McLaughlin received honorary degrees from several Ontario universities. He was named a companion of the Order of Canada in 1967. MARGARET E. MCCALLUM

McLaughlin, Samuel, photographer, publisher, watchmaker (b in Ire 28 Jan 1826; d at Los Angeles, Calif 26 Aug 1914). McLaughlin issued Canada's first publication of photographs — *The Photographic Portfolio* (1858-60), a series of his views in and around Québec City. He also published Québec City directories 1854-57 and had been a watch and chronometer maker in that city. In 1861 he became the first official photographer for the PROVINCE OF CANADA. He provided impressive documentation of many Canadian public-works projects, including the initial construction and development of the Parliament Buildings, Ottawa. RICHARD J. HUYDA

McLean, James Stanley, meat packer, philanthropist (b in Clark Twp, Durham County, Ont 1 May 1876; d at Toronto 1 Sept 1954). A graduate of U of Toronto (1896), McLean became a clerk at the Harris Abattoir Co, Toronto, in 1901. The president, Joseph FLAVELLE, taught him the importance of careful accounting and, as president himself in the 1920s, McLean, through cost cutting and weekly budgeting, made profits for his company when other Canadian meat packers lost money. In 1927 he merged Harris and 3 other firms into CANADA PACKERS LTD, and was president until 1954. Under his autocratic leadership, Canada Packers dominated the industry and developed numerous by-products. A member of the United Church and a patron of Canadian art, McLean endowed the J.S. McLean Junior Farmer Scholarship and made generous donations to hospitals. JOSEPH LINDSEY

McLean, John, fur trader, explorer (b at Dervaig, Scot 24 July 1798; d at Victoria, 8 Mar 1890). In charge of HBC trade at Ft Chimo [Qué] 1837-43, he searched relentlessly for an overland route to Ft Smith [NORTH WEST RIVER], on Hamilton Inlet. In 1839, he ascended the George R, travelled overland to Petitsikapau Lk, moved SE to the CHURCHILL R, and was the first European to see CHURCHILL FALLS. In 1841, he found a route into the interior, circumventing the falls. McLean did not receive the promotion he thought he deserved, and resigned after a stint at FT SIMPSON (1846). He managed a bank in Guelph, Canada W, for 9 years, but his career ended when he took responsibility for the loss of £1300 from his branch. By 1857 he was in Elora, where he was clerk of division court for 25 years. McLean published *Notes of a Twenty-Five Years' Service in the Hudson's Bay Territory* (1849), a valuable account of the FUR TRADE. JAMES MARSH

MacLean, John Angus, farmer, politician, premier of PEI (b at Lewes, PEI 15 May 1914). After serving in WWII, MacLean returned to PEI and contested unsuccessfully the federal elections of 1945 and 1948. First elected in 1951, he served for more than 2 decades as MP for Queens County, then left federal politics to lead the provincial Conservatives to victory in 1979. Stressing the virtues of rural community life, his government banned new shopping malls and cancelled participation in New Brunswick's Point Lepreau nuclear reactor project. MacLean resigned as premier on 17 Nov 1981 but continued to sit in the Assembly. DAVID A. MILNE

Maclean, John Bayne, publishing executive (b at Crieff, Canada W 26 Sept 1862; d at Toronto 25 Sept 1950). Maclean (who also spelled his name McLean and MacLean) was a journalist on various conservative Toronto newspapers before founding *Canadian Grocer* (1887) — the first of an array of trade magazines under the corporate name Maclean Hunter. (Horace Talmage Hunter was his partner and successor as company president.) Such magazines allowed him to found more general publications such as the FINANCIAL POST (1907) and CHATELAINE (1928). Best known is MACLEAN'S (1911-, successor to *Busy Man's Magazine* bought by Maclean in 1905); it was a fortnightly until 1969 and a monthly until 1977, when it became a weekly newsmagazine. DOUG FETHERLING

Reading: F.S. Chalmers, *A Gentleman of the Press* (1969).

MacLean, John Duncan, politician, premier of BC (b at Culloden, PEI 8 Dec 1873; d at Ottawa 28 Mar 1948). He taught in prairie schools and in BC and became a principal in Rossland, BC, before going to McGill. He graduated with a medical degree in 1905 and was practising in Greenwood, BC, when elected a Liberal MLA in 1916. Appointed provincial secretary and minister of education, he became minister of finance in 1924. When John OLIVER's failing health became known to his party in 1927, MacLean was made leader designate and, on Oliver's death, became premier, serving for one year. Though a competent Cabinet minister, he was an unimaginative, colourless premier who took office when his party's fortunes were on the wane. The Liberals were defeated by the Conservatives in the 1928 election. After an unsuccessful bid for a federal seat, MacLean was appointed chairman of the Canadian Farm Loan Board in Ottawa and held the post until his death. ROBIN FISHER

McLean Gang, BC outlaws (*fl* 1879). Consisting of Allan, Charlie and Archie McLean and Alex Hare (all 4 of mixed blood), the gang lived by banditry and violence. On 8 Dec 1879 they killed John Tannatt Ussher, a Kamloops policeman who was arresting them for horse theft, and James Kelly, a shepherd. A posse trapped them in a cabin near Douglas Lk and after a short siege the gang surrendered. At the time Allan was 24, Charlie and Alex 17, and Archie 15. Tried in New Westminster, they were executed in a group hanging on 31 Jan 1881. EDWARD BUTTS

Maclean Hunter Limited is a diversified communications company, with assets in 1983 totalling $712 million and revenues of $634 million. As the largest publisher of national MAGAZINES and periodicals in Canada, its list includes the FINANCIAL POST (newspaper and magazine), *Flare* and English/French editions of CHATELAINE and MACLEAN'S, and in French, CHÂTELAINE and *L'ACTUALITÉ*. The company publishes over 80 Canadian special-interest, consumer and business magazines, directories and manuals, as well as business periodicals in the US and Europe. It has a controlling interest in Toronto Sun Publishing Corporation, publishers of the *Toronto Sun, Edmonton Sun, Calgary Sun* and *Houston Post.*

Maclean Hunter's broadcasting holdings include the CTV affiliate CFCN-TV in Calgary and Lethbridge and 11 radio stations located in Calgary, Edmonton, Toronto, Kitchener-Waterloo, Chatham-Wallaceburg (Ont), Ottawa and Halifax. As Canada's second-largest CABLE-TELEVISION operator, Maclean Hunter in 1983 provided service to 362 000 subscribers in 20 Ontario

municipalities through its 16 cable systems, and to 232 000 subscribers in the US. Other interests include book distribution, commercial printing, business forms, trade shows and specialized information services. PETER S. ANDERSON

Maclean's was acquired by John Bayne MACLEAN in 1905 and was the first consumer magazine to be published by him. It had existed for several years under various titles and continued to have name changes until 1911, when it officially became *Maclean's*. Initially, the new magazine was a general-interest digest for businessmen, ordinarily devoting most of its space to reprints of articles from the world's periodicals. By 1914, however, Maclean and his editor, T.B. COSTAIN, saw that Canadian NATIONALISM might be a profitable line, and by the boom years of the 1920s *Maclean's* had its formula. There were always articles on Canadian men and women, Canadian politics and problems, Canadian fiction, and regular features at the "back of the book." Occasionally, as when George DREW denounced the arms manufacturers, there was a crusading air, but ordinarily the magazine was firmly middlebrow.

The high point was the early 1950s. Blair FRASER was the Ottawa correspondent, and his regular column presented the best grade of political gossip while his longer pieces were the decade's best political reporting. In Toronto, editor Ralph ALLEN tried for a liberal mix of thoughtful and light pieces, good illustration and occasional fiction. The magazine was successful in circulation and revenue.

In the 1960s *Maclean's* experienced difficulties. ADVERTISING revenues fell as television cut into the periodical market, and even able writers such as Peter Gzowski, Peter NEWMAN and Christina McCall could not arrest the decline. What saved *Maclean's* was the conversion to a weekly newsmagazine format. Under Newman as editor, the magazine took advantage of the opening that resulted from *Time* leaving Canada to create Canada's first newsmagazine. The result has been a success in advertising sales and in reader response. Although the new *Maclean's* still relies on stringers for most of its foreign news, its Canadian coverage is good and provides a welcome supplement to the pallid fare in most newspapers. Circulation in June 1984 was 644 024 per month. *See also* MAGAZINES. J.L. GRANATSTEIN

McLearn, Frank Harris, paleontologist (b at Halifax 27 Feb 1885; d at Ottawa 7 Oct 1964). Educated at Dalhousie and Yale, he served on the GEOLOGICAL SURVEY OF CANADA from 1913 to 1952. His thesis on the Silurian fossils of Nova Scotia is accepted as definitive, but he is best known for his studies on the Mesozoic faunas of western Canada. Fieldwork in the Crowsnest Pass and along the Athabasca and Peace rivers enabled him to establish the stratigraphy and correlation of the Cretaceous and Triassic formations of those areas. He also contributed greatly to the paleontological knowledge of the Queen Charlotte Is, the plains of southern Saskatchewan and the Manitoba Escarpment. His correlations were fundamental to the development of petroleum geology in western Canada. L.S. RUSSELL

McLennan, Sir John Cunningham, physicist (b at Ingersoll, Ont 14 Apr 1867; d at Paris, France 9 Oct 1935). After graduating in physics from U of T in 1892, McLennan worked as a demonstrator and in 1898 went to the Cavendish Laboratory in Cambridge, Eng. In 1900 he received the first doctorate in physics from U of T. He spent his career at that university, bringing his physics laboratory to the forefront of research in radioactivity, spectroscopy and low-temperature physics. During WWI McLennan was scientific adviser to the British Admiralty. In 1915 he was elected to the Royal Soc of London (receiving its gold medal in 1928) and in 1917 received the OBE. After the war he returned to U of T but spent each summer in Britain, becoming president of the scientific section of the British Association for the Advancement of Science in 1923. President of the Royal Canadian Institute in 1916, he helped found the NATIONAL RESEARCH COUNCIL and was a member of the Ontario Research Foundation (est 1928). He resigned from U of T in 1932 and moved to England where he continued his pioneering research in the use of radium to treat cancer. He was knighted in 1935. YVES GINGRAS

MacLennan, John Hugh, novelist, essayist, professor (b at Glace Bay, NS 20 Mar 1907). MacLennan is best known as the first major English-speaking writer to attempt a portrayal of Canada's national character. His education consisted of an ever-widening circle of experience that began in Nova Scotia, took him as a Rhodes scholar from Dalhousie to Oxford, from where he travelled on the continent, and culminated in a PhD in classics at Princeton, NJ. Returning to Canada in the mid-1930s to take a teaching job at Lower Canada College near Montréal, MacLennan continued work on a novel, begun at Princeton, in which he hoped to convey his personal interpretation of all he had witnessed during his travels abroad.

The failure to publish this novel — and an earlier one on a similar theme — induced him to take another tack. The events that preceded WWII sparked him to recall what he had witnessed of the Halifax naval base during WWI. By way of experiment, he wrote *Barometer Rising* (1941), focusing on the HALIFAX EXPLOSION he had survived as a 10-year-old. The success of this shift from international to national subject matter (brought to the fore by the favourable criticism of Edmund Wilson) induced him to theorize that writers in Canada must now both set the stage and recite the country's dramas to the world at large. *Barometer Rising* and his essay collection *Cross-Country* (1949) ushered in a new phase in Canadian literature.

Though he would now focus directly on aspects of contemporary Canadian life, MacLennan eschewed regionalism. "I have always seen Canada as a part of the history of the world," he maintains. Although *TWO SOLITUDES* (1945) deals with English-French tensions in Québec, *The Precipice* (1948) with puritanism in small-town Ontario and *Each Man's Son* (1951) with the Cape Breton mining community, each novel expands from its specific situation to consider, respectively, the rapid transition instigated by WWI, the contrast between American and Canadian societies, and the effect of Calvinism, wherever it is found. With his last 3 novels — *The Watch that Ends the Night* (1959), *Return of the Sphinx* (1967) and *Voices in Time* (1980) — he has increasingly moved outwards from the specific base of Montréal (where he taught in McGill's English dept 1951-81) to encompass those universal themes that arise from local political, social and human interests. Because his works transcend their particular settings, he is the most widely and most successfully translated Canadian novelist to date.



Hugh MacLennan, novelist and essayist who has been widely praised for his descriptive writing. He was the first major English-speaking writer to portray Canada's national character (*photo by Nakash/Cameron*).

MacLennan now holds a position of exceptional respect in Canada. He has won the GOVERNOR GENERAL'S LITERARY AWARD 3 times for fiction (*Two Solitudes*, *The Precipice*, *The Watch that Ends the Night*) and twice for nonfiction (*Cross-Country* and *Thirty and Three*) and has garnered many other awards and honorary degrees. Despite this success, critics have long debated the merit of his work. Many have endorsed Wilson's early praise; others have argued that the didactic aspect of MacLennan's fiction forces the stereotyping of characters, the predominance of the authorial voice, and reliance on outdated Victorian techniques of narrative and structure. Still others see MacLennan as overly ambitious in subject matter; especially in his treatment of French Canada is his lack of firsthand experience an artistic drawback. However, almost all critics have singled out MacLennan's skill in descriptive writing, whether of episode, action or natural landscape. Although MacLennan is primarily a novelist, his essays (the best of which are collected in *The Other Side of Hugh MacLennan*, 1978) have elicited more consistent critical admiration. In these, MacLennan ranges over a variety of subjects with a civilized mind, impish humour, warm humanity and sharp intuition. He and Robertson DAVIES are Canada's finest essayists.

Ironically, MacLennan's own international aspirations are generally overlooked. As time passes, he has taken on mythic proportions as the Canadian nationalist who pioneered the use of Canadian scenarios in fiction. To him, writers such as Robertson Davies, Margaret LAURENCE, Robert KROETSCH, Leonard COHEN and Marian ENGEL owe the sense that Canada is a place worth writing about. ELSPETH CAMERON

Reading: Elspeth Cameron, *Hugh MacLennan* (1981).

McLeod, Alan Arnett, aviator (b at Stonewall, Man 20 Apr 1899; d at Winnipeg 6 Nov 1918). He received the VICTORIA CROSS for heroic action, in which he received 5 wounds, against 8 enemy aircraft. He was injured again rescuing his observer, A.W. Hammond, after their aircraft crashed. The youngest of 3 Canadian fliers to win the VC in WWI, he died of influenza while recuperating in Winnipeg. JAMES MARSH

Macleod, James Farquharson, police officer, judge (b on Isle of Skye, Scot 25 Sept 1836; d at Calgary 5 Sept 1894). Commissioner of the NWMP, member of the NWT Council and judge, Macleod was a respected and popular figure in the southwestern prairies. Educated in Ontario, he practised law near Bowmanville, Ont, in the 1860s. He served as brigade major with the WOLSELEY expedition in 1870. Joining the police as a superintendent, he was assistant commissioner 1874-75. He resigned to become a stipendiary magistrate, but returned as commissioner in 1876. He founded Ft Macleod, suppressed the whisky traffic and, having won the confidence of the Blackfoot chiefs, negotiated Treaty No 7. Nevertheless, he lost the confidence of the government and resigned in 1880. He continued to act as a magistrate and in 1887 was appointed a judge of the Supreme Court of the NWT.

A.B. MCCULLOUGH

Macleod, John James Rickard, physiologist, codiscoverer of INSULIN (b at Cluny, Scot 6 Sept 1876; d at Aberdeen, Scot 16 Mar 1935). Trained at the universities of Aberdeen and Leipzig and the London Hospital Medical Coll, J.J.R. Macleod emigrated to America in 1903 to teach at Western Reserve U, Cleveland. He gradually developed an international reputation as an expert in carbohydrate metabolism and general physiology, and in 1918 was appointed professor of physiology at U of T. In the spring of 1921 Macleod gave F.G. BANTING laboratory space, equipment, advice and one of his student assistants (C.H. BEST) to investigate the hypothetical internal secretion of the pancreas. Contrary to Banting's and Best's later distorted accounts, Macleod was an active, essential supervisor of a research effort that, by the spring of 1922, had resulted in the discovery of insulin. His elaboration of the early crude results, handling of the clinical trials, and highly professional presentations of the research particularly impressed the Swedish investigators who rightly recommended that he share the 1923 Nobel Prize for medicine or physiology with Banting.

Macleod's contribution to physiology and Canadian science was not properly recognized in Toronto or Canada for many decades. He left Canada in 1928 to become regius professor of physiology at U of Aberdeen, where he died in 1935, honoured in his native country but not in his adopted one. MICHAEL BLISS

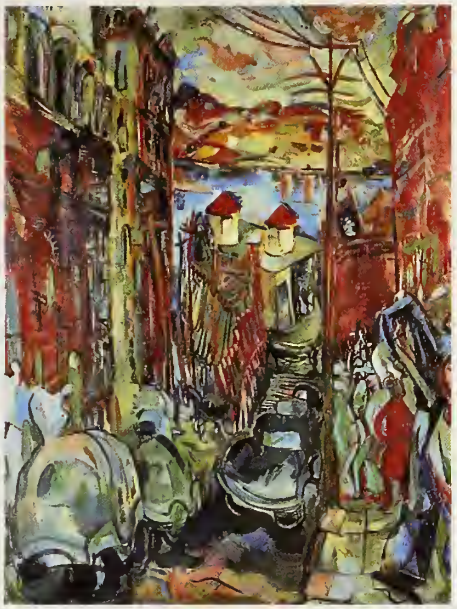
Reading: Michael Bliss, *The Discovery of Insulin* (1982).

Macleod, Mary Isabella, née Drever (b at Red R 11 Oct 1852; d at Calgary 15 Apr 1933). At age 17, during the RED RIVER REBELLION (1869-70), Drever showed the steady nerve for which she became famous in western Canada when she evaded detection by Métis guards and safely delivered an important dispatch addressed to Col WOLSELEY. Accompanying Wolseley's troops was James MACLEOD, soon commissioner of the newly formed NWMP; they were married in 1876 and settled in Ft Macleod. She was one of several women to sign Treaty No 7 at Blackfoot Crossing Sept 1877, frequently accompanied her husband on his inspections and tours of duty, and she was universally admired by NWMP officers and their wives. SUSAN JACKEL

McLeod, Neil, lawyer, politician, premier of PEI, judge (b at Uigg, PEI 15 Dec 1842; d at Summerside, PEI 19 Oct 1915). Called to the PEI Bar in 1872, McLeod was elected to the Legislative Assembly in 1879. Re-elected in 1882 and 1886, McLeod, a Conservative, was premier 1889-91. In 1892 he was appointed county court judge for Prince County. NICOLAS J. DE JONG

McLeod, Norman, Presbyterian minister (b at Point of Stoer, Scot 29 Sept 1780; d at Waipu, NZ 14 Mar 1866). McLeod, a teacher and lay preacher, moved to Pictou, NS, in 1817. His forceful preaching attracted a large congregation that joined him on "The Ark" in 1820 to sail to Ohio but landed instead at St Ann's Harbour, Cape Breton. McLeod made himself a moral dictator over his followers, imposing severe punishments for trivial "sins." Despite his fanaticism they obeyed his command to migrate to Australia in 1851, but McLeod was unhappy and moved them to Waipu, NZ. In the 1850s, almost 900 persons left NS to join him in his search for "righteous" surroundings. JOHN S. MOIR

MacLeod, Pegi Nicol née Margaret Kathleen Nicol, painter (b at Listowel, Ont 4 Jan 1904; d at NY 12 Feb 1949). MacLeod's images of the contemporary world helped form the first wave of Canadian modernism. Her gift lay in her ability to present life's spontaneity and energy. After studies with Franklin BROWNELL at the Ottawa Art Assn, she attended Montréal's École des beaux-arts with fellow students Goodridge ROBERTS and Marian SCOTT. The breakthrough in her style is revealed in her 1933 watercolours of school children in a garden. In 1936, with Douglas DUNCAN, she helped found the Picture Loan Soc. In 1937 she moved to New York but frequently visited Fredericton where she helped found (and taught at) the Observatory Art Centre. She painted numerous works of the women's division of the Armed Forces (1944-45) and her *oeuvre* is composed of almost 1000 works in many media including designs of hooked rugs. JOAN MURRAY



Pegi Nicol MacLeod, *Saint John, New Brunswick* (1947), oil on canvas (*courtesy Art Gallery of Hamilton/Mrs Jane MacLeod Pappidas*).

Reading: Joan Murray, *Daffodils in Winter: The Life and Letters of Pegi Nicol Macleod* (1984).

McLoughlin, John, fur trader, physician, merchant (b near Rivière-du-Loup, Qué 19 Oct 1784; d at Oregon City, Ore 3 Sept 1857). He studied medicine but in 1803 joined the NORTH WEST CO, becoming a partner in 1814. Greatly worried by the rivalry between the NWC and the HUDSON'S BAY CO, he attempted to bring about a settlement. When a coalition between the 2 took place, under other auspices, in 1821 he became a chief factor in the HBC. Governor George SIMPSON, concerned about the Columbia District, put McLoughlin in charge when he visited it in 1824-25, and McLoughlin was its superintendent for 2 decades. In later years differences arose between McLoughlin and Simpson over how to defeat American trading ships on the coast and how to deal with American immigrants to Oregon. McLoughlin favoured a chain of forts along the coast; Simpson favoured the use of ships. Simpson wanted the immigrants treated ruthlessly; McLoughlin, the man on the spot and a humanitarian, dealt with them kindly, realizing that an eventual American takeover of the area was inevitable. The 2 finally parted company over the murder of McLoughlin's son at Ft Stikine in 1842. After a prolonged dispute, McLoughlin retired in 1846 and lived the rest of his life at Oregon C. His holdings included flour and saw mills and he engaged in an export trade in lumber and other commodities. He has long been known as "the Father of Oregon." W. KAYE LAMB

McLuhan, Herbert Marshall, communication theorist (b at Edmonton 21 July 1911; d at Toronto 31 Dec 1980). Professor of English at U of T, McLuhan became internationally famous during the 1960s for his studies of the effects of mass media on thought and behaviour. Trained in literature (PhD, Cambridge, 1943), he laid the basis of his later work in his erudite dissertation, "The Place of Thomas Nash in the Learning of his Time." McLuhan thought of himself as a grammarian studying the linguistic and perceptual biases of mass media. A deeply literate man of astonishingly wide reading, he gravitated intellectually to the cutting edge of modern culture where the "irritation," he said, was greatest. His contribution to COMMUNICATIONS has been compared to the work of Darwin and Freud for its universal significance. Still, he was misunderstood by many because of his revolutionary ideas and their expression in an aphoristic prose style. He emphasized the connectedness of things and built what he called "mosaic patterns" of meaning, rather than offering mere argument using one-dimensional specialist logic.

McLuhan studied changes in perception created by electric media competing with print and machine process, the old strategy of fragmenting reality into informational categories. With the integrating, interdisciplinary force of electric process, information shifts its focus from specialist emphasis on detail towards a need to interpret the contexts created by media forms. The environment, overloaded with detailed information, can be ordered meaningfully, McLuhan said, through enhanced pattern-recognition skills, the ability to deal with open systems undergoing continual change at electric speed. He stressed how electric processes decentralized information, bringing simultaneous awareness to every point in a network. The perception of reality then becomes dependent upon the structure of information.

His famous distinction between "hot" and "cool" media referred to the different sensory effects associated with media of higher or lower definition. High-definition ("hot") media, such as print or radio, are full of information and allow for less sensory completion or involvement on the part of the reader or listener than low-definition ("cool") media, such as telephone or television, which are relatively lacking in information and require a higher sensory involvement of the user. The form of each medium is associated with a different arrangement, or ratio, in the order among the senses and thus creates new forms of awareness. These transformations of perceptions are the bases of the

Marshall McLuhan, world-famous communications innovator (© *Karsh, Ottawa/Miller Services Ltd*).



way in which the message *means*. In this sense, "the medium is the message."

Controversy always raged around McLuhan's work, for he was initiating a new paradigm which required that we recognize the form our information takes as basic to the way that knowledge is perceived and interpreted. *The Mechanical Bride* (1951) documents the power of advertising to manage public consciousness. *The* GUTENBERG GALAXY (1962) presents a pattern of insights into the cultural transformation created by print technology, and with the publication of *Understanding Media* (1964) McLuhan's reputation became worldwide. Of the several books that followed, *Through the Vanishing Point* (1968, coauthored with Harley Parker), *The Interior Landscape: The Literary Criticism of Marshall McLuhan* (1969), *From Cliché to Archetype* (1970, with Wilfred WATSON) and *Take Today: The Executive as Dropout* (1972, with Barrington Nevitt) are the most important.

McLuhan received numerous N American and European honours and awards, including the Schweitzer Chair (1967), which he spent at New York's Fordham U. The Centre for Culture and Technology that he founded is still functioning under the guidance of his disciples at U of T. FRANK D. ZINGRONE

Maclure, Samuel, architect, artist (b at Sapperton [New Westminster], BC 11 Apr 1860; d at Victoria 8 Aug 1929). The foremost BC domestic architect from 1900 to 1929, Maclure established a building style and form that gave Victoria and parts of Vancouver a distinctive Canadian West Coast flavour. Noted mainly for his large Tudor-revival house designs with 2-storey central halls and lavishly finished interiors, he also pioneered the shingle style, worked in traditional board-and-batten, and later turned to a severe Edwardian classicism. Much of his work survives, as do the watercolour landscape sketches for which he was noted during his lifetime. MARTIN SEGGER

Reading: Martin Segger and D. Franklin, *Victoria* (1979).

McMahon, Francis Murray Patrick, industrialist (b at Moyie, BC 2 Oct 1902). He began as a driller working for mining companies in BC, and in 1927 established a small business as a diamond-drilling contractor. In 1930-31 he participated in drilling in the Fraser R Delta in search of natural gas for nearby Vancouver, and when that failed he proposed a 1000 km pipeline to transport gas from the Peace R district of northeastern BC. In 1936 he acquired for $100 an option on 32 ha of oil and gas rights near an oil discovery at Turner Valley, Alta. A successful oil well on this property led to the establishment of Pacific Petroleums Ltd, which became one of the most successful oil- and gas-producing companies in western Canada. In 1957, 25 years after he had first promoted the plan, McMahon completed construction of the Westcoast Transmission pipeline from the Peace R, Canada's first large natural-gas pipeline. In 1979 Petro-Canada acquired ownership of Pacific Petroleums for $1.5 billion. EARLE GRAY

Reading: Earle Gray, *Wildcatters* (1982).

McMaster, Ross Huntington, industrialist (b at Montréal 11 Oct 1880; d there 3 Jan 1962). For over 50 years, McMaster was a senior executive of the Steel Company of Canada (STELCO). He began his career with the Sherwin-Williams Paint Co. In 1903 he became general manager of Montréal Rolling Mills, where his father had worked. When the company was merged into Stelco in 1910, McMaster became Montréal manager of the new steel company, Canada's largest. He became Stelco president in 1926 and chairman in 1945, a post he held until 1960. Refusing to burden the company with undue debts, especially in the stagnant 1920s, McMaster insisted throughout his presidency on a strong profit margin. He introduced a "gaited" (cost plus profit) sales policy, replacing the old "Pittsburgh plus" pricing schedule. He introduced modern accounting practices to Stelco. A lifelong Montréal resident, he also took a business interest in the Montréal *Gazette*. DUNCAN MCDOWALL

Reading: W. Kilbourn, *The Elements Combined: A History of the Steel Company of Canada* (1960).

McMaster, William, businessman, banker, philanthropist (b in County Tyrone, Ire 24 Dec 1811; d at Toronto 22 Sept 1887). After immigrating to America he came to York [Toronto] in 1833 and entered a dry-goods firm. He shrewdly concentrated on wholesaling and turned his enterprise into one of Toronto's most profitable. Eager to curtail Montréal's control of the western economy, he joined George BROWN's Reformers. Their opposition to the Church of England and its Conservative friends also appealed to McMaster who, as a Baptist, wished to advance the cause of his coreligionists.

At midcentury he ventured into banking, and in 1867 played a major role in establishing the Canadian Bank of Commerce, in large part as competition for the Bank of Montreal. During his presidency the bank surpassed all others in Ontario and was second only to its Montréal rival. After his death, his will revealed his desire to further Baptist education. Having supported the Canadian Literary Institute (Woodstock College) and Toronto Baptist College, he gave his estate of nearly $1 million to establish a Baptist institution of higher learning in Toronto. MCMASTER UNIVERSITY opened its doors in 1890 as an independent institution, after refusing federation with U of T. C.M. JOHNSTON

McMaster University, fd in 1887 as a BAPTIST institution, opened in Toronto in 1890 and moved to Hamilton in 1930. Chartered by the provincial legislature, the university was named for William MCMASTER, who bequeathed to it the bulk of his estate. It incorporated 2 older Baptist educational enterprises: Woodstock College (fd 1857) and Toronto Baptist College (1881). While in Toronto, McMaster had to overcome the opposition of theological conservatives to the instruction it presented. In 1930, under Chancellor Howard P. Whidden, a fresh start was made in nearby Hamilton, which offered an ample setting for McMaster's 500 students and considerable private support from its citizens. This arrangement honoured the traditional Baptist refusal to accept financial assistance from any public body.

Although WWII threatened enrolment, the demand for trained scientific personnel in industry and the armed forces prompted feverish activity in the university's laboratories. The war also led to the recruitment of the chemistry department's H.G. THODE for crucial wartime nuclear studies. Stimulated by scientific and technological demands, McMaster underwent a structural reorganization so that it might receive public aid; George P. Gilmour, Whidden's successor, directed the process. As a result, Hamilton College was established in 1948 as a nondenominational affiliate which would be eligible for governmental funding. By this time doctoral programs in the sciences had either been implemented or were being planned. Under Thode's leadership, engineering and nuclear studies expanded. A nuclear reactor was constructed on campus, the first such university facility in Canada.

Enrolment: McMaster University, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
9 556	1 539*	2 809	858

* Includes medical interns and residents

In 1957, when it became evident that Baptist resources alone were insufficient, McMaster became a fully nondenominational private institution. The Baptist connection continued through the incorporation and affiliation of McMaster Divinity College. Rapid growth during the 1960s was highlighted by the establishment of doctoral programs in humanities and social sciences, the organization of a business school and the planning of a college of health sciences. In 1967 McMaster, with the exception of its Divinity College, was reorganized into divisions. These have since become 6 faculties: humanities, social sciences, science, engineering, business and health sciences. C.M. JOHNSTON

MacMillan, Alexander Stirling, businessman, politician, premier of NS (b at Upper South River, NS 31 Oct 1871?; d at Halifax 7 Aug 1955). After a successful career in lumbering and construction, he was appointed chairman of the Nova Scotia Highways Board in 1920 and served briefly as minister of highways in 1925. A member of the Legislative Council 1925-28, he held a seat in the NS Assembly 1928-45. In 1933 he again assumed the powerful highways portfolio and in 1940 also took on the posts of premier, provincial secretary and minister of public works. A tough debater and a shrewd politician, the aging MacMillan found wartime leadership burdensome. He willingly relinquished the premiership to Angus L. MACDONALD and retired from public life in 1945. MARGARET CONRAD

MacMillan, Sir Ernest Alexander Campbell (b at Mimico [Toronto] 18 Aug 1893; d at Toronto 6 May 1973). Internationally known as a conductor of symphonic and choral music, he was also an organist and pianist, an educator, a spokesman for music, and a leading figure in Canadian musical organizations. He left about 20 compositions and many arrangements; his extensive writings and talks cover many subjects, from folk song to musical pedagogy. By his cultivation, skill, energy, and travels, he became the most influential Canadian musician of his time.

A prodigy, he had composed several songs and played the organ publicly by age 10. During his teens, he audited music classes at Edinburgh U and attained both an organ diploma and an Oxford baccalaureate in music. He held a professional position as an organist in Toronto at age 15. Interned in Germany as an enemy alien, 1914-18, he developed his talents through

Sir Ernest MacMillan, known as the statesman of Canadian music, was the first person to be knighted outside the UK for contributions to music; photo taken in 1943 (© *Karsh, Ottawa/Miller Services Ltd*).



prison-camp shows and concerts. In the early 1920s in Toronto he performed as church organist and choir director, wrote for journals and taught music. Most of his original works belong to this phase of his career. In 1923 he directed the first of 30 annual presentations of Bach's *St Matthew Passion*. He was active in the annual CPR folk festivals (1927-31), and edited *A Book of Songs* (1929; reissued as *A Canadian Song Book*, 1937), widely used as a school text, and an anthology of essays, *Music in Canada* (1955). He was principal of the Toronto (later Royal) Conservatory of Music 1926-42; dean of the faculty of music, U of T, 1927-52, and toured all regions of the country as festival adjudicator and as Conservatory examiner. MacMillan's fame as a conductor grew rapidly after 1931, when he became conductor of the Toronto Symphony Orchestra. He led the TSO until 1956, and for the last 14 of those years was also conductor of the Toronto Mendelssohn Choir. He was guest conductor with major orchestras in the US, Australia and Brazil, and conducted the first commercial recordings of his home organizations. Bach was his specialty, but he exposed audiences to a gamut of music and championed numerous works by Canadian composers.

MacMillan was knighted in 1935 and received the Canada Council Medal (1964), the Order of Canada (Companion, 1970), the Canadian Music Council medal (1973, awarded posthumously), the Richard Strauss Medal (GEMA, West Germany), honorary diplomas from the 2 royal music schools (London, England), and honorary doctorates from 8 universities. Named after him were the MacMillan Theatre and the annual MacMillan/CAPAC Lectures (Toronto); and the Sir Ernest MacMillan Fine Arts Clubs (Vancouver). In 1982 CBC Radio presented the 6-part documentary "Sir Ernest MacMillan — the Music Builder." JOHN BECKWITH

MacMillan, Harvey Reginald, entrepreneur (b at Newmarket, Ont 9 Sept 1885; d at Vancouver 9 Feb 1976). After studying at the Ontario Agricultural Coll and the Yale Forestry School, MacMillan worked on the BC coast as a timber cruiser in 1907. Although he was hired as assistant inspector of forest reserves for western Canada in 1908, tuberculosis forced him to spend the next 2½ years in a sanatorium. In 1912 he became chief forester for BC, a post he kept until WWI, when he became timber-trade commissioner for the federal government, assistant manager of the Cherainus plant of Victoria Lumber and Manufacturing Co and, by the end of the war, an employee of the IMPERIAL MUNITIONS BOARD.

In 1919 MacMillan, backed by British timber merchant Montague Meyer, launched the H.R. MacMillan Export Co. His manager and later partner was W.J. Van Dusen, and the 2 men developed the company into a major exporter of lumber. Competition was met with aggressive marketing, the purchase of sawmills and timber limits, and the building of a plywood plant in 1935. During WWII MacMillan was chairman of Wartime Shipping Ltd, a crown corporation. After the war he continued to expand his company, building the Harmac Pulp Mill in 1947. In 1951 the company merged with Bloedel, Stewart and Welch. In 1956 MacMillan resigned as chairman and in 1970 he and Van Dusen resigned as directors, but MacMillan maintained his interest in MACMILLAN BLOEDEL until his death. CHRISTOPHER G CURTIS

Reading: Donald McKay, *Empire of Wood* (1982).

MacMillan, William Joseph Parnell, physician, premier of PEI, lieutenant-governor (b at Clermont, PEI 24 Mar 1881; d at Charlottetown 7 Dec 1957). After a brilliant career as a scholar and physician, MacMillan entered politics in 1923. Ten years later he became premier during the Island's worst economic depression. The dynamic premier implemented many relief programs and greatly increased government expenditures to relieve the needy Islanders. Nevertheless, MacMillan and the Conservative Party were swept from office when the Liberal Party captured all 30 seats in the 1935 election. In 1957 MacMillan was appointed lieutenant-governor only days before his death. LEONARD CUSACK

MacMillan Bloedel Limited, with head offices in Vancouver, is Canada's largest forest-products company. It began in 1909 as the Powell River Paper Company Limited, and it was reorganized as the Powell River Company in 1911. Upon merging in 1960 with MacMillan and Bloedel Limited (est 1951), its name was changed to MacMillan, Bloedel and Powell River Limited. The present name was adopted in 1966. Between 1964 and 1980 the company made various acquisitions, mainly of corrugated case, lumber and paper companies. With integrated operations in Canada, the US and overseas, "MacBlo" produces newsprint, papers, lumber, panelboards and containers. It also owns timberland in BC. In 1983 it had sales or operating revenue of $2 billion (ranking 41st in Canada), assets of $2.1 billion (ranking 45th) and 15 472 employees. The Noranda Group holds 49% of the shares. *See* TIMBER TRADE HISTORY; FORESTRY. DEBORAH C. SAWYER

Reading: Donald MacKay, *Empire of Wood* (1982).

McMurrich, James Playfair, physiologist (b at Toronto 16 Oct 1859; d there 9 Feb 1939). McMurrich taught biology at Ontario Agriculture College for 5 years before seeking a PhD (1885) at Johns Hopkins U. Though an early enthusiast for a national scientific program for Canada (see his letter in *The Week*, 6 Nov 1884) he worked in the US for 20 years before becoming professor of anatomy at U of T in 1907; the university had lately been reorganized and endowed by the Ontario government in order to promote science in Canada. McMurrich was dean of the gradute school (1922-30) and active in the Biological Board of Canada (Fisheries Research Board), the Canadian Inst of Toronto and the RSC (president, 1922). DONALD J.C. PHILLIPSON

MacNab, Sir Allan Napier, soldier, lawyer, businessman, politician (b at Newark, UC 19 Feb 1798; d at Hamilton, Canada W 8 Aug 1862). A forceful though enigmatic personality, MacNab had a deep influence on many aspects of pre-Confederation Canada. As a youth he served with conspicuous gallantry in the WAR OF 1812. Moving in 1826 from York [Toronto] to Hamilton, he set up a thriving law practice, but he owed his fortune to speculation in real estate. An entrepreneur as well, he was, with Glasgow merchant Peter Buchanan, chiefly responsible for the construction of the GREAT WESTERN RY.

In the first phase of his political career (1830-35), MacNab vigorously promoted economic development and moderate Tory policies. In the second (1836-49) he became an extreme Tory. Knighted for his zeal in suppressing the REBELLION OF 1837-38, he vainly stressed loyalty as an issue in public policy. In the third (1850-56) he declared that "all his politics were Railroad," but as leader of the Conservatives he was also concerned to move his party back from extremism. In 1854 he played an important role in the formation of the Liberal-Conservative alliance and became premier of the Canadas (1854-56). Dundurn, his stately 72-room mansion, still stands today in Hamilton. D.R. BEER

Reading: D.R. Beer, *Sir Allan MacNab* (1984).

McNab, Archibald, 17th chief of Clan Macnab (b in Perthshire, Scot *c*1781; d at Lannion, France 12 Aug 1860). McNab came to Upper Canada in 1822 to flee his creditors in Scotland. He was given land on the Madawaska R, the future McNab Township, and brought about 15 families from Scotland who with others recruited in Canada settled the township on terms laid down by McNab. For the next 15 years he plundered these people and pursued them in the courts. He was supported at first by his politically well-placed friends in Toronto and at Perth, but his position, unassailable in the 1830s, was wholly undermined in the 1840s by his excessive greed. Ultimately he was driven from the township by the determination of the settlers to work together and petition the councils of Upper Canada and Canada W. He lived in Hamilton until at least 1851 before leaving Canada and dying in exile in France. With 4 children and a wife abandoned in Scotland, he fathered at least one illegitimate child in McNab Township, and another upon his return to England in the 1850s. JULIAN GWYN

McNair, John Babbitt, lawyer, politician, judge, premier of NB (b at Andover, NB 20 Nov 1889; d at Fredericton 14 June 1968). First elected MLA for York in 1935, he was attorney general in the DYSART government and president of the provincial Liberal Party. Defeated in 1939, he was re-elected in 1940 for Victoria and in 1944 for York. In 1940 he succeeded Dysart as party leader and premier, and in 1943 passed the Civil Service Act providing security of tenure for public servants. Following the defeat of his government in 1952, McNair left politics and returned to legal practice. In 1955 he was named chief justice of New Brunswick and in 1957 he headed the royal commission examining the fiscal status of Newfoundland. He was appointed lieutenant-governor of New Brunswick in 1965. DELLA M.M. STANLEY

McNaughton, Andrew George Latta, army officer, scientist, diplomat (b at Moosomin [Sask] 25 Feb 1887; d at Montebello, Qué 11 July 1966). He was trained as an engineer at McGill, enlisted in the nonpermanent militia in 1909 and took the 4th Battery of the CANADIAN EXPEDITIONARY FORCE overseas in 1914. His scientific approach to gunnery brought him rapid advancement; he was twice wounded and ended the war commanding the Canadian Corps artillery. He joined the permanent force in 1920 and became deputy chief of the general staff in 1922. As chief of the general staff, 1929-35, he began the mechanization of the permanent force and the modernization of the nonpermanent militia.

General A.G.L. McNaughton with Mackenzie King (*Central Press Photo/Miller Services Ltd*).



From 1935 to 1939 he was president of the NATIONAL RESEARCH COUNCIL OF CANADA.

McNaughton returned to soldiering in WWII as commander of the 1st Canadian Infantry Division in 1939. Senior Canadian officer in the UK while the force there grew to a corps (1940) and then an army (1942), he endeavoured to hold the Canadians together in one formation and deeply involved himself in the scientific aspects of soldiering. He initiated an improved method of airburst ranging and the development of "sabot" antitank ammunition. But his tactical judgement was weak — he endorsed the ill-fated DIEPPE plan — and he never properly mastered the relationship between politics and high command in war. By late 1943 the crusty Canadian's uncompromising opposition to fragmentation of the Canadian Army Overseas was causing resentment in Ottawa; he was out of favour with his own minister of national defence, J.L. RALSTON, and British criticism of his generalship was mounting. Under pressure and in declining health, he resigned his command in Dec 1943.

McNaughton remained a favourite of PM Mackenzie KING (he had earlier been a confidante of PM R.B. BENNETT) and was slated to become the first Canadian-born governor general. Instead he was lured briefly and unsuccessfully into politics; he served as minister of national defence 1944-45 but was unable to stave off CONSCRIPTION for overseas service or win a seat in Parliament. A compelling public figure for almost 2 decades after 1945, McNaughton was Canadian representative on the UN Atomic Energy Commission, and president of the Atomic Energy Control Board of Canada, 1946-48; permanent delegate to the UN, 1948-49; chairman of the Canadian Section of the INTERNATIONAL JOINT COMMISSION, 1950-62, and of the PERMANENT JOINT BOARD ON DEFENCE, 1950-59. He was a determined, independent-minded proponent of his view of the national interest in all these capacities, and in his last great campaign he bitterly opposed the COLUMBIA RIVER TREATY.

NORMAN HILLMER AND BRERETON GREENHOUS

McNaughton, Duncan Anderson, track and field athlete (b at Cornwall, Ont 7 Dec 1910). Raised at Kelowna and Vancouver, BC, he attended U of Southern Calif, joining its track team as a high jumper. His "diving" western-roll technique disqualified him at the 1930 British Empire Games and nearly excluded him from the 1932 Los Angeles Olympics. Ultimately, he was allowed to compete and, in a dramatic jump-off to break a tie, he cleared the bar at 6 ft 6 in (2 m), beating Americans Bob Van Osdel and Cornelius Johnson and the Philippines' Simeon Toribio for the gold. A year later McNaughton retired; he distinguished himself in the RCAF and later as a petroleum geologist.

TED BARRIS

McNaughton, Violet Clara, née Jackson, journalist, feminist leader (b at Borden, Eng 11 Nov 1879; d at Saskatoon 3 Feb 1968). In 1912 the McNaughtons joined the Saskatchewan Grain Growers Assn and jointly became secretary-treasurer of the Hillview local. Violet's insistence on being recognized as a delegate to the 1913 SGGA convention led to a special "Women's Congress," and an organizing committee for a women's section, with Violet as secretary, was created. When the section was organized in 1914, McNaughton was elected president (1914-17). She sparked in 1915 the formation of the Saskatchewan Equal Franchise League, which was primarily responsible for gaining the franchise for women a year later. In 1919 she became president of the Interprovincial Council of Farm Women and, in that post, became a prominent national feminist leader. She was elected to the board of the SGGA in the early 1920s and was important in the Saskatchewan and national Progressive movements, helping to formulate the platform for the PROGRESSIVE PARTY in 1921. From 1925 to 1950 she edited the "Mainly for Women" page in *The Western Producer*.

IAN MACPHERSON

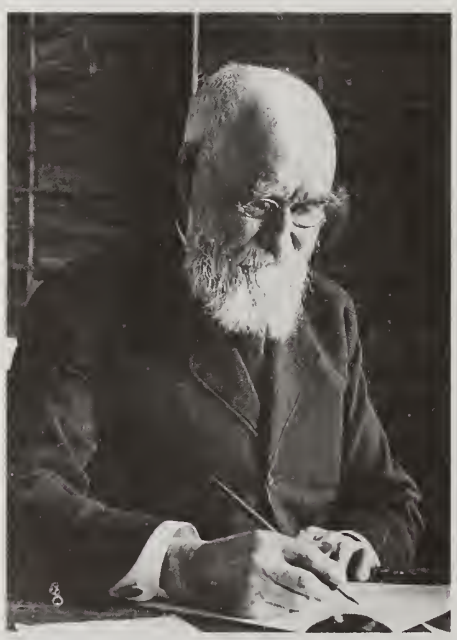
McNeil Case G. McNeil, a journalist who wanted to see a film (*Last Tango in Paris*) banned in his province (NS) by a provincial regulatory body, challenged the constitutionality of the provincial Theatres and Amusement Act. The Supreme Court of Canada, in a divided decision, ruled that the provincial measure was valid. In its opinion, this local control over the film was justified by the Constitution Act, 1867 (s92.13 and s92.16). The court distinguished between criminality and provincial interest in morality. A provincial Act that establishes standards of decency is not necessarily an infringement on criminal law. According to Mr Justice Ritchie, tastes and mores may vary from region to region and the decision about what is morally acceptable to the public may be considered a matter of local and private nature in the province, within the sense of section 92.

GÉRALD-A. BEAUDOIN

Macoun, John, explorer, naturalist (b at Maralin, Ire 17 Apr 1831; d at Sidney, BC 18 July 1920). Champion of the agricultural capabilities of the western interior, Macoun was also Canada's foremost field naturalist and amassed a collection of Canadian flora and fauna which became the foundation for the National Museum of Natural Sciences. Macoun developed his expertise as a plant geographer himself. In 1872 he took part in the first of 5 government surveys of western Canada. Over the next decade, he declared in various reports and public lectures that western lands were ideally suited for agriculture. Though the route for the CPR main line was located through the grasslands essentially for strategic reasons, Macoun provided the agricultural justification for that route.

In 1882 Macoun was appointed to the GEOLOGICAL SURVEY OF CANADA as Dominion botanist and began a study of the range and distribution of Canada's flora, adding fauna when he became survey naturalist and assistant director in 1887. Macoun established a Dominion Herbarium of over 100 000 specimen sheets and discovered approximately 1000 new species, many of which were named after him. By the time he retired to Vancouver I in 1912, the Geological Survey boasted the finest collection of Canadian flora and fauna in the country.

W.A. WAISER



John Macoun, Canada's foremost field naturalist, whose large collection of flora and fauna became the foundation for the National Museum of Natural Sciences (*courtesy National Museums of Canada/National Museum of Man/31874*).



In her time Agnes Macphail was recognized as a feminist, though she was primarily concerned with issues such as the tarriff (© *Karsh, Ottawa/Miller Services Ltd*).

Macphail, Agnes Campbell, politician, reformer (b at Proton Township, Grey County, Ont 24 Mar 1890; d at Toronto 13 Feb 1954). Macphail was the only woman elected to Canada's Parliament in 1921, the first federal election in which women had the vote. She served until defeated in 1940. In 1943 she was elected to the Ontario legislature, one of the first 2 women there. She lost her seat in 1945 but was again in the legislature 1948-51. She was also the first woman appointed member of a Canadian delegation to the LEAGUE OF NATIONS, where she insisted on serving on the Disarmament Committee.

Agnes Macphail began as a country schoolteacher and was active in the Ontario agricultural CO-OPERATIVE MOVEMENT and the UNITED FARMERS OF ONTARIO. She entered politics to represent the farmers of her region; in office she came also to see herself as representing other women. As MP she first sat as a member of the PROGRESSIVE PARTY, with which the UFO was then affiliated. She later sat as an independent and finally as a representative of the CO-OPERATIVE COMMONWEALTH FEDERATION; as MPP she represented the CCF. Although involved in founding the CCF, she distrusted partisanship and did not acknowledge party discipline.

Though modern accounts have tended to deny it, in her own time Macphail was recognized as a feminist. Rural issues such as a protective tariff were always primary for her, but she gave major attention to so-called "women's issues" such as prison reform. She was the founder of the Elizabeth Fry Society of Canada and was largely responsible for the establishment in 1935 of the Archambault Commission to investigate Canada's prisons. Her feminist antimilitarism included active participation in the WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM (but she reluctantly voted for Canada's entry into WWII). She supported women's acquisition of civil rights, although she was not an active suffragist. She was a friend of Nellie MCCLUNG and admired Thérèse CASGRAIN's suffragist efforts in Québec, and she welcomed the decision in the PERSONS CASE. She was responsible for Ontario's

first equal pay legislation (1951). After her electoral defeat, she supported herself by journalism, public speaking and organizing for the Ontario CCF, but she suffered from lack of money and poor health. She died just before a senate appointment was to be announced. NAOMI BLACK

Reading: D. French, "Agnes Macphail," in *The Clear Spirit* ed by Mary Quayle Innis (1966); M. Stewart and D. French, *Ask No Quarter* (1959).

McPhail, Alexander James, farmer, farm leader, businessman (b near Paisley, Ont 23 Dec 1883; d at Regina 21 Oct 1931). In 1913 McPhail joined the Saskatchewan Dept of Agriculture, but resigned in 1918 out of loyalty to his superior, P.F. Brendt, who had been dismissed because of his German nationality. Returning to Elfros, Sask, McPhail became a livestock drover, selling mostly on the Winnipeg market. He became an active organizer for the PROGRESSIVE PARTY and joined the moderate wing of the Saskatchewan Grain Growers' Assn, becoming secretary later that year. McPhail was a leading proponent of the wheat pool movement and was elected first president of the SASKATCHEWAN WHEAT POOL board in 1924. As president, he faced several difficult issues. He reluctantly carried out the pool's purchase of the elevator system owned by the Saskatchewan Co-operative Elevator Co. He was the principal organizer of the Central Selling Agency, established by the 3 Prairie wheat pools to market grain internationally. A firm believer in voluntary marketing, McPhail campaigned against compulsory marketing, a controversial issue in Saskatchewan during the late 1920s. After the market crash in 1929, the Saskatchewan pool, like the others, avoided bankruptcy only because of government support. IAN MACPHERSON

Reading: H.A. Innis, ed, *The Diary of A.J. McPhail* (1940).

Macphail, Sir Andrew, physician, man of letters, professor of medicine, soldier (b at Orwell, PEI 24 Nov 1864; d at Montréal 23 Sept 1938). Macphail studied at Prince of Wales College, Charlottetown, before proceeding to McGill, where he received degrees in arts and medicine. After practising medicine and teaching at Bishop's U medical faculty in Montréal 1893 to 1905, Macphail in 1907 was appointed McGill's first professor of the history of medicine, a chair he occupied for 30 years. In 1911 he became founding editor of the monthly *Canadian Medical Association Journal*, a position he held until enlisting as a medical officer in WWI. Beginning in 1905 he published more than 10 books and scores of shorter pieces, most on nonmedical themes. Many of his essays appeared in *The* UNIVERSITY MAGAZINE, an outstanding Canadian quarterly he edited 1907-20, with the exception of his 4 years overseas. Most of his writings in this period were political commentary or social criticism. His particular concerns were to define the imperial connection between Canada and the UK, and to expose fallacies in, for example, feminism or modern education. He was knighted for his literary and military work on 2 Jan 1918. The book to which he devoted most care, and which he considered his best, appeared posthumously: *The Master's Wife* (1939, repr 1977), a semiautobiographical reminiscence of PEI. IAN ROSS ROBERTSON

McPherson, Aimee Semple, née Kennedy (b at Ingersoll, Ont 9 Oct 1890; d at Oakland, Calif 27 Sept 1944). At age 17 Aimee married Robert Semple, a Pentecostal missionary who died in China in 1912. She returned with her newly born daughter to the US, married H.S. McPherson and conducted tent revivals in the Atlantic seaboard states. Her evangelistic success took her to Los Angeles in 1918 where, 5 years later, she opened her debt-free, 5000-seat, $1.25 million Angelus Temple of the Four Square Gospel. "Sister Aimee"'s theatrical pulpit techniques made



Aimee Semple McPherson (*courtesy Public Archives of Canada/C-52134*).

her the most publicized revivalist in the world — she toured the US, Canada, Britain and Australia. In 1926, shortly after divorcing McPherson, by whom she had a son, Aimee disappeared and was presumed drowned; she reappeared weeks later claiming to have been kidnapped, apparently to cover her affair with her radio station manager. During the next decade she was connected with moral and financial scandals, including divorce from her third husband. Her public image never fully recovered and her health deteriorated. She died of an apparently accidental drug overdose. JOHN S. MOIR

Macpherson, Cluny, doctor, inventor, businessman, justice of the peace (b at St John's Mar 1879; d there 16 Nov 1966). Educated at McGill and later in Edinburgh and Paris, he was commissioned a surgeon and magistrate in Battle Harbour, Lab, where he helped Wilfred GRENFELL contain a smallpox epidemic. He returned to private practice in St John's in 1904 and was appointed registrar of the Nfld Medical Board, a position he held with few interruptions until his death. He was decorated in May 1915 for his invention of the gas helmet to provide protection against poison gas. Active as the director of the Grenfell Assn of Newfoundland and a director of the International Grenfell Assn, president of the Medical Council of Canada, 1954-55, and president of a commission of the Newfoundland Supreme Court, Macpherson was also prominent in business. STEPHEN O. JACKSON

Macpherson, Crawford Brough, political theorist, professor (b at Toronto 18 Nov 1911). Educated at U of T and U of London, he returned to U of T in 1935 to begin 4 decades of teaching in the department of political economy, interrupted only by work for the Wartime Information Board (1943-44) and by visiting professorships in Britain, the US and Australia. His various writings on the development of liberal-democratic theory have brought him international acclaim. Turning first to the work of 17th-century English theorists such as Thomas Hobbes and John Locke, Macpherson identified what he called "possessive individualism" as the ideology of a rising bourgeois class. His uniquely humanist analysis drew on a Marxist critique of emergent capitalism, but also on the ethical promise of liberalism: the individual freedom to realize one's full human potential, which he believed was overshadowed by capitalist market relations. In an early work he turned his analytical skills on a particular strand in Canadian liberal-democratic thought, the ideology of the early 20th-century Alberta farmers' movement. His major publications include *Democracy in Alberta* (1953), *The Political Theory of Possessive Individualism* (1962), *The Real World of Democracy* (1965), *Democratic Theory: Essays in Retrieval* (1973), *The Life and Times of Liberal Democracy* (1977) and *Burke* (1980).

CRAIG HERON

McPherson, Donald, figure skater (b at Windsor, Ont 20 Feb 1945). World figure-skating champion in 1963, McPherson was the first Canadian to win the Canadian, N American and world championships in the same year. He competed in the 1960 Squaw Valley, Calif, Olympics at age 15, and at 18 was the youngest man to win the world title. Not strong in compulsory figures, McPherson performed free-skating routines that were brilliant and near-perfect. After the 1963 competitions, he retired from amateur competition. He skated for 11 years with a professional ice show and won the 1975 world professional title. BARBARA SCHRODT

Macpherson, Duncan Ian, political cartoonist (b at Toronto 20 Sept 1924). Macpherson is one of the most influential editorial cartoonists in N America, though the influence is a result of his much-copied visual style rather than of his political views. His association with the *Toronto Star* began in 1959, and his renderings of John DIEFENBAKER soon reached the same state of vitriolic perfection as BENGOUGH's of John A. MACDONALD some 80 years earlier. He has produced collections of his cartoons and has illustrated various other works. In 1971 the Canada Council awarded him the Molson Prize, and in 1973 he became a member elect of the Royal Canadian Academy of Arts.

Macpherson, Jean Jay, poet, teacher (b at London, Eng 13 June 1931). She was brought to Newfoundland in 1940 and, educated at Carleton, McGill and U of T, she has been teaching English at Victoria Coll, U of T since 1957. She began publishing poetry in CONTEMPORARY VERSE in 1949, had her first book published in 1952 and won the Governor General's Award for poetry in 1958 for *The Boatman*, a cycle of pellucid lyrics unified by symbols of fall and redemption. From 1954 to1963 she published the works of Canadian poets in 8 Emblem Book pamphlets. Her subsequent work includes other poetry, a classical mythology for secondary schools and an authoritative study of patterns in the late romances of 2 continents. JEAN O'GRADY

Reading: Jay Macpherson, *Poems Twice Told: The Boatman and Welcoming Disaster* (1981) and *The Spirit of Solitude* (1982).

McTaggart-Cowan, Patrick Duncan, meteorologist (b at Edinburgh, Scot 31 May 1912). McTaggart-Cowan's family immigrated to Canada in 1913; he graduated from UBC and was a Rhodes scholar at Oxford. As officer-in-charge of the meteorological service in Newfoundland from 1937 to 1942, he pioneered weather services for the first passenger transatlantic flights. During WWII he was chief meteorologist for the RAF FERRY COMMAND. In 1946 he became assistant director of the Canadian weather service, and when Andrew THOMSON retired in 1959, he became director. Named the founding president of SIMON FRASER U in 1964, he guided the university until his appointment as executive director of the SCIENCE COUNCIL OF CANADA in 1968. In 1970 he directed Operation Oil to clean up the *Arrow* oil spill in Chedabucto Bay, NS. The recipient of several medals and honours and 7 honorary doctorates, he was created member, OBE, in 1944 and officer of the Order of Canada in 1979.

DAVID PHILLIPS

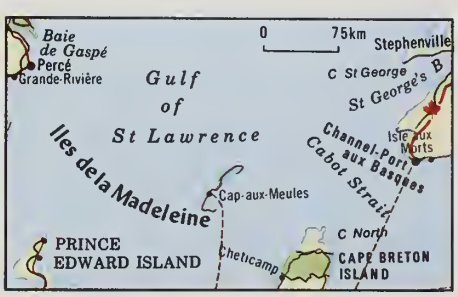
McTavish, Simon, fur-trade merchant (b in Stratherrick, Scot *c*1750; d at Montréal 6 July 1804). He immigrated to N America at age 13, probably as an apprentice to a merchant. After engaging in the fur trade out of Albany, NY, he moved to Montréal in the mid-1770s. He is not known to have travelled west of Lk Superior but he financed trading expeditions to the Saskatchewan R and the Northwest generally. In 1779 he was a key figure in the creation of the first NORTH WEST CO and he may have been behind the reorganization of 1783. After joining Joseph FROBISHER in 1787 to form McTavish, Frobisher and Co, chief outfitter and sales agent for the NWC, his control of the latter firm tightened. His preeminent position in Montréal business circles and his personal style were reflected in his nickname, "The Marquis." DANIEL FRANCIS

Made Beaver Soon after its founding in 1670, the HUDSON'S BAY COMPANY found it necessary to devise a unit of value that would articulate Indian bartering with European bookkeeping methods. A Standard of Trade was established, based on the made beaver (one prime beaver skin in good condition). Prices of all goods were set in MB. Later the HBC issued brass tokens in denominations of one MB and fractions thereof. *See* FUR TRADE. JENNIFER S.H. BROWN

Madeleine, Iles de la (Magdalen Islands), Qué, pop 14 130 (1981c), 202 km^2, is an archipelago located in the middle of the ST LAWRENCE, 288 km SE from the GASPÉ Pen, 112 km N from PEI and 88 km NW from CAPE BRETON I. The 100 km, hook-shaped archipelago consists of 16 islands, islets and outcroppings.

Preceded by BASQUE fishermen, Jacques CARTIER arrived at Île Brion in 1534, he named it in honour of the great French admiral. He christened the islands "Les araynes" because of the endless beaches of very fine white sand. Later CHAMPLAIN referred to them as the "Ramées." The definitive name was given in honour of Madeleine Fontaine, wife of the islands' first seigneur. They were the site of the first battle in N America between the English and the French (1597). Real colonization began in 1755, when the ACADIANS were deported, and several families landed on the islands. The TREATY OF PARIS (1763) gave all N American French possessions to England; in 1787 George III gave the islands to Capt Isaac Coffin, who subjected the inhabitants to seigneurial tenure. These hardships forced the islanders into exile and they founded several villages on Québec's North Shore. In 1895 Québec legislation enabled the islanders to buy back their land and the islands then began to develop and prosper.

The largest islands are inhabited: Havre Aubert, CAP AUX MEULES, Havre aux Maisons, Ile de GRANDE ENTRÉE, Grosse Île and Île de L'Est, which are linked by long sandspits; Ile Brion lies out to sea. The red and grey sandstone cliffs are spectacularly sculpted and the 300 km of beaches are dotted with harbours and picturesque bays. Fishing represents 45% of the island's economic base. Herring, cod, plaice, halibut, mackerel and scallops are shipped all over the world from plants where the fish are canned, frozen or smoked. Lobster is kept in ponds and shipped





The red and grey cliffs of the Iles de la Madeleine have been sculpted from the islands' sandstone (*photo by J.A. Kraulis*).

live. Since 1972 the tourist industry has developed to such an extent that the population of the islands triples during the summer season. The future tapping of salt deposits at Grosse Île will become one of the mainstays of the islands' economy. The capital is Cap-aux-Meules.

JEAN-MARIE DUBOIS AND PIERRE MAILHOT

Magazines are paper-covered publications issued at regular intervals, at least 4 times a year. Paid magazines are sold on the newsstands or delivered through the mails to subscribers; unpaid or controlled-circulation magazines are deposited free of charge at the homes or offices of specific groups of people defined as a target audience. These 2 groups incorporate consumer, literary, academic, trade and professional journals and are designed to entertain, inform, educate and provoke commentary. With rare exception, all of them carry ADVERTISING, usually in the proportion of 60% advertisements to 40% editorial. In the last decade, magazine supplements in newspapers have all but disappeared while regional (particularly city) and specialty magazines (eg, those dealing exclusively with fashion, travel or women's issues) have flourished.

The history of magazines in Canada is not a story of ideas or particular writers. Canadian innovations in form and content have been slight, contributions to belles lettres competent but not dazzling, and association with trends affirmative rather than provocative. The story of magazines in Canada is a political saga of small independent interests struggling to survive in an environment dominated by foreign interests. The struggle has always been between preserving cultural autonomy and permitting the free flow of ideas. The Canadian market is small, divided into 2 linguistic camps, and stretched through a narrow corridor that makes distribution awkward and expensive. More important is the impact of the US: in 1979, of the paid-circulation consumer magazines audited by the Audit Bureau of Circulations (ABC), 46% were imported foreign magazines and 54% were magazines produced in Canada. However, almost half of the circulation of Canadian-produced consumer magazines was accounted for by *Time, Reader's Digest* and *T.V. Guide*, all of which make extensive use of American editorial material.

For the last 6 months of 1983 the top American magazines coming into Canada were *National Geographic* (746 068), *National Enquirer* (464 360) and *Woman's Day* (361 337). The top Canadian-produced paid-circulation magazines were *Reader's Digest* (1 658 638, French and English editions), CHATELAINE (1 411 182, French and English editions), *T.V. Guide* (804 199), MACLEAN'S (644 900) and *Time* (331 078). The largest circulation unpaid magazines were *Recipes Only* (2 million), *Homemaker's* (1 650 370, French and English editions) and *Quest* (712 225). Despite 3 royal commissions struck at least in part to recommend measures to protect the ailing magazine industry, Canadians quite simply prefer to read American magazines.

Canadian periodicals were first established in NS by transplanted New Englanders. The first Canadian magazine, edited by the Rev William Cochran and printed by John Howe, father of reformer Joseph HOWE, was *The Nova Scotia Magazine and Comprehensive Review of Literature, Politics, and News*. It commenced publication in 1789, lasted 3 years, and was concerned more with British than colonial affairs. The bilingual *Le Magasin de Québec* was established by Samuel

The process of photoengraving was pioneered in Canada and was first used in the highly successful *Canadian Illustrated News* (*courtesy Public Archives of Canada/ C-75551*).



Neilson and Thomas Gilmore in Lower Canada's capital and published from 1792 to 1794. It marked the first attempt at drawing the 2 cultures together through a printed medium.

Until the late 19th century, high production costs, poor distribution and low circulation meant that most attempts at magazine publication in British North America were short-lived and derivative. Various efforts were made to launch literary magazines for select audiences, but they were largely overwhelmed by the newspaper boom of the 1820s. Some notable productions were J.S. Cunnabell's *Acadian Magazine* and *Halifax Monthly Magazine*, John Gibson's *Literary Garland* from Montréal, and Michel Bibaud's various efforts: *La Bibliothèque canadienne*, *l'Observateur*, *Le Magasin du Bas-Canada* and the important *l'Encyclopédie canadienne*. Many eminent Canadians were published in these outlets, including Susanna MOODIE and John RICHARDSON in the *Literary Garland*.

By mid-century, Toronto had become an important centre for English-language production with magazines such as *The Canadian Journal*, *Anglo-American* and *British Colonial*. All were consciously literary and all soon failed. The introduction of regular train service, the electric telegraph, and the coming of Confederation gave great impetus to the Canadian magazine industry. American magazines such as *Harper's* were freely circulating in the country and many people felt Canadian counterparts were necessary to help give substance to the newly minted nationality. Montréal was also an influential centre, with magazines such as John Dougall's *New Dominion Monthly*, which pursued an aggressive national bias and achieved in only a few years a circulation of 8000.

The technique of photoengraving was pioneered in Canada and used first in the immensely successful *Canadian Illustrated News*, which began operations in 1869 and gained a large following principally because of its vivid portrayal of scenery and its stirring images of the NORTH-WEST REBELLION. Its French counterpart was the technically more accomplished, but generally less commercially successful, *L'Opinion publique illustré*. Other significant magazines of the period were religious in orientation. Particularly important were the *Northern Messenger* and *Methodist Magazine and Review*, a magazine of opinion on Canadian affairs. Goldwin SMITH's *Canadian Monthly, National Review*, *Nation* and *Bystander* contributed to serious discussion, as did *La Revue canadienne* and 2 university-based journals, QUEEN'S QUARTERLY (1893-) and *University Magazine* (edited by Sir Andrew MACPHAIL at McGill). Toronto's satirical *Grip* flourished from 1873 to 1894 and a number of national cultural magazines appeared, such as *Canadian Monthly* and *Week*. Interest in a definitive national cultural expression dimmed after the turn of the century, however, and was only revived in magazine format after WWI with the launching in 1920 of the CANADIAN FORUM.

National news and politics found an outlet in *Toronto Saturday Night* (1887), which dropped the city name in 1889 (*see* SATURDAY NIGHT). This consumer magazine, a feisty combination of social news and political crusades against issues such as divorce or the exploitation of labour, soon developed a highbrow following, and circulation reached 10 000. *The Canadian*, launched in Toronto in 1893, was another attempt at a national organ, although this time the object was to challenge quality American competition such as *Scribner's* and *The Atlantic*. *The Canadian* was a mouthpiece for "Wasp" Ontario; it did not often stretch its definition to include French Québec, the Maritimes or even the West, except as an Ontario fief.

The mid-1890s saw yet another attempt to stem the flood of American consumer magazines with the publication of what would become *Maclean's Magazine*. Called the *Busy Man's Magazine*, 1896-1911, it was at first no more than a digest of previously published pieces. The magazine was successful in attracting advertisers, both from overseas markets and the US, especially after the adoption of American trim size. *Maclean's* expressed the Canadian national voice of the time — decidedly British and imperial — but it also frequently published such local writers as Lucy Maud MONTGOMERY and Robert SERVICE.

As the Canadian population stretched westward, magazines of regional and specialized interest began to appear. *The Manitoban* was launched in 1891 and the *British Columbian* followed 2 decades later. *Busy East* (eventually *Atlantic Advocate*) appeared in 1910, as did the *Canadian Home Journal*. The latter catered to the growing awareness of women as an important segment in society, although its content focused on recipes and housework. The market for trade and business magazines led J.B. MACLEAN to launch a series that included *Canadian Grocer* and *Dry Goods Review*. From the end of the 19th century also, farm weeklies increased in popularity, eg, Montréal's *Family Herald and Weekly Star*.

Circulation of Canada's top half dozen magazines never amounted to more than 300 000 during WWI, though American magazines flooded the country. In 1927 some foreign materials, mainly fiction, were denied free entry, but this had no appreciable effect on the home industry and talent continued to drain south. However, *Mayfair* and *Chatelaine*, both modeled on American formats, were launched in the late 1920s, with *Chatelaine* gaining 60 000 readers in its first year (1928). Government was finally beginning to listen to the woes of industry, which had greatly increased with the advent of commercially sponsored radio programs in 1928. "The world is listening, not reading" was the slogan that wooed many advertisers, at least temporarily, away from print and into broadcast. In 1931 R.B. BENNETT's Conservative government imposed a content tax on US magazines devoting more than 20% of their space to advertising, with the result that some 50 American magazines began printing in Canada. Mackenzie KING removed the tax when his Liberals regained power in 1935, arguing that it was a tax on thought and literary art. The American magazines immediately returned home and Canadians returned to importing them.

The coming of WWII caused magazine circulations, particularly of opinion and information magazines, to increase considerably. *Maclean's*, for example, reached a circulation of 275 000 in 1940. Canadian editions of American magazines were introduced as well — *Time Canada* appeared in 1943 — and the American *Liberty* magazine increasingly used Canadian content.

The influence and sheer presence of American magazines was felt even more after the war. B.K. Sandwell, editor of *Saturday Night*, complained that Canada was the only country in the world in which the largest percentage of reading matter was foreign controlled; 86 489 copies of US-owned magazines were bought by Canadians in 1948. A year before Mackenzie King had banned the importation of pulp magazines and comic books, but had exempted supplements distributed with newspapers. The STAR WEEKLY in Toronto became the exclusive carrier of the most popular comics from the US, thus playing havoc with the circulation of the *Montreal Star*'s rotogravure supplement, the MONTREAL STANDARD. In retaliation, the *Montreal Star* launched WEEKEND MAGAZINE as a supplement in 1951, with an initial circulation of 900 000. In 1952 the combined circulation of *Weekend* and *Star Weekly* was almost 2 million — 300 000 more than the total circulation of the 4 leading Canadian magazines of the time.

Television advertising began in 1952 and within one year it accounted for $1 335 000 in sales. The combined threat of weekend supplements, television and American magazines seemed unbreachable, until in 1956 the Liberal government imposed an advertising tax on Canadian editions of US magazines. The following year, however, the Conservatives repealed it.

In 1959 Grattan O'LEARY, editor of the OTTAWA JOURNAL, was appointed chairman of a 3-member Royal Commission on Publications to study the "position and prospects of Canadian magazines and other periodicals with special attention to foreign competition." The commission found that 75% of the general-interest magazines bought in Canada were American publications, that *Time* and *Reader's Digest* took 40 cents out of every dollar of magazine advertising, and that there were only 5 Canadian general-interest consumer magazines, of which *Maclean's* and *Liberty* were in poor financial shape (*Liberty* ceased publication in 1964). When the commission tabled its report in June 1961, its major recommendations were that expenditures made for advertisements in imported publications aimed at the Canadian market be disallowed as income tax deductions and that foreign periodicals containing Canadian domestic advertising be banned from entering Canada.

The DIEFENBAKER government accepted the recommendations but made special reservations for foreign periodicals already established in the country, specifically *Time* and *Reader's Digest*. Before these changes could be implemented, the Liberals under Lester PEARSON came into office and the magazine question was shelved until the Special Senate Committee on the Mass Media was struck (1969) under the chairmanship of Liberal Senator Keith DAVEY. The Davey Committee recommended in its report, "The Uncertain Mirror," in 1970 that the O'Leary Commission findings be implemented. Between the time of the O'Leary Commission and the Davey Report, *Reader's Digest* circulation had climbed from 1 million to nearly 1.5 million, *Time*'s circulation had increased from 215 000 to 444 000 and its advertising revenue had nearly tripled from $3.9 million to $9.5 million. At the same time, television attracted an increasing proportion of brand-name advertising and destroyed the economic base of mass consumer magazines.

Matters continued to drift until yet another official investigation was launched. The Ontario Royal Commission on Book Publishing delivered its final report with some 70 recommendations on 22 Feb 1973. On 7 Oct 1974 *Saturday Night*, the country's oldest surviving magazine, suspended publication. That same year a group of Canadian magazine publishers, headed by Michael de Pencier, publisher of *Toronto Life* (founded in 1966 and premier publication of Key Publishers), banded together to form the Canadian Periodical Publishers' Assn to foster a Canadian-owned and -controlled magazine publishing industry. Incorporated in 1975 as Bartholomew Green 1751 Assn Inc — in memory of the man who brought the first printing press to Canada — the lobby group had 180 members in 1984.

On 18 Apr 1975 the Liberal government introduced Bill C-58 to eliminate, among other things, the tax concessions enjoyed by Canadian editions of foreign-owned publications such as *Time* and *Reader's Digest*. Four days later *Saturday Night* resumed publication. After the bill passed in Feb 1976, *Time* announced the end of its Canadian edition and the last issue appeared on 1 Mar 1976.

One of the greatest beneficiaries of Bill C-58 was MACLEAN HUNTER (with 160 magazines, the largest magazine publisher in Canada), which had long wanted to revamp *Maclean's* into a newsmagazine. The launch of such a publica-

tion, which Secretary of State Hugh Faulkner had informed the Commons was a major purpose behind the bill, occurred on 18 Sept 1978 under the editorship of Peter C. NEWMAN.

The most obvious contemporary trend in magazine publishing (other than the continuing and overwhelming presence of foreign publications) is the emergence of life-style and specialty magazines, some of which, such as *Toronto Life* or *Western Living*, are regional in nature. Sophisticated market research techniques have meant that target audiences — career women, homemakers, travellers, lawyers, or even smaller groupings such as lawyers who travel — can be identified readily and an editorial product designed to deliver appropriate advertising material to the designated consumer. The Kent Commission (1981), discovered that slightly over three-quarters of the population were magazine readers, and that readership was higher among the young and better educated.

The term "general-interest magazine" has little relevance in the contemporary market. Nowhere is that more apparent than in the increasing prominence of controlled-circulation magazines. The largest publisher of such magazines is COMAC, which was founded in 1966 and has 9 magazines including *Homemaker's/Madame à foyer*, *Quest* (which folded in late 1984) and *City Woman*. In late 1983 a rival company launched the largest circulation Canadian magazine, *Recipes Only*, which has a controlled circulation of 2 million readers and is a prime example of the current trend toward publishing for a narrow and specific market. All these magazines endorse doctrines of affluence and have a clear middle- and upper-middle-class consumer bias. They reflect a glistening internationalism rather than a parochial nationalism and, in that sense, are a mirror of contemporary Canadian middle-class aspirations. *See also* LITERARY MAGAZINES IN ENGLISH; LITERARY PERIODICALS IN ENGLISH; LITERARY PERIODICALS IN FRENCH. SANDRA MARTIN

Reading: H.F. Angus, ed, *Canada and her Great Neighbour* (1938); P. Audley, *Canada's Cultural Industries* (1983); Canada, Royal Commission on Publications, *Report* (1961); F.S. Chalmers, *A Gentlemen of the Press* (1969); I. Litvak and C. Maule, *Cultural Sovereignty: The Time and Reader's Digest Case in Canada* (1974).

Magistrate, historically, retired police officers, now lawyers appointed by the lieutenant-governor-in-council. Known in most provinces as provincial court judges, magistrates are judicial officers with summary jurisdiction in both criminal and civil actions, hearing minor indictable offences and those where the accused may elect mode of trial. They may preside over family court or small-claims court, and are ex officio COMMISSIONERS FOR OATHS. K.G. MCSHANE

Magnussen, Karen Diane, figure skater (b at North Vancouver 4 Apr 1952). An accomplished free-skating performer, Magnussen won the women's title at the Canadian championships in 1968. In 1969 she withdrew from world competition because of stress fractures in both legs, but recovered in 1970 to recapture the Canadian title, which she held until 1973. She won silver medals in the 1972 Sapporo Olympics and world championships. In 1973, when free skating — Magnussen's strength — was given a larger percentage of the total marks, she won the world championship in Bratislava, Czechoslovakia, with a brilliant performance. She received the Velma Springstead Trophy as Canada's outstanding woman athlete 1971-73 and was awarded the Order of Canada in 1973. BARBARA SCHRODT

Magog, Qué, City, pop 13 604 (1981c), inc 1950, is situated on the Magog R at the outlet of Lac Memphrémagog (Abenaki, "expanse of water") in the EASTERN TOWNSHIPS. Economic links have been strong with both SHERBROOKE, 25 km E, and MONTRÉAL, 122 km NW. Formerly an Indian campsite and subsequently known as The Outlet, its first settlers were LOYALISTS and other Americans. Today's population is predominantly French Canadian. Built in 1884, A.H. Moore's Magog Cotton and Print Co, the first calico-printing plant in Canada, was amalgamated with Dominion Cotton Mills in the 1890s. Moore's Magog and Waterloo Railroad was sold to the CPR. Currently at the centre of the city's economy, the Dominion Textile Co employs one-fifth of Magog's population. Other important employers include the food-processing, clothing, printing and iron-products industries. Lac Memphrémagog and nearby Mont Orford have made Magog a traditionally popular resort area, which also hosts a summer theatre, swim meet and music festival. PAULA KESTELMAN

Magpie, common name for BIRDS of several genera in the CROW family. Of the 17 species known worldwide, only the black-billed magpie (*Pica pica*) is found in Canada. This permanent resident breeds from southern YT to western Manitoba, wandering further E in winter. Magpies have extended their range eastward in historical times. Magpies possess heavy bills and short, rounded wings. Their tails often make up over half their total length of some 50 cm. Magpies are black with white scapulars (feathers at the base of the wing) and underparts. They are weak fliers, adapted to ground foraging in open habitats. Their elaborate nests, requiring about 6 weeks for construction, are composed of a domed mass of sticks with one or more entrances leading to a cup of mud. Magpies are believed to mate for life. LORRAINE G. D'AGINCOURT

Maguire, Thomas, Roman Catholic priest (b at Philadelphia, Pa 9 May 1776; d at Québec C 17 July 1854). Educated at the Séminaire de Québec, he was ordained in 1799 and was parish priest at Berthier (Berthier-sur-Mer) 1805-06 and Saint-Michel, 1806-27. Dedicated to education as a means of raising clerical prestige, he was director of the Collège de Saint-Hyacinthe 1827-31. As chaplain at the Ursuline convent, Québec 1832-54, he updated the curriculum and teaching practices in its boarding school for girls. A remarkable administrator, he saved both the college and convent from impending financial ruin. He was emissary from the Canadian bishops to Rome (1828-29, 1833-35) during their struggle against the Sulpicians to establish the episcopal authority of Jean-Jacques Lartigue. Maguire was an impassioned polemicist against attacks on the church by British Protestants and Canadian liberal professional men. From 1835 until his death he was vicar general of the bishop of Québec. JAMES H. LAMBERT

Reading: Lucien Lemieux, *L'Établissement de la première province ecclésiastique au Canada, 1783-1844* (1968).

Maheux-Forcier, Louise, writer (b at Montréal 9 June 1929). After extensive musical studies, she decided to devote herself exclusively to writing. Her first novel, *Amadou* (Prix du Cercle du livre de France, 1963), one of Québec's first poetic novels, developed the then taboo theme of lesbianism. While revealing her as a subtle, lucid and courageous writer, the novel aroused passionate controversy among critics. The author pursued her quest for primal beauty in her other novels (*L'Île joyeuse*, 1965; *Une Forêt pour Zoé*, 1969, Gov Gen's Award; *Paroles et musique*, 1973; *Appassionata*, 1978), as well as in her short stories (*En toutes lettres*, 1980) and films for television. The ever-present androgynous character exerts a strong attraction on the living sources of this dream world, finding expression in a visual and rhythmical perfection of writing. GABRIELLE POULIN

Mahone Bay, NS, Town, pop 1228 (1981c), is located on the "Lighthouse Route" of NS's S shore, 10 km NW of LUNENBURG. A quiet residential community and retirement haven, it is known for its beautiful bay, dotted with hundreds of islands. Its name is derived from the French *Mahonne*, "Venetian Boat," referring to the long, low boats used by pirates who frequented the area. In 1754 Capt Ephraim Cook brought English, French and Swiss settlers to the area. Farming and fishing were mainstays of life until the mid-1800s, when shipbuilding became an important industry. Today the building of pleasure craft has replaced construction of seagoing vessels. Mahone Bay has been able to adapt to the 20th century by concentrating on the manufacturing, service and tourism industries. Although many young people have left the town, it has shown a consistent growth rate over the last 50 years. HEATHER MACDONALD

Mahone Bay is an inlet of the Atlantic Ocean on the SE coast of Nova Scotia, 70 km W of Halifax. With many safe and sheltered anchorages, it is perhaps the finest cruising area in the province. Of its 365 islands, Tancook 1 in the mouth of the bay is the largest and best known. Apart from recreation and tourism, the primary industries are fishing and shipbuilding. The famous fishing schooner BLUENOSE was built and launched in 1921 at LUNENBURG on the western shore of the bay. P.C. SMITH

Mahovlich, Francis William, Frank, hockey player (b at Timmins, Ont 10 Jan 1936). He played junior hockey at St Michael's College, Toronto, and joined TORONTO MAPLE LEAFS 1957-58, winning the CALDER TROPHY. A powerful skater with an explosive slap shot, he led Toronto in scoring 1960-66, and played a large part in Toronto's 4 STANLEY CUP victories of the 1960s. His obvious capabilities led to great expectations and pressures from fans and management, and he left the team twice, distressed with his treatment. In 1962 Chicago owner James Norris offered $1 million for him in a much-publicized incident. He was traded to Detroit 1967 and then Montréal 1970, where he set a new playoff scoring record in 1971. He finished his career with Toronto Toros, later Birmingham Bulls, of the WHA, retiring in 1978. In 17 NHL seasons he scored 533 goals and 570 assists, adding 51 goals and 67 assists in playoffs. JAMES MARSH

Maillard, Pierre, priest of the Séminaire des missions étrangères, missionary (b in the diocese of Chartres, France *c*1710; d at Halifax 12 Aug 1762). Missionary to the MICMAC, Maillard was a brilliant linguist who perfected a system of written symbols for the Micmac language. He was sent to Île Royale [Cape Breton I] in 1735, and during the winter of 1737-38 worked out his system of hieroglyphics. In subsequent years he compiled a Micmac grammar and dictionary. Although (unknown to Maillard) there had been 2 earlier attempts to put Micmac in written form, Maillard's system alone had lasting impact. During the WAR OF THE AUSTRIAN SUCCESSION, he urged the Micmac to support the French cause. He was captured in 1745 and sent to France, but returned in 1746. In 1759 Maillard made peace with the British and, from 1760 until his death, lived in Halifax. JOHN H. YOUNG

Reading: M.D. Johnson, *Apôtres ou agitateurs* (1970); H.J. Koren, *Knaves or Knights?* (1962).

Maillet, Antonine, novelist (b at Buctouche, NB 10 May 1929). After the success of *La Sagouine* (1974) and *Pélagie-la-Charrette* (1979), which won the Prix Goncourt, Maillet dominates contemporary Acadian literature. Her imaginary universe is rooted in the geography, history and people of ACADIA. Her novels, often reworked for the theatre, fuse adventure, desire, frustration, agony and joy to offer a new image of the origi-



Antonine Maillet, whose novel *La Sagouine*, as well as being a great literary success, gave voice to her Acadian people (*courtesy Canapress*).

nal Acadia, restructured to fit an epic vision. She presents a simple event (conflict between 2 characters, a collective struggle to conquer the land, the long trip back to the homeland of Acadia), rich in every kind of development. As the characters work through these developments, they become symbols. The language of these pieces, a fusion of "ancient and sonorous words" and literary language, is an original creation. The narrator is often presented not as an individual but as a collective being, the memory of the Acadian people. Maillet is a storyteller. In all her tales, the action is narrated by someone whose imagination moves through history to legitimize the soul of the people. Only *La Sagouine* is not a narration. Here the character is autonomous and has an authenticity and complexity that lifts her above the other characters in the piece.

Maillet's renown coincides with an Acadian cultural revival. *La Sagouine*, as well as being a genuine literary success, appeared at the right moment to give voice to the Acadians. We find in that voice wisdom and lucidity, verve and reserve, humour and anger. As the author herself says, to recognize her works is to recognize the people to whom she belongs. YVES BOLDUC

Maillou, *dit* Desmoulins, Jean-Baptiste, builder, architect (b at Québec City 21 Sept 1668; d there Sept 1753). The brothers Joseph and Jean Maillou were successors of Claude BAILLIF and, because of their knowledge of classical and French Renaissance design, were employed by merchants, clerics and government officials. Joseph's death in 1702 left Jean-Baptiste in control of a flourishing business constructing houses, churches, religious houses, public buildings and FORTIFICATIONS. The French Crown's military expenditures sustained the colony, and Maillou profited from the defences built at Québec and Crown Point (NY). He received the title "Architect to the King" in 1719. Having been a land surveyor and expert estimator, he was appointed deputy overseer of highways in 1728. Royal patronage was vital to social advancement in NEW FRANCE and, under the Crown's aegis, this former stonemason became a propertied and influential bourgeois of Québec.

PETER N. MOOGK

Reading: Peter N. Moogk, *Building a House in New France* (1977).

Maillou House, 17 rue St-Louis, Québec City (1736, 1766-67, 1805), built in 3 phases spanning the French and British periods, bears witness to the enduring conservatism of Québec building traditions. Begun soon after 1736 and probably built by its owner, self-taught architect and master mason Jean-Baptiste MAILLOU, the house received a second storey in 1766-67 during the ownership of seigneur Antoine Juchereau Duchesnay. A 2-bay extension to the E was added in 1805 by John Hale, deputy paymaster general for the British army in N America. The irregular rubble masonry walls, cut-stone jambs, steep roof pitch, iron shutters, asymmetrically placed chimneys and double rows of dormers are all traditional features of 18th-century domestic architecture in Québec. CHRISTINA CAMERON

Mainguy, Edmond Rollo, naval officer (b at Chemainus, BC 11 May 1901; d at Nanaimo, BC 29 Apr 1979). After graduating from the Royal Naval College of Canada, he served in various posts until 1939, when he took command of the destroyer *Assiniboine*. Following a year as captain (Destroyers), Newfoundland, Mainguy became chief of naval personnel in 1942 and ended the war in command of the cruiser HMCS *Uganda*. A capable and well-liked officer, he chaired a commission in 1947 investigating several mutinies in the fleet. The resulting "Mainguy Report" recommended improvements in the handling of lower deck grievances. He was promoted rear admiral and appointed chief of the naval staff in 1951. Mainguy retired from the navy in 1956 and was president of Great Lakes Shipping until 1965. MARC MILNER

Maintiens le Droit [French, "Uphold the Right"], the official motto of the ROYAL CANADIAN MOUNTED POLICE. The use of the motto by the NORTH-WEST MOUNTED POLICE was first advocated in 1873 and adopted 2 years later. The expression "They always get their man," associated with the force since 1877, has no official standing. JOHN ROBERT COLOMBO

Mainwaring, Sir Henry, pirate (b near Ightfield, Eng 1587?; buried at Camberwell [London], Eng 15 May 1653). A skilled navigator who was commissioned by the Crown in 1610 to capture the pirate Peter EASTON, he failed and turned to piracy, basing himself in N Africa. In 1614 he sailed for Newfoundland to reprovision his ships and recruit men. He took over Easton's old base at HARBOUR GRACE and terrorized Spanish and Portuguese shipping in the region. His audacious attacks almost destroyed the peace between England, Spain and Portugal. Pardoned in 1616 by James I, he returned to England where he was knighted, elected to Parliament and made a vice-admiral. A Royalist, he was ruined during the English Civil War and died in poverty. EDWARD BUTTS

Reading: Edward Butts and H. Horwood, *Pirates and Outlaws of Canada* (1984). G.E. Mainwaring, ed, *The Life and Works of Sir Henry Mainwaring (1920-22)*.

Mair, Charles, writer, civil servant (b at Lanark, UC 21 Sept 1838; d at Victoria 7 July 1927). Mair's memory rests on 3 bases: his inflammatory activities surrounding the RED RIVER REBELLION of 1870; his role in the formation of CANADA FIRST, an early nationalist movement; and his composition of the drama *Tecumseh* (1886). Mair represented to an extreme the contemptuous Upper Canadian dismissal of the Métis claims. Imprisoned by Louis RIEL at the outbreak of the rebellion, Mair escaped and on his return to Ontario agitated tirelessly for the suppression of the uprising. Canada First, of little immediate, practical influence, remains significant as the first of a series of Canadian nationalist groups. While not outstanding from a literary viewpoint, *Tecumseh* was important in the development of Canadian drama. It presents a vision of Canada as a co-operative enterprise in contrast with the self-seeking individualism of the US. DENNIS DUFFY

Maisonneuve, Paul de Chomedey de, officer, founder of MONTRÉAL (bap at Neuville-sur-Vanne, France 15 Feb 1612; d at Paris, France 1676). He was chosen by the Société Notre-Dame de Montréal to found a missionary colony on Montréal I. The expedition, which included Jeanne MANCE, arrived at Québec late in 1641. Maisonneuve began construction of VILLE-MARIE [Montréal] in 1642 and remained governor of Montréal I to 1665. His most urgent problem was to protect the settlement during the IROQUOIS WARS. In 1663, the year in which NEW FRANCE came under direct royal government, ownership of Montréal I passed from the Société Notre-Dame to the Sulpicians. The history of these early years is told in DOLLIER DE CASSON'S *Histoire du Montréal, 1640-1672* (1868; tr *A History of Montreal*, 1928).

MARY MCDOUGALL MAUDE

Maitland, Ont, UP, pop 667 (1981c), located on the St Lawrence R, 8 km E of Brockville. During the SEVEN YEARS' WAR (1756-63) it was the site of a fort and shipyard, Pointe au Baril, where the last French warships to sail on Lk Ontario were built. The father of Maitland was Ziba Phillips, a Loyalist who acquired property there in 1818 and built a house. A townsite was laid out in 1824 and named after Sir Peregrine MAITLAND, lt-gov of Upper Canada at the time. St James's Church, begun in 1826, survives as a fine example of early Gothic revival architecture. Barbara Heck, founder of N American Methodism, settled here after the American Revolution. Never developing beyond a small settlement, Maitland has profited from the commercial traffic along the St Lawrence corridor and the popularity of the St Lawrence islands with vacationers.

DANIEL FRANCIS

Maitland, Sir Peregrine, soldier, civil administrator (b in Hampshire, Eng 6 July 1777; d at London, Eng 30 May 1854). At age 15 he joined the Grenadier Guards. He served with distinction at the Battle of Waterloo and was knighted in 1815. In 1818 he was appointed lt-gov of Upper Canada, where he became identified ideologically with the conservative element later known as the FAMILY COMPACT. Continuously at the centre of political controversy, he believed that democratic and American tendencies in Upper Canadian society had to be resisted to maintain the imperial connection. By the end of his tenure, Reform elements were demanding that the lt-gov choose his advisers from elected members of the Legislative Assembly, one of the issues that led to the REBELLIONS OF 1837. As lt-gov of NS 1828-34 he left little mark on the province's political history. Appointed commander in chief of the Madras army in 1836, he resigned 2 years later. In 1844 he became governor of Cape of Good Hope, but was replaced during the Kaffir War, being considered ineffective.

HARTWELL BOWSFIELD

Major, André, writer, literary critic, journalist (b at Montréal 22 Apr 1942). Since 1973 Major has been a producer of cultural programs for the Radio Canada network. He first became known in 1961, with the appearance of 2 collections of poetry: *Le Froid se meurt* and *Holocauste à deux voix*. By 1963 he was also publishing short stories. That same year he helped found PARTI PRIS, to which he contributed until 1965. In this same period Major was especially interested in the often tragic problems of young people struggling to contain personal rebellion. Since 1968, without ceasing to express himself politically, Major has published poems and several novels. One novel, *Les Rescapés* (1976), won the Gov Gen's Award. His newest story is "La Folle d'Elvis" (1981). Major is also interested in theatre and has written 2 radio plays and a stage play.

JACQUES COTNAM

Makpaaq, Vital (Makpa, Arnasungnark), sculptor (b near the Kazan R, S of Baker Lk, NWT 1922; d at Baker Lk 1978). Makpaaq was a stone carver of the Sarvaqtuungrmiut group of inland CARIBOU INUIT. His sculptures, of extreme formal simplicity, describe the intimate life of his people: a mother giving birth in the old way over a skin-lined shallow pit, aided by a midwife and her husband; an Inuit family joined by the mass of the stone and the spirit of the carver. His work has been exhibited internationally, notably in the 1971-72 Masterworks of the Canadian Arctic exhibition. *See* INUIT ART.

K.J. BUTLER

Malahat Pass, elev about 280 m, is located 25 km NW of Victoria, BC, on Vancouver I. It is the height of land S of Malahat Ridge between Finlayson Arm — Squally Reach and Shawnigan Lk. The Esquimalt-Nanaimo Ry was completed from Victoria to Nanaimo in 1886 using the pass to bypass Malahat Ridge. A paved road now also crosses it. Malahat is an Indian word meaning "place where one gets bait." GLEN BOLES

Malartic, Qué, Town, pop 4833 (1981c), inc 1939, is located 70 km E of ROUYN-NORANDA in northwestern Québec. It was established by Québec's Ministry of Mines, which hoped to end the proliferation of squatter camps that had sprouted up around the gold mines in this part of the Abitibi region during the gold rush of the mid-1930s. The town was named after the first gold mine, which was possibly named after the comte de Malartic, Montcalm's aide-de-camp. It developed near 3 of the largest gold mines in Québec — the Canadian Malartic, E Malartic and Malartic goldfields — and the population reached its peak (5983) in the early 1950s. Malartic's economic and urban structure was deeply affected in the 1960s by the decline in the region's mining industry and the closure of the major mines. Despite these problems, the town lives on, its economy still based on its gold mines. The Malartic regional mining museum chronicles the history of the town and valley during the mining boom.

BENOÎT-BEAUDRY GOURD

Malaspina Expedition, 1789-92. The successful scientific expeditions of James COOK and the comte de Lapérouse to the Pacific Ocean caused the Spanish to desire similar international acclaim. Through scientific investigation they also hoped to consolidate their claims to sovereignty over territories in the Pacific. Alejandro Málaspina and José Bustamante y Guerra received command of 2 specially prepared corvettes, *Descubierta* and *Atrevida,* whose crews were supplemented by scientists and artists. The expedition sailed from Spain on 30 July 1789 and rounded Cape Horn. Malaspina planned to investigate the Sandwich Is [Hawaiian Is], but new orders from Spain redirected his ships to the NORTHWEST COAST. The 1789 NOOTKA SOUND CONTROVERSY with the British and persisting beliefs in the existence of a NORTHWEST PASSAGE led to the side trip.

In search of the fabled STRAIT OF ANIAN, Malaspina sailed to 59° N lat. On 27 June 1791 the corvettes entered Mulgrave Sound (Yacutat Bay, Alaska). Reconnaissance dashed hopes that a Northwest Passage was accessible by this route, but the scientists collected samples and studied Tlingit culture. Malaspina coasted farther west along the Alaskan shore before heading south to Nootka Sound. Arriving 12 Aug 1791, the scientists employed the Spanish post at Yuquot (Friendly Cove) as a base from which to explore, chart, collect minerals and plants and observe the Nootka.

Returning to Mexico, Malaspina made recommendations leading to the 1792 voyage of the SUTIL AND MEXICANA. He visited the Marianas, the Philippines, New Zealand and Australia before returning via S America to Spain. Although the expedition was highly successful, Malaspina's ensuing troubles with the Spanish court led to suppression of a 7-volume work designed to glorify the Spanish exploits; the account did not reach print until the late 19th century. *See* SPANISH EXPLORATION. CHRISTON I. ARCHER

Reading: Iris H.W. Engstrand, *Spanish Scientists in the New World* (1981).

Malaysians Malaysia was constituted in 1963 out of the Federation of Malaya and the former British colonies of Singapore (until 1965), Sarawak and North Borneo (Sabah). The population of Malaysia includes the Malays (about 46%), Chinese (about 35%) and Indians (about 9%). The term "Canadian Malaysian" therefore does not indicate membership of a discrete ethnic, linguistic or religious community, but simply a shared experience of national origin.

Migration and Settlement Between 1973 and 1980, 4721 Malaysians immigrated to Canada. Of these, 1597 (or 33.5%) planned to reside in Ontario; 1539 (32.6%) in BC; 801 (17%) in Alberta; 368 (7.8%) in Québec; and 237 (5%) in Manitoba. The largest single occupational group was clerical, followed by fabricating, assembling and repairing; science, engineering and math; medicine and health; managerial or administrative; service; entrepreneurial; sales; and construction.

Group Maintenance Although Malaysians do not belong to a single ethnic community, there is a sense of cultural identity (shared to a considerable extent with Singaporeans), which results from the fusion in the Malay world, over many centuries, of influences from China and India. It is this sense of common background that distinguishes Canadian Malaysians from other Asian communities in Canada. Community organizations in Toronto and Vancouver and Malaysian student associations on several university campuses encourage an awareness of aspects of Malaysian cultural traditions.

Since English is one of the languages widely used in Malaysia, assimilation of immigrants appears most likely to occur in anglophone Canada.

H.E. WILSON

Maliseet (Malecite) have long been associated with the SAINT JOHN R in NB and Maine, and early extended as far as the St Lawrence. These Algonkian (Algonquian) speakers referred to themselves as *Welustuk* ("of the beautiful river"). Their lands and resources are bounded on the E by MICMAC, on the W by Passamaquoddy and Penobscot. Local histories depict many encounters with IROQUOIS and MONTAGNAIS. Contact with European fisher-traders in the early 17th century and with specialized fur traders developed into a stable relationship which lasted for nearly 100 years. Despite devastating population losses to European diseases, these Atlantic hunters held on to coastal or river locations for hunting, fishing and gathering, and concentrated along river valleys for trapping.

With the general unrest as European hostilities concentrated between Québec and PORT-ROYAL, and as increasing sporadic fighting and raiding took place on the lower Saint John (English against the French), the eastern fur trade faltered. Maliseet women took over a larger share of the economic burden and began to farm, raising native crops which previously had been grown only S of Maliseet territory. Men continued to hunt, though with limited success, but they proved useful to the French as support against the English, and for a short period during the late 17th and early 18th centuries Maliseet men became virtually a military organization. With the gradual cessation of hostilities in the first quarter of the 18th century, and with the beaver supply severely diminished, there was little possibility of a return to traditional lifeways. Native agriculture on the river was curtailed by the coming of white settlers; all the farmland along the Saint John R, previously occupied by Maliseet family territories, was taken, leaving the native peoples virtually displaced persons. With evidence of widespread hunger and wandering, pressure came to bear on government officials who established the first INDIAN RESERVES during the 19th century, at Oromocto, Fredericton, Kingsclear, Woodstock and Tobique.

As late as the 19th century, the Maliseet practised some traditional crafts, especially building WIGWAMS and birchbark CANOES, but major shifts had taken place during the previous 2 centuries as Maliseet acquired European cutting tools and containers, muskets and alcohol, foods and clothing. In making wood, bark or basketry items, or in guiding, trapping and hunting, the Maliseet people have spoken of themselves as engaged in "Indian work." The growth of potato farming in Maine and NB created a market for Maliseet baskets and containers. Other Maliseet work in pulp mills, construction, nursing, teaching and business.

The Maliseet of NB experience problems of unemployment and poverty common to native people elsewhere in Canada, but they have evolved a sophisticated and intricate system of decision making and resource allocation, especially at Tobique where they support community enterprises in economic development, scouting and sports. Some are successful in middle and higher education and have important trade and professional standings; individuals and families are prominent in native and women's rights; and others serve in provincial and federal native organizations, in government and in community development. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE.

TOM MCFEAT

Reading: A.G. Bailey, *The Conflict of European and Eastern Algonkian Cultures, 1504-1700* (2nd ed, 1969); H.F. McGee, ed, *The Native Peoples of Atlantic Canada* (1984); W. Mechling, *Malecite Tales* (1914); W.D. and R.S. Wallace, *The Malecite Indians of New Brunswick* (1957).

Malloch, Archibald Edward, surgeon (b at Brockville, Canada W 14 June 1844; d at Hamilton, Ont 6 Aug 1919). Educated at Queen's and at U of Glasgow, where he graduated in 1867, he served as house surgeon for Joseph Lister when the latter was beginning to publish accounts of antiseptic surgery. He became a firm believer in the method and, after his return to Canada in 1869, was likely the first in the country to use it in its fully developed form. A skillful surgeon, he was not prominent outside medicine, nor was he active in medical circles outside his practice in Hamilton. His only formal relationship with a medical school — as professor of anatomy at Victoria College, Toronto — lasted less than 2 years. He was not as vociferous an advocate of antiseptic surgery as he might have been. By the 1890s, however, most Canadian surgeons were using antisepsis or its successor, asepsis.

CHARLES G. ROLAND

Malone, Maurice Joseph, hockey player (b at Sillery, Qué 28 Feb 1890; d at Montréal 15 May 1969). He turned professional with Québec Bulldogs in 1909, playing 7 years with them, 4 with MONTREAL CANADIENS and 2 with Hamilton Tigers. Some of his scoring feats have never been matched. He once scored 9 goals in a game, but it was his 7 goals on 31 Jan 1920 that was still the NHL record in 1984. He scored 142 goals in 125 NHL games; a total of 338 goals in 271 professional games.

JAMES MARSH

Malpeque, PEI, UP, pop 160 (1981c), is a compact, attractive village located on the northeastern shore of MALPEQUE BAY, 60 km NW of Charlottetown. First called *Makpaak* ("the big water") by the Micmac, the current name is an Acadian modification. When Samuel Holland surveyed the Island after the British CONQUEST of

New France, he believed that through the bay's excellent anchorage a major colonial seaport would develop in the area. Thus, he established the capital of Prince County in what is now the tiny coastal community of Princetown. With its crossroads development, Malpeque became the stronger of the 2 communities. However, the development of the Malpeque Bay area was cut short by sandbars at the bay's entrance that discouraged shipping. Because of the navigability of Bedeque Bay on the county's southern shore, both communities lost ground to SUMMERSIDE. Today, most of the residents of Malpeque are farmers and fishermen, and oysters are the area's most important product. W.S. KEIZER

Malpeque Bay is a picturesque bay so deeply indented into the NE coast of PEI that its southern edge lies within 7 km of the S coast of the Island. Aptly named from the Micmac word *makpaak*, ie, "the big water," it contains several islands and many small rivers and creeks flow into it. Its waters support a thriving shellfish industry, most notably its world-famous cultivated oysters. These are grown on "farms," where the young seed oysters are sown and later harvested from the mud on the bottom of the bay with long-handled, rake-ended tongs that are worked like scissors. P.C. SMITH

Malpractice is intentional or negligent failure by any professional, eg, doctor, lawyer, accountant, to meet the standards of reasonable competence in his field. These standards are set taking into account the circumstances in which the professional is acting. Specialists must meet the higher standards of a reasonably competent specialist; beginners must meet ordinary standards, inexperience being no excuse. Professionals are expected to keep up-to-date and to act only within the sphere of their own competence, and those acting otherwise will be judged according to the standards of practitioners by whom the task should have been undertaken. Québec's Civil Code contains a standard similar to that existing in the common law of TORT which, with the law of contract, governs malpractice in the other provinces. The damages awarded in malpractice suits vary enormously, depending on the loss to the plaintiff. Generally, they are much higher in the US than in Canada.
MARGARET SOMERVILLE

Maltese There are over 50 000 people of Maltese origin in Canada, most of whom emigrated after WWII from the islands of Malta (pop 315 000) and Gozo, which are situated in the Mediterranean, S of Sicily. Maltese trace their ethnic and linguistic origins to the Phoenicians. In 58 AD, when the Apostle Paul was shipwrecked on Malta, they were converted to Christianity. The Maltese, who speak a Semitic tongue, celebrate their national day on March 31. In Canada the Maltese settled first in Ontario; although significant immigration occurred in 1840, around 1907, and between 1918 and 1920, there were few Maltese in Canada until after WWII. Between 1946 and 1981 over 18 000 came to Canada. Toronto has the largest Maltese community (some 25 000) with a heavy concentration around Dundas St W, where the Maltese Franciscan fathers have built a church. Maltese clubs and societies are located in this area. Other Maltese communities are found in Ontario and in Montréal, Winnipeg and Vancouver.
GEORGE BONAVIA

Mammals, including humans, are generally regarded as the most advanced of VERTEBRATES (animals with a backbone and spinal chord or, at least, a notochord). Their large and complex brains allow for learning, quick reactions and flexible behaviour. The word is derived from the milk-producing mammary glands unique to the class Mammalia.

Major Groups of Mammals in Canada
(excluding humans)
Numbers refer to native species

Order	*Family*	*Examples*
Marsupialia	Didelphidae (1)	opossum
Insectivora	Soricidae (16)	shrews
	Talpidae (6)	moles
Chiroptera	Molossidae (1)	free-tailed bat
	Vespertilionidae (*c* 18)	common bats
Carnivora	Canidae (6)	dog, wolf, fox
	Felidae (3)	cats
	Mustelidae (*c* 14)	weasel, skunk, otter, wolverine
	Odobenidae (1)	walrus
	Otariidae (3)	eared seals
	Phocidae (*c* 7)	hair seals
	Procyonidae (1)	raccoon
	Ursidae (3)	bears
Cetacea:		
Odontoceti	Delphinidae (*c* 11)	dolphins
	Monodontidae (2)	white whale, narwhal
	Phocoenidae (2)	porpoises
	Physeteridae (2)	sperm whales
	Ziphiidae (*c* 8)	beaked whales
Mysticeti	Balaenidae (2)	right or baleen whales
	Balaenopteridae (5)	fin whales
	Eschrichtiidae (1)	grey whale
Perissodactyla	Equidae*	horse
Artiodactyla	Antilocapridae (1)	pronghorn
	Bovidae (5)	bison, sheep, muskox, goat
	Cervidae (5)	moose, deer, caribou
	Suidae*	hog
Rodentia	Aplodontidae (1)	mountain beaver
	Arvicolidae (*c* 23)	muskrat, vole, lemming
	Capromyidae*	nutria or coypu
	Castoridae (1)	beaver
	Cricetidae (*c* 7)	native mice
	Dipodidae (4)	jumping mice
	Erethizontidae (1)	porcupine
	Geomyidae (2)	pocket gophers
	Heteromyidae (3)	pocket mice, kangaroo rats
	Muridae*	Old World mice and rats
	Sciuridae (*c* 22)	squirrel, marmot
Lagomorpha	Leporidae (2)	hare, rabbit
	Ochotonidae (5)	pika

*Introduced or domesticated

Although Canada has a rich and diverse mammalian fauna, few species are uniquely Canadian. These include Vancouver I marmot (*M. vancouverensis*), Gaspé shrew (*S. gaspensis*) and Ungava lemming (*Dicrostonyx hudsonicus*). Our known fauna is shared with Greenland, Alaska and the northern US. Of the N American terrestrial mammal fauna, many reach their northern limits of distribution somewhere in Canada. Our marine and arctic mammals tend to consist of northern circumpolar species. There has been an interchange of species with the Old World across the Bering Strait that includes caribou (reindeer), wapiti, moose, bears, weasels, walruses, various rodents, etc. Other species have made their way to Canada from the neotropics. These include the opossum, raccoon and porcupine. One of the truly endemic species of N America, the pronghorn, occurs in the plains regions of Canada and the US. Fur-bearing mammals figured prominently in the early years of exploration and settlement of Canada and have been an economically important resource throughout the years. The HUNTING of big-game species has also contributed significantly to the Canadian economy. Compared with most nations, Canada is particularly fortunate in still having substantial wilderness areas providing suitable habitats for many mammals and therefore Canada has fewer rare or endangered species than most countries. As lands are being more and more exploited by ever-increasing human populations, the safeguarding of native mammalian fauna through wise conservation becomes increasingly important and critical.
R.L. PETERSON

Reading: A.W.F. Banfield, *The Mammals of Canada* (1977).

Mance, Jeanne, founder of the HÔTEL-DIEU hospital at Montréal (bap at Langres, France 12 Nov 1606; d at Montréal 18 June 1673). When young and unusually interested in foreign missions, Jeanne Mance was introduced to Mme de Bullion (who dedicated a small fortune to establishing a hospital at Montréal) and to the Société Notre-Dame de Montréal and its associates. Mance joined the association, which planned a utopian settlement on Montréal I, and sailed in 1641 with Maisonneuve and the first settlers for VILLE-MARIE, spending her first winter at the Sillery reserve. The hospital was not completed until 1645 but there were patients from 1642. She returned to France in 1645 to make new financial arrangements and again in 1657 after fracturing her arm. She came back claiming to have been miraculously healed and bringing Sisters Hospitallers from La Flèche to staff her hospital. CORNELIUS J. JAENEN

Mandel, Eli, author (b at Estevan, Sask 3 Dec 1922). The son of Russian Jewish immigrants, he was raised on the Prairies during the Depression, an experience that left its mark on his poetry. Mandel has taught English and creative writing at the universities of Alberta, Victoria, Toronto and York University. He is the author of 10 books of poetry (including *Dreaming Backwards,* 1981; *Life Sentence,* 1981) and several works of criticism (*Silent Speaking Words,* 1967; *Another Time,* 1977). Mandel's *An Idiot Joy* (1967) won the Gov Gen's Award for poetry. The title, which comes from Saul Bellow's *Herzog,* sums up Mandel's view of his role as an obsessive, omniscient wordsmith, capturing his own life experiences in language. SHARON DRACHE

Manery, Jeanne Fisher, biochemist (b at Chesley, Ont 6 July 1908). She was educated at U of T, did postdoctoral studies at the universities of Rochester and Harvard, was a demonstrator in the physiology department, U of T (1932-35) and then demonstrator and special lecturer in the biochemistry department (1940-48). In 1948 she was appointed part-time assistant professor and in 1953 full-time, a first for a woman in that department. A full professor in 1965, she retired in 1976 but remained active in teaching, research, publishing and administration. An expert in the physiology of transport into and out of cells of water and the ions essential for many cellular functions, especially the generation of energy, Manery has succeeded in isolating and characterizing the enzyme of the cellular membrane which catalyses cation transport, work described in numerous scientific papers in journals and monographs. Manery's honours in recognition of her scientific accomplishments include an honorary doctorate (1983) from Memorial U. She has had a long association with the Royal Canadian Institute, of which she was president in 1980. Her scientific work and her recent feminist endeavours brought women a new status in her field. ROSE SHEININ

Manicouagan Réservoir, 1942 km², elev 360 m, located in southeastern Québec about 140 km from the Labrador border, is the second-largest lake in Québec and was created by a meteorite millions of years ago. The circular-shaped reservoir contains a centrally situated island, capped by 952 m Mont de Babel. Fed by the Rivières Hart Jaune and Mouchalagane, it drains S, via the 250 km Rivière MANICOUAGAN, and empties into the St Lawrence R near BAIE-COMEAU. Hydro-

electric developments have resulted in the damming of the water flow at the 214 m high Daniel Johnson (Manicouagan 5) Dam, one of the world's largest, situated 40 km S of the reservoir (1968). The availability of power has attracted several industries over the years, yet the area still retains its attraction for canoeists, fishermen and wildlife enthusiasts. Its name is possibly of Cree origin and might mean "where there is bark" (for canoe making). It could also be a French form of *Manicouaganistiku,* meaning "drinking place." The lake appears on Jonathan Carver's map of Québec (1776) as Lk Asturagamicook, and is shown to be drained by the Manicouagan or Black R. DAVID EVANS

Manicouagan River, 455 km long, rises in E-central Québec near the Labrador border and flows S to the ST LAWRENCE R near BAIE-COMEAU. It drains a rugged, heavily forested watershed of 45 900 km², and has been an important artery for moving logs S to supply pulp and paper mills at its mouth. Several hydroelectric power plants (Manic 1 completed 1967, 184 000 Kw; Manic 2 completed 1967, 1 015 000 Kw; Manic 3 completed 1976, 1 183 200 Kw; and Manic 5 completed 1971, 1 292 000 Kw) have harnessed the river's power, some of which is carried under the St Lawrence by a submarine cable to the Gaspé area. Iron ore is mined in the river's upper reaches. The name may come from an Indian word meaning "where there is bark" (ie, for making canoes). DANIEL FRANCIS









Manitoba

Capital: Winnipeg
Motto: None
Flower: Prairie crocus
Largest Cities: Winnipeg, Brandon, Thompson, Portage la Prairie, Flin Flon
Population: 1 026 000 (1981c); rank fifth, 4.2% of Canada; 70.9% urban; 19.7% rural nonfarm; 9.5% farm; 1.9 per km² density; 0.8% decrease from 1976-81; Jan 1984e pop, 1 051 500
Languages: 86% English; 5.1% French; 10.9% Other
Entered Confederation: 15 July 1870
Government: Provincial — Lieutenant-Governor, Executive Council, Legislative Assembly of 57 members; federal — 6 senators, 14 members of the House of Commons
Area: 650 087 km²; including 101 592 km² of inland water; 6.5% of Canada
Elevation: Highest point — Baldy Mountain (832 m); lowest point — Hudson Bay shore
Gross Domestic Product: $13.9 billion (1982e)
Farm Cash Receipts: $1.7 billion (1982)
Electric Power Generated: 22 084 154 MWh (1983)
Sales Tax: 6% (1984)

Manitoba is the "keystone" province located in the heart of Canada. Created by the Manitoba Act of 1870, the province was at first a tiny rectangle comprising little more than the RED RIVER COLONY radiating from the juncture of the Red and Assiniboine rivers. After lengthy and often difficult provincial-federal negotiations the boundaries were extended in 1881 and 1884. In 1912 they were finally set at 49° to 60° N and 101°30'-102° W to 95° W, angling NE at about 53° N on the E boundary. For 200 years the FUR TRADE dominated the area known as RUPERT'S LAND. Settlement, particularly from eastern Canada and eastern Europe, eventually created a sound agricultural tradition. Postwar political and economic efforts have enabled the economy to diversify industry and develop primary resources, while maintaining agricultural strength.

Land and Resources

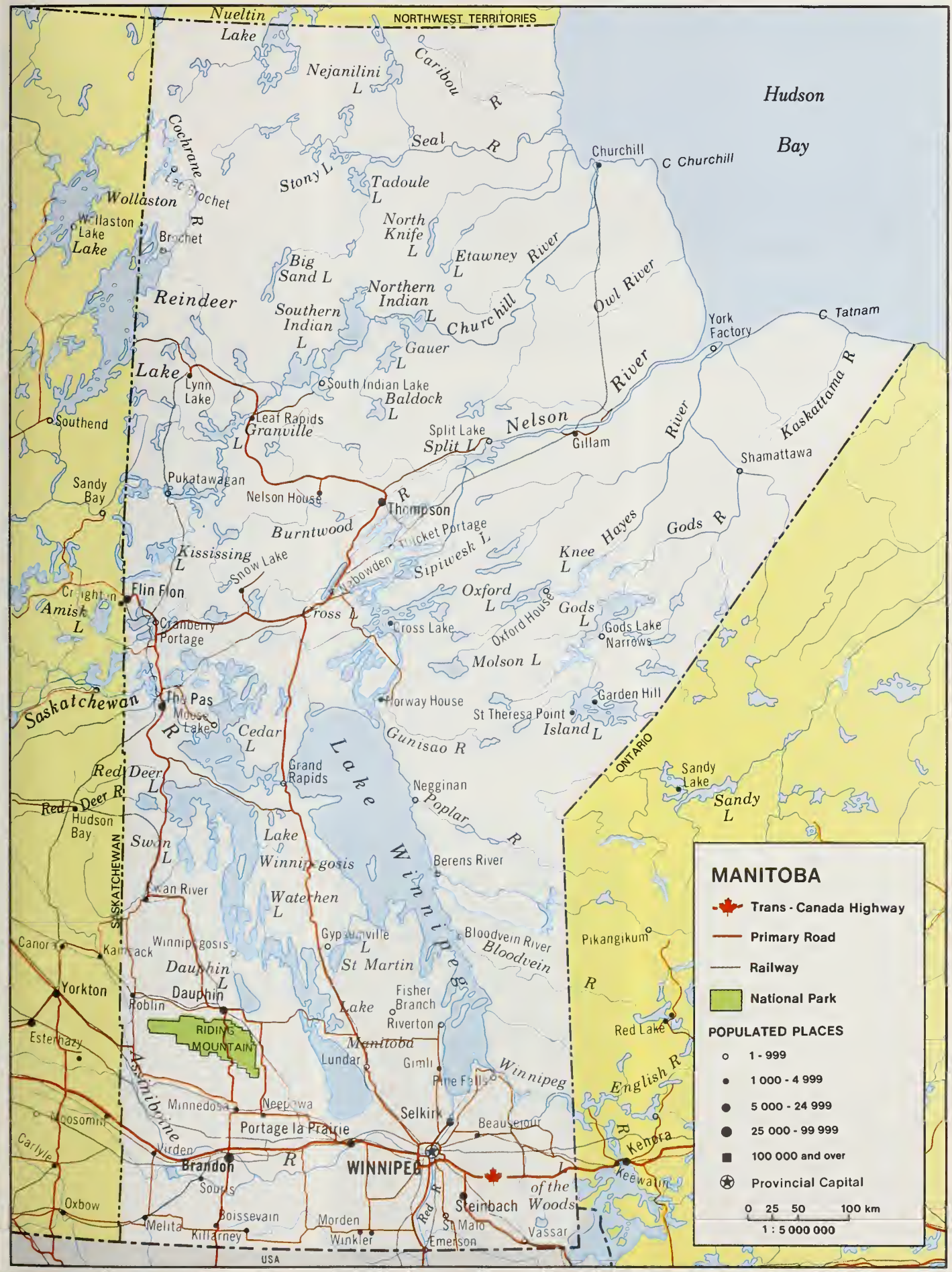
The regions of Manitoba are derived chiefly from its landforms. Since the retreat of the continental ice sheet some 8000 years ago, many physical forces have shaped its surface into 4 major physiographic regions: Hudson Bay Lowland, Precambrian Upland, Lake Agassiz Lowland and Western Upland. Manitoba provides a corridor for the Red, Assiniboine, Saskatchewan, Nelson and Churchill rivers. Three large lakes, Winnipeg, Winnipegosis and Manitoba, cover much of the Lake Agassiz Lowland. They are the remnants of Lake AGASSIZ, which occupied S-central Manitoba during the last ice age. The prolonged duration of this immense lake accounts for the remarkable flatness of one-fifth of the province, as 18-30 m of sediments were laid on the flat, preglacial surface. Antecedent streams, such as the Assiniboine, Valley and Swan rivers, carved the SW part of the province (Western Upland) into low plateaus of variable relief, which with the Agassiz Lowland provide most of Manitoba's arable land. The Precambrian Upland is composed of hard granite and other crystalline rocks that were subject to severe glacial scouring during the Ice Age; its thin soil, rock outcrop and myriad lakes in rock basins are inhospitable to agriculture but are amenable to hydroelectric-power sites, freshwater fishing, metal mines and some forestry. Flat sedimentary rocks underlie the Hudson Bay Lowland, and the climate is extremely cold. Little development or settlement exists other than at CHURCHILL, Manitoba's only saltwater port. A line drawn from SE Manitoba to Flin Flon on the W boundary separates the arable and well-populated section to the S and W from the sparsely inhabited wilderness to the N and E. The latter comprises about two-thirds of the area of the province.

Geology The bedrock underlying the province varies from ancient Precambrian (Archean) to young sedimentary rocks of Tertiary age. The former has been identified as 2.7 billion years old, the oldest on Earth, and forms part of the Canadian SHIELD, a U-shaped band of Precambrian rocks tributary to Hudson Bay. It consists principally of granites and granite gneisses in contact with volcanic rocks and ancient, metamorphosed sedimentary rocks. Contact zones often contain valuable minerals, including nickel, lead, zinc, copper, gold and silver — all of which are mined in Manitoba. Along the flanks of and overlying the ancient Precambrian rocks are sedimentary rocks ranging from Paleozoic to Tertiary age. Lake Agassiz Lowland comprises a surface cover of lacustrine sediments superimposed on early Paleozoic rocks of Ordovician, Silurian and Devonian age, from which are mined construction limestone, gypsum, clay, bentonite, sand and gravel. In favourable structures petroleum has also been recovered from rocks of Mississippian age.

West of Agassiz Lowland rises an escarpment of Cretaceous rocks, which comprise the surface formations of the Western Upland. For long periods the escarpment was the W bank of Glacial Lk Agassiz. East-flowing rivers such as the Assiniboine, the Valley and the Swan once carried the meltwaters of retreating glaciers, eroding deep valleys (spillways) that opened into this lake. The former lake bottom and the former valleys of tributary streams were veneered with silts and clays, which today constitute the most fertile land in western Canada. Both the Western Upland and the bed of Lk Agassiz comprise the finest farmlands of Manitoba. In the SW the geologic structures of the Williston Basin in N Dakota extend into Manitoba and yield small amounts of petroleum. A vast lowland resting on undisturbed Paleozoic sediments lies between the Precambrian rocks of northern Manitoba and Hudson Bay. Adverse climate, isolation and poorly drained peat bogs make this region unsuitable for agriculture.

Terrain Minor terrain features of Manitoba were formed during the retreat of the Wisconsin Glacier at the close of the last ice age. The rocks of the Shield were severely eroded, leaving a marshy, hummocky surface threaded with a myriad of lakes, streams and bogs. Relief is rolling to hilly. Much of Agassiz Lowland, the largest lacustrine plain in N America (286 000 km²), is suitable for irrigation. Much is so flat that it requires an extensive drainage system. Its margins are identified by beach ridges. The Western Upland is now covered by glacial drift. Rolling ground moraine broken in places by hilly end moraines has a relief generally favourable to highly productive cultivated land.

Drainage Since southern Manitoba is lower than the regions to the W, E and S, the major rivers of western Canada flow into it. Including their drainage basins, these are the SASKATCHEWAN RIVER (336 000 km²); the RED and ASSINIBOINE (285 000 km²) and WINNIPEG rivers (138 000 km²). Lakes Winnipeg, Manitoba and Winnipegosis receive the combined flow of these basins. In turn the water drains into Hudson Bay via the NELSON R. These streams together with the


NORTHWEST TERRITORIES
Nueltin Lake
Nejanilini L
Caribou R
Hudson Bay
Churchill
C Churchill
Seal R
Stony L
Tadoule L
Cochrane
Lac Brochet
Wollaston Lake
Brochet
North Knife L
Etawney River
Big Sand L
Reindeer
Southern Indian L
Northern Indian L
Churchill River
Owl River
York Factory
C Tatnam
Gauer L
Lake
Lynn Lake
South Indian Lake
Baldock L
Southend
Leaf Rapids
Granville L
Split Lake
Split L
Nelson River
Gillam
Kaskattama R
Shamattawa
Sandy Bay
Pukatawagan
Nelson House
Thompson
Burntwood
Thicket Portage
Sipiwesk L
Knee L
Hayes R
Gods R
Kississing L
Snow Lake
Wabowden
Flin Flon
Amisk L
Cross L
Cross Lake
Oxford L
Oxford House
Gods L
Gods Lake Narrows
Cranberry Portage
Molson L
The Pas
Moose Lake
Saskatchewan R
Norway House
Garden Hill
St Theresa Point
Island L
Cedar L
Gunisao R
ONTARIO
Red Deer L
Grand Rapids
Lake Winnipegosis
Negginan
Poplar R
Sandy Lake
Sandy L
Red Deer R
Red Hudson Bay
Swan L
Berens River
SASKATCHEWAN
Swan River
Waterhen L
Pikangikum
Canora
Kamsack
Winnipegosis
Gypsumville
Bloodvein River
Bloodvein R
Dauphin L
St Martin
Yorkton
Dauphin
Roblin
Fisher Branch
Lake Manitoba
Riverton
Red Lake
RIDING MOUNTAIN
Esterhazy
Lundar
Gimli
Pine Falls
Winnipeg R
English R
Assiniboine R
Minnedosa
Neepawa
Selkirk
Beausejour
Kenora
Moosomin
Portage la Prairie
Carlyle
Virden
Brandon
WINNIPEG
Keewatin
Souris
Lake of the Woods
Oxbow
Steinbach
Boissevain
Morden
Red R
St Malo
Melita
Killarney
Winkler
Emerson
Vassar
USA
MANITOBA
Trans-Canada Highway
Primary Road
Railway
National Park
POPULATED PLACES
1 - 999
1 000 - 4 999
5 000 - 24 999
25 000 - 99 999
100 000 and over
Provincial Capital
0 25 50 100 km
1 : 5 000 000



A view of the Post dog trains leaving Fort Garry for St Paul, 1851; watercolour by W. Armstrong, 1901 (*courtesy Public Archives Canada/C-10503*).

CHURCHILL, HAYES and other rivers provide a hydroelectric potential of 9748 MW.

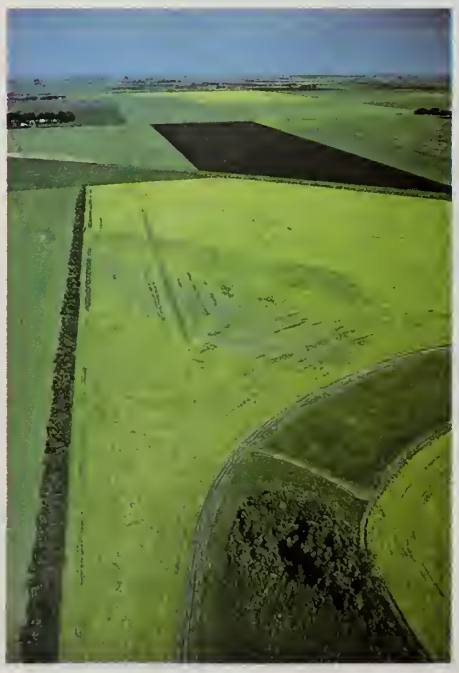
Climate, Vegetation and Soil Situated in the upper middle latitudes (49° N to 60° N) and at the heart of a continental landmass, Manitoba experiences large annual temperature ranges: very cold winters and moderately warm summers. The southward sweep of cold, dry arctic and maritime polar air masses in winter is succeeded by mild, humid maritime tropical air in summer. Nearly two-thirds of the precipitation occurs during the 6 summer months, the remainder appearing mostly as snow. The frost-free period varies greatly according to local conditions, but as a general rule the average 100-day frost-free line extends from Flin Flon SE to the corner of the province. Spring comes first to the Red R Valley, which has a frost-free period of about 120 days, and spreads to the N and W. As a result, the mean number of growing degree days (above 6°C) varies from 3000 to 2000 within the limits defined. Snowfall tends to be heaviest in the E and diminishes westward. Around Winnipeg the average snowfall is 131 mm per year. Fortunately, 60% of the annual precipitation accompanies the peak growing period for grains: May, June and July. Late Aug and early Sept are dry, favouring the harvest of cereal grains.

Subarctic conditions prevail over N Manitoba. Churchill occupies a position on Hudson Bay where abnormally cold summers are induced by sea temperatures. Manitoba's climate is best understood with reference to air masses. During the winter, low temperatures and humidities are associated with the dominance of cA and cP air. During spring abrupt seasonal changes introduce mT air from the S, which is unstable and very warm. The usual sequence of mid-latitude "lows" and "highs" brings frequent daily temperature changes. Some Pacific air moves E, moderating at intervals the extreme cold of winter.

Manitoba's natural vegetation ranges from open grassland and aspen in the S, to mixed forest in the centre, typical boreal forest in the N and bush-tundra by Hudson Bay. In the S high evaporation rates discourage the growth of trees, which are replaced by prairie. Both tall-grass and mixed-grass species were extensive before settlement. Elm, ash and Manitoba maple grow along stream courses, and oak grows on dry sites. With increase in latitude and reduced evaporation, mixed broadleaf forest replaces parkland. The northern half of the province is characteristically boreal forest, consisting of white and black spruce, jack pine, tamarack, aspen and birch. This pattern continues with decreasing density nearly to the shores of Hudson Bay, where the cold summers and short growing period discourage all but stunted growth of mainly spruce and willow and tundra types of moss, lichens and sedges. Spruce, fir and pine are processed for lumber and large pulp mills are found at Pine Falls and The Pas.

In general the province's soil types correlate closely with the distribution of natural vegetation. The following soil descriptions are in order of decreasing agricultural value. The most productive are the black soils (chernozems), corresponding to the once dominant prairie grassland of the Red R Valley and SW Manitoba. They differ in texture from fine in the former to medium in the latter. Coarse black soils are found in the old Assiniboine delta and the Souris Valley, the former extending from Portage la Prairie to Brandon. Sand dunes are evident in places. In areas of transition to mixed forest, degraded black soils and grey-wooded soils are common, notably in the area from Minnedosa to Russell S of Riding Mountain. Large areas of the former Lk Agassiz, where drainage is poor, are termed "degraded renzina" because of high lime accumulation. Soils derived from the hard granites and other rocks of the Shield, typically covered with coniferous forest, are described as grey wooded, podsol and peat; they are rated inferior for agriculture.

Manitoba landscape west of Winnipeg (*photo by J.A. Kraulis*).



Resources and Conservation Manitoba's principal resource is fresh water. Of the 10 provinces it ranks third, with 101 592 km² in lakes and rivers, one-sixth its total area. The largest lakes are WINNIPEG (24 390 km²), WINNIPEGOSIS (5374 km²) and MANITOBA (4659 km²). Other freshwater lakes of more than 400 km² are SOUTHERN INDIAN, MOOSE, Cedar, ISLAND, Gods, Cross, Playgreen, Dauphin, Granville, Sipiwesk and Oxford. Principal rivers are the Nelson, which drains Lk Winnipeg, and the Red, Assiniboine, Winnipeg, Churchill and Hayes. Lk Winnipeg is the only body of water used today for commercial transportation, but the Hayes, Nelson, Winnipeg, Red and Assiniboine rivers were important during the fur-trade and early settlement eras. The network of streams and lakes today is a source of developed and potential hydroelectric power; its installed generating capacity is 3644 MW. Possessing 70% of the hydroelectric potential of the Prairie region, Manitoba promises to become the principal contributor to an electric grid that will serve Saskatchewan and Alberta as well as neighbouring states of the US. Flooding along the Red R and its principal tributaries, the Souris and Assiniboine, has affected towns as well as large expanses of agricultural land. Major flood-control programs have been undertaken, beginning with the Red R Floodway and control structures completed in 1968. A 46 km diversion ditch protects Winnipeg from periodic flooding. Upstream from Portage la Prairie a similar diversion was built between the Assiniboine R and Lk Manitoba. Associated control structures include the Shellmouth Dam and Fairford Dam. Towns along the Red R are protected by dikes.

Agricultural land is the province's second major resource, with over 4 million ha in field crops in addition to land used for grazing and wild-hay production. Based on "census value added," agriculture leads by far all other resource industries; mining follows in third place after hydroelectric power generation. Nickel, copper, zinc and gold account for about 75% by value of all minerals produced. The fuels, mainly crude petroleum, are next, followed by cement, construction stone, sand and gravel. Of the nonmetallics, peat and quartz are important.

Most of Manitoba's productive forestland belongs to the Crown. The volume of wood cut is approximately 1 784 000 m³ annually, from which lumber, plywood, pulp and paper are produced. Manitoba's freshwater lakes yield large quantities of fish; the leading species by value are pickerel, whitefish, perch and sauger. Hunting and trapping support many native people.

Conservation of resources has been directed mainly to wildlife. Fur-bearing animals are protected by quotas, by licensing trappers and allotting trap lines. Hunting is restricted by a series of wildlife Acts, which began in 1870. Of 270 kinds of bird common to the province only 12 lack legal protection. In 1961 a system of wildlife management areas was established, consisting of 47 tracts of crown land encompassing 6.8 million ha to provide protection and management of game birds and animals. Since Manitoba is on the staging route of the North American Flyway, many migratory birds use the protected areas. Hunting of all species of game is totally restricted or closely managed in management areas, including the shoreline of Hudson Bay, a natural breeding ground for POLAR BEARS. Hunting and fishing are also closely controlled in provincial parks and forest reserves. Forest conservation is limited to fire pro-

tection, insect control and controlled cutting. Surveillance of 233 000 km^2 of forestland by aircraft and from numerous widely dispersed fire towers reduces significantly the incidence and spread of forest fires. Insects and disease are controlled by aerial spraying, tree removal and regulated burning. Among the more virulent pests are jack pine budworm, spruce budworm, aspen tortrix, forest tent caterpillar and birch beetle. Winnipeg is fighting desperately to contain dutch elm disease. In 1980, 2.4 million seedlings for REFORESTATION, mainly jack pine, red pine and white spruce, were produced at Hadashville, and reforestation is actively pursued by producing nursery stock — annual plantings average 3000 ha. To ensure future supplies of commercial timber, operators must make annual cuttings by management units on a sustained yield basis.

People

Between 1682, when YORK FACTORY at the mouth of the Hayes R was established, and 1812, when the first Selkirk settlers came to Red R, settlement consisted of fur-trading posts established by the HUDSON'S BAY CO, the NORTH WEST CO and numerous independent traders. As agriculture spread along the banks of the Red and Assiniboine rivers, radiating from their junction, the RED RIVER COLONY was formed. In 1870 the British government paid the HBC $1.5 million for control of the vast territory of Rupert's Land and opened the way for the newly formed Dominion of Canada to create the first of 3 Prairie provinces. Manitoba in 1870 was little larger than the Red R Valley, but by 1912 its current boundaries were set. Settlement of the new province followed the Dominion Lands Survey and the projected route of the national railway. Through the Dominion Lands Act of 1872 settlers could buy land, usually a half or quarter section, although most settled land in Manitoba was obtained under the Homestead Act and not by direct sale. By 1910 most of S Manitoba and the Interlake and Westlake areas were settled. Railway branch lines brought most settlers within 48 km (30 mi) of a loading point from which grain could be shipped to world markets. Rural population peaked in 1941, followed by a steady decline resulting from consolidation of small holdings into larger farm units, retreat from the submarginal lands of the frontier because of long, cold winters and poor soils, and the attraction of the larger cities, especially Winnipeg. Overpopulation of submarginal lands in the Interlake and the Westlake districts and along the contact zone with the Shield in the SE caused a substantial shift from the farm to the city. Hamlets and small towns have shrunk or disappeared; large supply centres are more easily reached with modern motor vehicles, and children are bused to schools in larger towns and cities. Elimination of uneconomic railway branch lines also has left many communities without services.

Manitoba's population is disproportionately distributed between the "North" and the "South." A line drawn from the lat 54° N (N of The Pas) to the SE corner of the province sharply divides the continuous settled area, containing 95% of the people, from the sparsely populated N. Settlement of the N is confined to isolated fishing stations and mining towns, scattered Indian reserves and Churchill, a far N transshipment centre on the shores of Hudson Bay.

Urban Centres Until 1941 the rural population component exceeded the urban. The rural population subsequently declined in absolute and relative terms until today it is 24.3% of the total. "Rural" includes farm residents and people living in towns and hamlets that have populations under 1000. Centres designated as "urban" (more than 1000) now comprise 75.7% of the total. More than half of the urban total live in Winnipeg, which together with its satellite, Selkirk, accounts for 60% of the provincial total. WINNIPEG began in the shadow of Upper Fort Garry. In the 1860s free traders, in defiance of the HBC monopoly, located there and competed for furs. After 1870 the tiny village rapidly became a commercial centre for the Red R Colony. Located at "the forks" of the Red and Assiniboine rivers, it commanded water and land travel from the W, S and N and became the northern terminus of the railway from St Paul, Minn, in 1878. Following the decision to have the CANADIAN PACIFIC RAILWAY cross the Red R at Winnipeg (1881), the centre became the apex of a triangular network of rail lines that drew commerce from Alberta eastward, and it eventually became a crossroads for E-W air traffic. Since WWII Winnipeg has experienced modest growth and commercial consolidation in a reduced hinterland. It is the provincial centre of the arts, education, commerce, finance, transportation and government.

Although Winnipeg's pre-eminence is unchallenged, certain urban centres dominate local trading areas. BRANDON, Manitoba's second city, is a distribution and manufacturing centre for the SW, as is the smaller PORTAGE LA PRAIRIE, set in the Portage Plains, one of the richest agricultural tracts in the province. In the N, Thompson and Flin Flon service the mining industry. The major towns of Selkirk, Dauphin and The Pas were founded as fur-trading forts and today serve as distribution centres for their surrounding communities. Lynn Lake, Leaf Rapids and Bissett are small northern mining centres. A network of smaller towns in SW Manitoba fits the "central place theory" modified by the linear pattern of rail lines emanating from Winnipeg. Grain elevators approximately every 48 km (30 mi) became the nuclei of hamlets and towns. Eventually, with the advent of motor transport, branch lines were eliminated and with them many place-names that once stood for thriving communities. The present pattern is a hierarchy of central places, from hamlets to regional centres, competing to supply a dwindling farm population.

Demographic Trends and Labour Force Manitoba's population change was negative in 1978 and 1979. The natural increase remained nearly constant but was exceeded by outmigration for these years — the largest percentage moving to the 3 western provinces and Ontario. There was almost zero population growth in 1980, and total population for the years 1978 to 1981 remained nearly constant.

The labour participation rate is higher for men than women although the figure for women increased steadily in the years 1977 to 1981, as a reflection of an increase in the total participation rate. The unemployment rate is slightly higher for women than men. When Winnipeg is considered separately, its participation and unemployment rates are higher than those in rural areas. Compared with other provinces, Manitoba in 1981 had the third-lowest unemployment rate (6%) — following Alberta (3.8%) and Saskatchewan (4.6%).

Manitoba's employment of labour by industry exceeds the Canadian average in 7 industries: agriculture, transport, communication, utilities, trade and commerce, service industries and public administration. Agriculture has always been a large employer in the province, and the strong showing in transportation, trade and commerce accurately reflects Manitoba's "keystone" position at the heart of Canada.

Language The dominant "mother tongues" are English (71.7%), German (7.3%), Ukrainian (5.6%) and French (5.1%). The concentration of those reporting their "mother tongue" as English is higher in urban centres than in rural areas. The reverse is true for French, Ukrainian and German, the latter mainly because of the large MENNONITE farming population. In 1870 the Manitoba Act gave French and English equal status before the courts and in the legislature. In 1890 a provincial Act made English the only official language of Manitoba. This Act was declared *ultra vires* in 1980, and in 1984 the provincial government recognizes both English and French as equal in status. The Department of Cultural Affairs provides a program in MULTICULTURALISM, which produces foreign-language pamphlets for specific ethnic groups. In schools the *Français* program provides instruction entirely in French for Franco-Manitobains and the French-immersion program gives all instruction in French to students whose mother tongue is not French. Some schools offer instruction in the majority of subjects in a minority tongue, eg, Polish, Ukrainian, German. The mother tongues of native Indians are Saulteau, Cree, Chipewyan and Sioux. The native people of the N speak mainly Cree; Saulteaux is the mother tongue of most bands in the S although English is most often spoken.

Ethnic Composition Of all Canadian provinces Manitoba contains the largest diversity of ethnic origins. The relative proportions are British (41.9%), GERMAN (12.4%), UKRAINIAN (11.5%), FRENCH (8.7%), native Indians (4.3%) and POLES (4.0%). British descendants have decreased proportionately since 1921 (57.5%); numerically they are strongest in urban areas, whereas the minorities are relatively more numerous in rural areas. The distribution of the larger ethnic groups, especially in rural areas, is related to the history of settlement. The Mennonites are concentrated in the southern Red River Valley around Steinbach and Winkler; the Ukrainians and Poles live in the Interlake district and along the frontier. Many French live south of Winnipeg close to the Red R. Those of ICELANDIC origin are found around the SW shore of Lk Winnipeg. Native Indians live mainly on scattered reserves, primarily in central and N Manitoba, although some have moved to a very different life-style in Winnipeg.

Religion To some extent religious denominations reflect the pattern of ethnicity. Three groups comprise more than half the population: UNITED CHURCH (23.7%), Roman CATHOLIC (26.5%), ANGLICAN (10.6%). Most Ukrainians are members of the Ukrainian Catholic (4.8%) and Greek Orthodox (2.6%) churches. Those of German and Scandinavian backgrounds support mainly the Lutheran faith (5.8%) and 6.6% are Mennonite.

Economy

Hunting and trapping constitute Manitoba's oldest and today's smallest industry. For 200 years the HBC dominated trade in furs across western Canada as far as the Rocky Mts. Alongside the fur trade, buffalo hunting developed into the first commercial return of the plains; Indians, Métis and voyageurs traded meat, hides and PEMMICAN, which became the staple food of the region. Until 1875 the fur trade was the main business of Winnipeg, which was by then an incorporated city of 5000 and the centre of western commerce. In the city the retail/wholesale and real-estate business grew in response to a new pattern of settlement and the development of agriculture. Red Fife wheat became the export staple that replaced the beaver pelt. After the westward extension of the main CPR line in the 1880s, farmers and grain traders could expand into world markets and an E-W flow of trade began, with Winnipeg the "gateway" city. Over the next 20 years this basically agricultural economy consolidated. Lumbering, necessary to early settlement, declined and flour mills multiplied. During the boom years, 1897 to 1910, there was great commercial and industrial expansion, particularly in Winnipeg, and agriculture began to diversify. The following decades of depression, drought, labour unrest

and 2 world wars sharpened the realization that the economy must diversify further to survive, and since WWII there has been modest growth and commercial consolidation. Today, manufacturing leads all industrial groups, followed by agriculture, mining and the production of hydroelectric power. The primary industries (including electric-power generation) represent 45% of the total revenue derived from all goods-producing industries. Manufacturing and construction account for the remainder (55%).

Agriculture The prominent role of agriculture in the provincial economy is evident from both numbers employed (43 000) and value added by goods-producing industries (20%). There are diverse sources of income from agriculture. In 1983 farm cash receipts for crops amounted to $1 billion compared with livestock at $575 million. Wheat cash receipts are 3 times those from barley and oats combined. Barley ranks second, followed by CANOLA, flaxseed and rye. Hay crops are important because of a secondary emphasis on livestock production. Cash receipts from livestock are highest by far from cattle ($216 million in 1983), followed by hogs, dairy products, eggs and poultry. Wheat is grown throughout southern Manitoba, primarily where there are medium- to fine-textured black soils, especially in the SW. Barley used as prime cattle feed is tolerant of a range of climatic conditions, but is intensively grown S and N of Riding Mtn and in the Swan R Valley. Prime malting barley prefers the parkland soils and cooler summer temperatures. Cultivation of oats is general, concentrated in areas of livestock farming; it is frequently tolerant of less productive soil. Flax is grown mostly in the SW on black soil, and canola is significant on the cooler lands near the outer margin of cultivation. Specialized crops, including sugar beets, sunflowers, corn (for both grain and silage) and canning vegetables are concentrated in the southern Red R Valley, where heating degree days are at a maximum and soil texture is medium. Beef cattle are raised on most farms in western Manitoba but are less important in the Red R Valley. Dairy cattle are raised mainly in the cooler marginal lands, which extend in a broad arc from the SE to the Swan R Valley. Poultry is heavily concentrated in the Red R Valley, but hogs have a much wider distribution, influenced by a surplus of barley and fresh milk. Market gardening occupies good alluvial soil around Winnipeg and the Red R, from which water is obtained for irrigation during dry periods.

Neighbouring farmers set up co-operatives, which vary in scope and purpose from the common purchase of land and machinery to processing and marketing members' products. Two large co-operatives, Manitoba Pool Elevators and United Grain Growers, were founded to handle and market grain, and now deal in livestock and oilseeds and provide members with reasonably priced farm supplies. Manitoba's 8 marketing boards are producer bodies that control stages in the marketing of specific commodities. Wheat, oats and barley for export must be sold to the national CANADIAN WHEAT BOARD.

Agriculture is never likely to expand beyond the limits imposed by shortness of growing season (less than 90 days frost free) and the poor podsolic soils associated with the Shield. Plans for irrigating the southwestern Red R Valley, known as the Pembina Triangle, are under study. Periodic flooding of the upper Red R (S of Winnipeg) has damaged capital structures and reduced income. Approximately 880 000 ha of farmland are under drainage, mostly in the Red R Valley and the Interlake and Westlake districts. The Prairie Farm Rehabilitation Act (PFRA) encourages conservation of water through check dams and dugouts.

Mining Mining contributed 12.5% of the value added for goods-producing industries in 1981. Of Manitoba's income from all minerals, 74.5% is derived from metals, chiefly nickel, copper, zinc, tantalum and gold, with minor amounts of precious metals. All metals are found in the vast expanse of Precambrian Shield. Diminishing amounts of petroleum are recovered from sedimentary rocks of Mississipian age in the SW corner of the province near Virden and Tilston accounting for 10%. Industrial minerals, principally quarried stone, gravel and sand, account for 12.9%. The famous Tyndall stone is a mottled dolomitic limestone quarried near Winnipeg and distributed across Canada. Gypsum is mined in the Interlake district near Gypsumville and in the Westlake area near Amaranth. Silica sand comes from Black I in L Winnipeg. Nonmetals account for 2.5%.

Manitoba's most productive metal mines are at Thompson. Reputed to be the largest integrated (mining, smelting and refining) operation in N America, Thompson accounts for most of Manitoba's nickel production. The province's oldest mine, dating from 1927, is at Flin Flon; along with its satellite property at Snow Lake, it is a major producer of copper and zinc and small amounts of gold and silver. A third major centre is Lynn Lk which with its sister mine at Leaf Rapids, produces nickel and copper. Ore from these mines is smelted at either Fort Saskatchewan, Alta, or Flin Flon. Local supplies of clay are obtained at Fort White for making cement in Winnipeg.

Energy Other than a small amount of petroleum, the province's resources in energy are derived from hydroelectric power. Thermal plants depend mostly on low-grade coal imported from Estevan, Sask, and on diesel fuel. Manitoba Hydro, a crown corporation, is the principal authority for the generation, development and distribution of electric power, except for Winnipeg's inner core, which is served by Winnipeg Hydro, a civic corporation. Hydraulic power plants were first built along the Winnipeg R and 6 of these plants still operate. The availability of cheap power within 100 km of Winnipeg has made the city attractive to industry for many years. Since 1955 hydroelectric development has been in the N. In 1960 a plant was commissioned at Kelsey on the Nelson R, and in 1968 the Grand Rapids plant was built near the mouth of the Saskatchewan R. Increased demand led to the construction of 3 additional plants on the Nelson: Jenpeg, Kettle Rapids and Long Spruce. Downstream another plant at Limestone will be the largest in Manitoba when completed (1.4 million kW capacity). In addition, 2 thermal plants powered by coal from Estevan are located at Brandon and Selkirk; they supplement hydro sources at peak load times. Installed generating capacity is 3644 MW with a further potential of 6104 MW. Manitoba sells surplus power, mostly during the summer period, to Ontario, Saskatchewan, Minnesota and N Dakota. Its transmission and distribution system exceeds 76 000 km. Manitoba Hydro serves over 400 000 customers, who consumed 9.6 billion kWh in 1980. Natural gas from Alberta, which is used mainly for industrial and commercial heating, supplies one-third of Manitoba's energy requirements.

Forestry FORESTRY in its primary stage (logging) accounts for 0.3% of the value added for goods-producing industries. The most productive forestlands extend N from the agricultural zone to lat 57° N; N and E of this line timber stands are sparse and the trees are stunted, gradually merging with tundra vegetation along the shores of Hudson Bay. The southern limit is determined by the northward advance of commercial agriculture. On the basis of productivity for forestry, 24.4% of the total provincial land area is classified as "productive," 33.9% as nonproductive and 36.7% as nonforested land. Of the total productive forestland, 95% is owned by the provincial government. From 1870 to 1930 lands and forests were controlled by the federal government; after the transfer of natural resources in 1930, the province assumed full responsibility. In 1930 there were 5 forest reserves, and 5 additional reserves totalling 14 000 km^2 have since been added. RIDING MOUNTAIN NATIONAL PARK, on the Manitoba escarpment, is the province's only national park. Whiteshell in the E and Duck Mountain in the W are the largest of 12 provincial parks. Many areas of provincial forests have been set aside as parks of various kinds. Timber cutting practices are restricted around roads, lakes and rivers. In order of decreasing volume, the most common commercial tree species are black spruce, jack pine, trembling aspen (poplar), white spruce, balsam poplar and white birch. Other species common to Manitoba include balsam fir, larch (tamarack), cedar, bur oak, white elm, green ash, Manitoba maple and red and white pine. The government proposes annual cuts for each management unit on a sustained



Kettle Rapids on the turbulent Nelson R, one of Manitoba's many sources of hydroelectric power (*photo by Richard Vroom*).

yield basis. In addition to its reforestation program, the government provides planting stock to private landowners for shelterbelts and Christmas trees.

Fisheries Inland fisheries contribute 0.2% of the value added among primary industries. Water covers 16% of Manitoba, of which an estimated 57 000 km^2 is commercially fished. Two-thirds of the total catch comes from the 3 major lakes — Winnipeg, Manitoba and Winnipegosis — and the balance is taken from the numerous smaller northern lakes. The total value of the 1979-80 catch was $7 million and some 2000 fishermen were employed. Between 200 and 300 fish-receiving stations are located on the larger lakes as far N as Lac Brochet, and processing plants with quick-freezing facilities are also widely distributed. All the commercial catch is processed by the Freshwater Fish Marketing Corp, a crown agency based in Winnipeg, and 90% is exported to large northern cities in the US. Fourteen commercial species, dressed and filleted, include whitefish, pike, walleye and sauger. Pickerel, pike, walleye, trout and bass are principal sport fish. Manitoba Department of Natural Resources maintains hatcheries for walleye, whitefish and trout.

Industry Today, Manitoba has a firm base in its processing and manufacturing industries, as shown by the value of production: 1300 manufacturers employing 42 199 people produced goods exceeding $4.97 billion (1981) and accounted for about 42% of the value added for goods-producing industries. About two-thirds of the value of industrial production comes from the following industries: food processing, distilling, machinery (especially agricultural); irrigation and pumps; primary metals, including smelting of nickel and copper ores, metal fabricating and foundries; airplane parts, motor buses, wheels and rolling-stock maintenance; electrical equipment; computers and fibre optics. There are also the traditional industries: meat packing, flour milling, petroleum refining, vegetable processing, lumber, pulp and paper, printing and clothing. Winnipeg accounts for 75% of the manufacturing shipments. Half of all manufactured goods are exported, one-third to foreign countries.

Transportation Winnipeg's strongest asset has always been its location. In the heart of Canada and at the apex of the western population-transportation triangle, this city historically has been a vital link in all forms of E-W transportation. The YORK BOATS of the fur trade and the Red River Carts of early settlers gave way first to steamboats on the Red R, then to the great railways of the 19th and early 20th centuries. Subsequently, Winnipeg provided facilities for servicing all land and air carriers connecting E and W. Today, rail and road join the principal mining centres of N Manitoba. During the long, cold winter the myriad of interconnected lakes create a network of winter roads. Major northern centres are linked to the S via trunk highways. Since 1926 BUSH FLYING has made remote communities accessible; Transair, the prairie regional carrier, serves larger northern centres. Transcontinental routes of Air Canada and CP Air pass through Winnipeg, and Air Canada operates daily flights S to Chicago, connecting with the American network. Pacific Western Airlines has links with northern Manitoba as well as with major cities to the W and E. Perimeter Airlines also serves northern points and Nordair has eastern connections as far as Montréal. CP Air, Air Canada and Wardair provide international flights direct from Winnipeg to Europe and Hawaii. Northwest Airlines connects with Minneapolis, and Frontier Airlines with Denver and Los Angeles.

Southern Manitoba has 6500 km of trunk highways and 13 000 km of provincial roads (mainly gravel).

Because Winnipeg is Canada's principal mid-continent rail centre, both CNR and CPR have extensive maintenance facilities and marshalling yards in and around the city. Wheat has the largest freight volume, but diverse products from petroleum and chemicals to motor cars and lumber are transported by rail. The CN owns Symington Yards, one of the largest and most modern marshalling yards in the world. At Transcona it maintains repair and servicing shops for rolling stock and locomotives and at GIMLI a national employee-training centre. In addition to repair shops and marshalling yards, the CPR has a large piggyback terminal; Weston shops, one of 3 in its trans-Canada system, employs about 1600 people. Via Rail operates Canada's passenger train service, which uses the lines of the 2 major railways and provides direct service between Vancouver and Halifax and Saint John. In 1929 the HUDSON BAY RY, now part of the CNR system, was completed to the port of Churchill, where today major transshipment facilities handle annually some 500 000 t of grain between 20 July and 31 Oct. Formerly an army base, Churchill is also a research centre and a supply base for eastern arctic communities.

Government and Politics

On 15 March 1871 the first legislature of Manitoba met for the first time; it consisted of an elected legislative assembly of 12 English and 12 French members, an appointed legislative council and an appointed executive council who advised the government head, Lieutenant-Governor Adams G. Archibald. When the assembly prorogued, systems of courts, education and statutory law had been established, based on British, Ontarian and Nova Scotian models. The Legislative Council was abolished 5 years later. Since 1871 the province has moved from communal representation to representation by population and from nonpartisan to party political government. Today the LIEUTENANT-GOVERNOR is still formal head of the provincial legislature and represents the Crown in Manitoba. The government is led by the PREMIER, who chooses a CABINET, whose members are sworn in as ministers of the Crown. Her Majesty's Loyal Opposition is customarily headed by the leader of the party winning the second-largest number of seats in a given election. Laws are passed by the unicameral Legislative Assembly, consisting of 57 elected members. The judiciary consists of the superior courts, where judges are federally appointed, and many lesser courts that are presided over by provincial judges. The RCMP is contracted to provide provincial police services and municipal services in some centres; provincial law requires cities and towns to employ enough police to maintain law and order. Manitoba is federally represented by 14 MPs and 6 senators.

Premiers of Manitoba 1870-1984

	Party	*Term*
Alfred Boyd	nonpartisan	1870-71
Marc-A. Girard	nonpartisan	1871-72
Henry J. Clarke	nonpartisan	1872-74
Marc A. Girard	nonpartisan	1874
Robert A. Davis	nonpartisan	1874-78
John Norquay	nonpartisan	1878-87
David H. Harrison	nonpartisan	1887-88
Thomas Greenway	Liberal	1888-1900
Hugh John Macdonald	Conservative	1900
Rodmond P. Roblin	Conservative	1900-15
Tobias C. Norris	Liberal	1915-22
John Bracken	United Farmers of Manitoba	1922-28
John Bracken	Coalition	1928-42
Stuart S. Garson	Coalition	1942-48
Douglas L. Campbell	Coalition	1948-58
Dufferin Roblin	Conservative	1958-67
Walter C. Weir	Conservative	1967-69
Edward R. Schreyer	NDP	1969-77
Sterling Lyon	Conservative	1977-81
Howard Pawley	NDP	1981-

Lieutenant-Governors of Manitoba 1870-1984

	Term
Adams G. Archibald	1870-72
Alexander Morris	1872-77
Joseph E. Cauchon	1877-82
James C. Aikins	1882-88
John C. Schultz	1888-95
James C. Patterson	1895-1900
Daniel H. McMillan	1900-11
Douglas C. Cameron	1911-16
James A.M. Aikins	1916-26
Theodore A. Burrows	1926-29
James D. McGregor	1929-34
William J. Tupper	1934-40
Roland F. McWilliams	1940-53
John S. McDiarmid	1953-60
Errick F. Willis	1960-65
Richard S. Bowles	1965-70
John W. McKeag	1970-76
Francis L. Jobin	1976-81
Pearl B. McGonigle	1981-

Local Government Local government is provided by a system of municipalities. Manitoba has 5 incorporated cities (Winnipeg, Brandon, Selkirk, Portage la Prairie and Thompson), 35 incorporated towns and 40 incorporated villages. (An incorporated municipality has a greater degree of autonomy, especially in taxing and borrowing power.) There are 105 rural municipalities ranging in size from 4 to 22 TOWNSHIPS, many of which contain unincorporated towns and villages. Locally elected councils are responsible for maintaining services and administering bylaws. In remote areas where population is sparse, the government has established 18 local government districts (LGDs) with an appointed administrator and an elected advisory council. The Department of Northern Affairs has jurisdiction over remote areas in northern Manitoba and uses the community council as an advisory body. Community councils are elected bodies, mostly in Métis settlements, through which the government makes grants. Each has a local government "co-ordinator" to represent the government.

Public Finance For the fiscal year ending 31 March 1982 the province had revenues of $2.4 billion and expenditures of $2.67 billion, with a deficit of $270 million. Income taxes garnered $568 million (1981-82) and other taxes, including 5% sales tax and gasoline and resources taxes, totaled $412 million. Liquor revenues were $83 million. Unconditional transfer payments and shared-cost receipts from federal sources covering education, health and economic development are estimated at $904 million. More than 50% of government expenditures go toward education, health and social services.

Health and Welfare Manitoba Health Services Commission, with generous support from Ottawa, provides nonpremium medical care for all its citizens. A pharmacare program pays 80% of the cost of all prescription drugs above $75 ($50 for senior citizens). The province and Winnipeg each have a free dental-care program for all elementary-school children.

The Departments of Health and of Community Services and Corrections provide services in public and mental health, social services, probations and corrections. The government is responsible for provincial correction and detention facilities and through the Alcoholism Foundation administers drug and alcohol rehabilitation facilities. Manitoba has 87 provincially supported hospitals, including 10 in Winnipeg, and 113 personal care homes in addition to elderly persons' housing. Winnipeg is an important centre for medical research; its Health Sciences Centre includes Manitoba's chief referral hospitals and a number of specialist institutions, among them the Children's Centre and

the Manitoba Cancer Treatment and Research Foundation.

Politics While Manitoba's system of RESPONSIBLE GOVERNMENT was maturing during the 1870s, communal loyalties rather than party politics dominated public representation. As the 1880s advanced, however, a strong Liberal opposition to John NORQUAY's nonpartisan government developed under Thomas GREENWAY. After the election of 1888, Greenway's Liberals formed Manitoba's first declared partisan government until defeated in 1899 (on issues of extravagance and a weak railway policy) by an invigorated Conservative Party under Hugh John MACDONALD. When Macdonald resigned in 1900, hoping to return to federal politics, R.P. ROBLIN became premier, a position he held until 1915, when a scandal over the contracting of the new legislative buildings brought down the government in its fifth term. In 1920, against the incumbent Liberal government of T.C. NORRIS, the United Farmers of Manitoba first entered provincial politics and returned 12 members to the Legislative Assembly, heralding a new era of nonpartisan politics. The promise was fulfilled in the election of 1922, when the UFM won a modest majority and formed the new government. Manitoba was returning to its roots, reaffirming rural virtues of thrift, sobriety and labour to counter rapid change, depression and the aftereffects of war. The farmers chose John BRACKEN as their leader, and he remained premier until 1942. In 1928 the UFM withdrew from politics and Bracken formed a coalition party, the Liberal-Progressives, which gained a plurality in the 1936 election but survived with Social Credit support. He continued as premier in 1940 over a wartime government of Conservative, Liberal-Progressive, CCF and Social Credit members. Bracken was replaced by S.S. GARSON in 1942, when he became leader of the federal Conservatives. In 1945 the CCF left the coalition, the Conservatives left it in 1950 and the Social Credit Party simply faded. From 1948 the coalition was led by Premier Douglas CAMPBELL, although after 1950 it was predominantly a Liberal government. From 1958 the Conservatives under Duff ROBLIN governed the province until Edward SCHREYER's NDP took over in 1969 with a bare majority. His government survived 2 terms; during its years in office many social reforms were introduced and government activity in the private sector was expanded. In 1977 Sterling LYON led the Conservative Party to victory on a platform of reducing the provincial debt and returning to free enterprise. His government lasted only one term; in 1981 the NDP returned to power under Howard PAWLEY. The Lyon government, in fact, has been the only one-term government in Manitoba's history. The political tradition of the province has been notable for its long-term stability, particularly during the era of the UFM and later coalition governments.

Education

The denominational school system was guaranteed by the Manitoba Act of 1870 and established by the provincial School Act of 1871: local schools, Protestant or Roman Catholic, might be set up on local initiative and administered by local trustees under the superintendence of the Protestant or Roman Catholic section of a provincial board of education. The board was independent of the government but received grants from it, which the sections divided among their schools. Until 1875 the grants were equal; disparity in the population and the ensuing Protestant attack on dualism in 1876 made it necessary to divide the grants on the basis of enrolment in each section. After 1876 the British (predominantly Protestant) and French (Roman Catholic) coexisted peaceably and separately, until agitation against the perceived growing political power of the Catholic clergy spread W from Québec in 1889. A popular movement to abolish the dual system and the official use of French culminated in 1890 in the passage of 2 provincial bills. English became the only official language and the School Act was altered. Roman Catholics could have private schools supported by gifts and fees, but a new department of education, over local boards of trustees, was to administer nondenominational schools. French Catholic objections to violations of their constitutional rights were ignored by the Protestant Ontarian majority, who saw a national school system as the crucible wherein an essentially British Manitoba would be formed. Intervention by the courts and the federal government eventually produced the compromise of 1897: when there were 40 (urban) or 10 (rural) Catholic pupils, Catholic teachers were to be hired; when at least 10 pupils spoke a language other than English, instruction was to be given in that language; school attendance was not compulsory, since Catholics were still outside the provincial system. After 20 years of decreasing standards and linguistic chaos, the School Act was amended in 1916; the bilingual clause was removed and the new School Attendance Act made schooling compulsory for Catholics and Protestants alike, whether publicly or privately educated.

Today, Franco-Manitobains can receive instruction entirely in French through the *Français* program; as well, non-French students in French immersion are taught all subjects in French. Instruction in a minority tongue in the majority of subjects is possible in some schools. Both English- and French-medium schools are organized in 47 school divisions, each administered by an elected school board, under the Department of Education. There are 14 school districts of which 6 are financed mainly from sources other than provincial grants and taxes; these include private schools sponsored by church organizations and by the federal government. School boards are responsible for maintaining and equipping schools, hiring teachers and support staff and negotiating salaries. The Manitoba Teachers Federation negotiates with the boards. Total expenditures for 1980 were $215 million for foundation grants and $2 million for administrative expenses.

Institutions In 1980 enrolment in the public schools of the province totalled 204 400, and 12 550 teachers were employed. Elementary schools consist of kindergarten through grades 1 to 9, and larger urban centres offer a junior-high-school program for grades 7-9. Senior high school, grades 10-12, has a varied curriculum with core subjects and several options. Special, practically oriented programs are available at 24 vocational-industrial schools, and vocational-business training is given in 106 schools. There are also schools for the disabled, the blind, the deaf and those with learning disabilities.

COMMUNITY COLLEGES provide a wide variety of career-oriented adult educational and vocational programs, and day, evening and extension programs — full-time and part-time — are offered in more than 120 communities. Assiniboine Community College (enrolment 5372) operates in and outside Brandon; it is responsible for all community college agricultural training in the province. Keewatin College offers 25 certificate courses of one year or less, mostly in northern Manitoba, as well as a mineral sciences course. Red River College, located in Winnipeg, provides twenty-five 2-year post-secondary courses leading to recognized diplomas, as well as over 50 certificate courses of one year or less, including courses in applied arts, business administration, health services, industrial arts and technology. During 1980 over 12 000 students enrolled in community colleges.

In 1877 St-Boniface (French, Roman Catholic), St John's (Anglican) and Manitoba (Presbyterian) united as UNIVERSITY OF MANITOBA. Later, they were joined by other colleges, but in 1967 a realignment of the constituents resulted in 3 distinct universities. The U of Manitoba is one of the largest universities in Canada, with numerous faculties and with 4 affiliated colleges that provide instruction in French: St John's, St Paul's (Roman Catholic) and St Andrew's (Ukrainian Orthodox), and St-Boniface. In 1982, 13 250 full-time and 6100 part-time students were enroled. BRANDON UNIVERSITY offers undergraduate programs in arts, science, education and music, with an enrolment of 975 full-time and 1325 part-time students. The UNIVERSITY OF WINNIPEG, located in central Winnipeg, provides primarily undergraduate instruction, teacher training and theological studies for 2350 full-time and 3300 part-time students. Teachers are trained at all 3 universities and at Red River College.

Cultural Life

To a large degree, Manitoba's cultural activities and historical institutions reflect the varied ethnic groups that comprise its fabric. The provincial government, through its Department of Cultural Affairs and Historical Resources, subsidizes a wide range of cultural activities. Many annual festivals celebrate ethnic customs and history: Icelandic Festival at Gimli; Winnipeg Folk Festival; National Ukrainian Festival at Dauphin; Opasquia Indian Days at The Pas; Pioneer Days at Steinbach; Fête Franco-Manitobaine at La Broquerie; the midwinter Festival du voyageur in St-Boniface, the N Manitoba Trappers' Festival at The Pas and Folklorama sponsored by the Community Folk Art Council in Winnipeg. Manitoba's historic past is preserved by the Museum of Man and Nature (Winnipeg), considered one of the finest interpretive museums in Canada; by the Living Prairie Museum, a 20 ha natural reserve; St-Boniface Museum, rich in artifacts from the Red River colony; and the Provincial Archives and Hudson's Bay Co Archives. The Planetarium is among the finest in N America. The Winnipeg Zoo in Assiniboine Pk has a major collection of more than 1000 animals.

The Arts The Manitoba Arts Council promotes the study, enjoyment, production and performance of works in the arts. It assists organizations involved in cultural development; offers grants, scholarships and loans to Manitobans for study and research; and makes awards to individuals. The Winnipeg



Lionel LeMoine FitzGerald spent almost his whole life in Winnipeg, drawing and painting contemplative scenes. The painting *The Jar* (1938), oil on canvas, displays his use of glistening daubs of paint (*courtesy Mr and Mrs Earl Green/Collection of The Winnipeg Art Gallery. Ernest P. Mayer; donated by the Women's Committee*).

Symphony Orchestra, ROYAL WINNIPEG BALLET, Manitoba Theatre Centre, Le Cercle Molière, Manitoba Opera Association, Manitoba Contemporary Dancers and Rainbow Stage all contribute to Winnipeg's position as a national centre of the performing arts. Among well-known and respected Manitoban writers are the novelists Margaret LAURENCE and Gabrielle ROY, essayist, historian and poet George WOODCOCK and popular historian Barry Broadfoot. The Winnipeg Art Gallery, in addition to traditional and contemporary works, houses the largest collection of Inuit art in the world.

Historic Sites Among the fine historic sites associated with the settlement of the West is the HBC's Lower Fort Garry. Situated on the Red R 32 km NE of Winnipeg, this oldest intact stone fort in western Canada was built in 1832 and preserves much of the atmosphere of the Red River Colony. Among a number of historic houses is Riel House, home of the Riel family; York Factory, located at the mouth of the Nelson R and dating from 1682, was a transshipment point for furs. The partially restored PRINCE OF WALES'S FORT (1731-1782) at the mouth of the Churchill R was built by the HBC and destroyed by the French. Other points of historical significance are St-Boniface Basilica, oldest cathedral in western Canada; Louis RIEL's grave; Macdonald House, home of Sir Hugh John Macdonald; Fort Douglas; Ross House; Seven Oaks House; and the Living Prairie Museum.

Communications Manitoba has 9 daily newspapers: *Winnipeg Free Press, Winnipeg Sun, Brandon Sun, Dauphin Daily Bulletin, Portage la Prairie Daily Graphic, Swan River Report, Thompson Citizen, Flin Flon Daily Reminder* and *Roblin News*. Forty weekly papers service suburban Winnipeg and rural areas, with emphasis on farming, and several trade and business journals are published. The French-language weekly, *La Liberté*, is published in St-Boniface, and Winnipeg produces more foreign-language newspapers than any other centre in Canada.

The province has 16 radio stations, including the French-language station CKSB, and the CBC has 24 English-language and 6 French-language rebroadcasters. Four television stations operate from Winnipeg and one from Brandon, and CABLE TELEVISION is available in 16 centres. The Manitoba Telephone System, a crown corporation, provides telecommunications facilities for all Manitoba. (In 1906, because of high rates and inefficiency, the provincial government appropriated Bell Telephone and established Manitoba Government Telephones, the first publicly owned system in N America). Three microwave radio networks join N and S Manitoba, bringing CBC television and radio to most communities of 500 or more. CNCP Telecommunications maintains its Prairie region offices in Winnipeg. Manitoba Data Services, providing data processing to government and private sectors, is one of the largest computer utility operations in Canada.

History

Exploration The history of exploration in Manitoba did not begin in the S but in the coldest and most remote area — the shores of Hudson Bay. A succession of navigators, Henry HUDSON (1610), Thomas BUTTON (1612), Jens MUNK (1619), and Luke FOXE and Thomas JAMES (1631), searched the shoreline for the NORTHWEST PASSAGE. Two French Canadian explorers interested in the fur trade, DES GROSEILLIERS and RADISSON, persuaded Charles II of England to establish the Hudson's Bay Co in 1670, granting it a huge territory (part of which is modern Manitoba), to be called Rupert's Land. Trading posts were soon established along the shores: Fort Nelson (1682), Fort York (1612), Fort Churchill (1688), Prince of Wales's Fort (1731). Henry KELSEY, an HBC employee, penetrated SW across the prairies 1690-92. The LA VÉRENDRYE family travelled W via the Great Lakes, building Fort Maurepas on the Red R (1734), then 4 other posts within the present area of Manitoba. The subsequent invasion by independent traders of lands granted to the HBC stimulated an intense rivalry for pelts, which ended only with amalgamation of the HBC and the North West Company in 1821. About 20 forts existed at various times S of lat 54° N, but the early explorers left little permanent impression on the landscape.

Settlement Agricultural settlement began in 1812 with the arrival of Lord SELKIRK's settlers at Point Douglas, now within the boundaries of Winnipeg. Over the next 45 years the Red R Colony at Assiniboia survived hail, frost, floods, grasshoppers, skirmishes with the Nor'Westers and an HBC monopoly. Expansionist sentiment from both Minnesota and Upper Canada challenged the HBC's control over the NW and the Red R colony. In 1857 the British government sponsored a joint expedition with the Canadians to assess the potential of Rupert's Land for agricultural settlement; the PALLISER EXPEDITION reported a fertile crescent of land suitable for agriculture extending NW from the Red R Valley. The conflict between agricultural expansion and the rights of the Métis broke out into 2 periods of unrest (*see* RED RIVER REBELLION; NORTH-WEST REBELLION). Eventually the HBC charter was terminated and the lands of the North-West were transferred to the new Dominion of Canada by the Manitoba Act of 1870, and half and quarter sections of land were then opened to settlement. It was soon evident that the diminutive province needed to expand; settlers were rapidly moving to the North-West and spilling over the established boundaries. In 1881, after years of political wrangling with the federal government, the boundaries were extended to their present western position, as well as being extended farther E, and to lat 53° N. Between 1876 and 1881, 40 000 immigrants, mainly Ontario British, were drawn W by the prospect of profitable wheat farming enhanced by new machinery and milling processes. Mennonites and Icelandic immigrants arrived in the 1870s, the former settling around Steinbach and Winkler, the latter near Gimli and Hecla. Immigration then slowed until the late 1890s and it was limited mostly to small groups of Europeans. Between 1897 and 1910, years of great prosperity and development, settlers from eastern Canada, the UK, the US and eastern Europe — especially Ukraine — inundated the province and the neighbouring lands. Subsequent immigration was never on this scale.

Development From 1897 to 1910 Manitoba enjoyed unprecedented prosperity. Transportation rates fell and wheat prices rose. Grain farming still predominated, but mixed farms prospered and breeders of quality livestock and plants become famous. Winnipeg swiftly rose to metropolitan stature, accounting for 50% of the increase in population. In the premier city of the West a vigorous business centre developed, radiating from Portage and Main streets: department stores, real-estate and insurance companies, legal firms and banks thrived. Abattoirs and flour mills directly serviced the agricultural economy; service industries, railway shops, foundries and food industries expanded. Both the CPR and the Canadian Northern Railway (later CNR) built marshalling yards in the city, which became the hub of a vast network of rail lines spreading E, W, N and S. In 1906 hydroelectricty was first generated at Pinawa on the Winnipeg R, and the establishment of Winnipeg Hydro 28 June 1906 guaranteed the availability of cheap power for domestic and industrial use.

The general prosperity ended with the depression of 1913; freight rates rose, land and wheat prices plummeted and the supply of foreign capital dried up. The opening of the Panama Canal in 1914 ended Winnipeg's transportation supremacy, since goods could move more cheaply between E and W by sea than overland. During WWI, recruitment, war industry demands, and cessation of immigration sent wages and prices soaring; by 1918 inflation seemed unchecked and unemployment was prevalent. Real wages dropped, working conditions deteriorated and new radical movements grew among farmers and urban workers, culminating in the WINNIPEG GENERAL STRIKE of May 1919. Ensuing depression followed by an industrial boom in the late 1920s tilted the economic seesaw again. By 1928 the value of industrial production exceeded that of agricultural production; the long agricultural depression continued into the 1930s, aggravated by drought, pests and low world wheat prices, and the movement from farm to city and town accelerated. Cities were little better off: industry flagged and unemployment was high. To eliminate the traditional boom/bust pattern attempts have been made to diversify the economy. The continuing expansion of mining since 1911 has underlined the desirability of broadening the basis of the economy. The demands of WWII reinforced Manitoba's dependency on agriculture and primary production, but the postwar boom gave the province the opportunity to capitalize on its established primary and secondary industries, and to broaden the economic base. Agriculture diversified, mechanization increased, improved strains of wheat contributed to economic stability. New factories and small industries were built in Winnipeg and smaller centres. The Roblin government's aggressive policy of growth promotion based on free enterprise was succeeded by an increase in government involvement in the private sector under the NDP.

T R. WEIR

Manitoba Act, which received royal assent 12 May 1870 and went into effect 15 July, provided for the admission of Manitoba as Canada's fifth province. It marked, as well, the legislative resolution of the struggle between inhabitants of the RED RIVER COLONY and the federal government (*see* RED RIVER REBELLION). Local anxiety, especially over MÉTIS land rights, provoked inhabitants' determination to have a voice in the terms under which the community would be incorporated into Canada. A popularly elected convention, reflecting the settlement's cultural diversity, supported a provisional government dominated by Louis RIEL. Four successive lists of rights were drafted by the provisional government; the final version became the basis of federal legislation. Despite PM Macdonald's reluctance, Manitoba entered Canada as a province, not a territory. English- and French-language rights were safeguarded, as were Protestant and Roman Catholic educational rights; the right to education in either English or French was not protected. The Dominion retained control of natural resources, in particular unallocated land, which was to be sold to support the building of a Pacific railway and to be the magnet for a vast IMMIGRATION across the Prairies (*see* DOMINION LANDS POLICY). The new province of Manitoba, severely circumscribed in size, thus entered as a province unlike the original 4, and its creation revealed Ottawa's resolve to control western development. *See* ASSINIBOIA

J.E. REA

Manitoba Agricultural College, *see* AGRICULTURAL EDUCATION.

Manitoba, Lake, 4659 km², elev 248 m, is one of 3 large lakes occupying the southern half of Manitoba. A narrow, irregular lake, about 200 km long with marshy shores, it is fed mainly from Lk WINNIPEGOSIS, which lies to the NW, and drains NE via the Dauphin R to Lk WINNIPEG. The marshes at its southern end, which lie just 24

km N of PORTAGE LA PRAIRIE, are an important waterfowl research area. When Pierre LA VÉRENDRYE arrived in the mid-1730s, he found the area populated by Assiniboine. For many years it formed part of an important trade route along which furs were transported via Lk Winnipeg and the northern rivers to Hudson Bay. Subsequently a commercial fishery was established. Early French traders called it Lac des Prairies; the modern name probably refers to the Indian spirit *Manitou*, whose voice allegedly can be heard in the rushing water of a narrows.

DANIEL FRANCIS

Manitoba Research Council (MRC) was established by an Act of the Manitoba legislature in 1963. In 1971, after a period of inactivity, MRC began to provide technical assistance to industry and small research grants to university and business scientists. Federal-provincial funding provided permanent facilities: in 1978 a laboratory for research on food, beverages and feeds; in 1979-80 a centre to encourage manufacturers to use existing knowledge effectively, especially in the areas of ELECTRONICS, materials research and building systems. Plans for the establishment in Winnipeg of a $41-million Institute for Manufacturing Technology, in collaboration with the NATIONAL RESEARCH COUNCIL, were announced in late 1983. MRC operates essentially as a branch of the Manitoba Dept of Economic Development and Tourism, which provides most of the funding and salaries for the executive director and other staff (total of 40). MRC has 7 full members and 16 advisory members, representing industry, labour, university and government. Facilities include the Canadian Food Products Development Centre, Portage la Prairie, and the Industrial Technology Centre (including the Canadian Health Industry Development Centre), Winnipeg. MRC provides free to low-charge technical advice to small businesses, administers grants for research, and advises government ministers on the allocation of funds for scientific and technical research.

MARTIN K. MCNICHOLL

Manitoba Schools Question, the most complex and far-reaching of Canada's several crises involving minority school rights. The 1870 MANITOBA ACT established a dual system of Protestant and Roman Catholic schools. Through Anglo-Protestant settlement largely from Ontario during the 1870s and 1880s, the proportion of Roman Catholic and French to the total Manitoba population fell dramatically. In Mar 1890 Manitoba's Liberal government under Thomas GREENWAY abolished public funding of Catholic schools. Two Privy Council decisions, 1892 and early 1895, upheld the validity of the Manitoba law, but affirmed the federal government's power to restore the lost school privileges.

After much delay and several federal cabinet crises the faltering Conservative government introduced remedial legislation in March 1896. Liberal leader Wilfrid LAURIER, energetically supported by explicitly anti-French and anti-Catholic voices such as D'Alton MCCARTHY's, forced the bill's withdrawal. The June 1896 federal election was fought primarily on this explosive issue. Laurier defeated the government largely by winning 49 of 65 seats in Québec. Laurier circumvented danger from pro-remedial Québec Catholic bishops by promising a less abrasive but presumably more effective "sunny ways" approach to the province. The Laurier-Greenway compromise of late 1896 did not restore separate schools, but did give some religious-instruction privileges within the public schools. Not until the late 1970s were more favourable arrangements made by Manitoba. In modern Québec, the Manitoba Schools Question is viewed as Canada's most significant loss of French and Catholic rights outside Québec.

PAUL E. CRUNICAN

Manitoba Theatre Centre was created in 1958 as the first of Canada's professional regional theatres when cofounders Tom HENDRY and John HIRSCH merged the pre-existing amateur Winnipeg Little Theatre and the semi-professional Theatre 77. Named in 1962 by the CANADA COUNCIL as a model for others to follow, the centre's programming energy under its co-founders — particularly in the areas of education, touring and training — made it widely influential throughout N America. Under succeeding artistic directors Edward Gilbert, Kurt Reis, Len Cariou (who began as an actor with MTC), Arif Hasnain and Richard Ouzounian, the centre has narrowed the breadth of its responsibilities while consolidating its position as one of Canada's most securely based theatres. Its main stage attracts one of Canada's largest subscription audiences, and in The Warehouse, a second stage where new Canadian work is gradually regaining the importance it had during MTC's founding years, a new, younger audience is growing. Guided by artistic director James Roy, MTC is administered at present by a volunteer board of directors and supported by the Canada Council, Manitoba Arts Council, the City of Winnipeg and many private and corporate contributors. *See also* THEATRE, ENGLISH LANGUAGE.

TOM HENDRY

Manitou, an Algonquian word meaning "mysterious being," or simply "mystery," that represents the unknown power of life and the universe. The notion is connected to the veneration of the sun and is related to the concept of *mana*, a personal supernatural force, common among native peoples of N America. *See also* NATIVE PEOPLE, RELIGION.

RENÉ R. GADACZ

Manitoulin Island, the largest freshwater island in the world, is part of an archipelago at the top of Lk HURON that straddles the Ontario-Michigan border. Its northern shore encloses the North Channel, which leads to the St Marys R at Sault Ste Marie. It has an irregular, rocky shoreline and many interior lakes. In the 17th century it was part of the territory occupied by the OTTAWA. Jesuit missionaries arrived in 1648, but their mission was short-lived. The island was sporadically inhabited until the 1830s when it became the centre of Indian administration for northern Ontario. Indians from across the region were settled here and others visited to receive their annual presents from the British government. In 1862 the provincial government puchased most of the island from the Indians. By this time settlers were arriving to clear farms. The Indians now live on small reserves.

Though the island is fertile only in spots, farming has always been a major economic activity. Turkey production thrived after 1920 and by 1930 the island was one of the most important sheep-rearing areas in Ontario. Logging dates from the 1860s and commercial fishing for whitefish and trout was also an economic mainstay; however, both these industries have declined. Since the 1920s the island has become a popular outdoor recreation area, and tourism and agriculture are now the principal activities. Little Current is the main populated centre and is linked to the mainland by road and railway. The name refers to the Indian *Manitou* (spirit), believed to dwell on the island. DANIEL FRANCIS

Manitowaning, Ont, UP, pop 518 (1981c), is located on the NE shore of MANITOULIN I, about 100 km SW of SUDBURY. In 1835 T.G. Anderson, superintendent of Indian affairs for Upper Canada, selected it as administrative headquarters of the newly created Indian Reserve on Manitoulin I. Though OJIBWA and OTTAWA began to move onto the island in 1836, permanent settlement at Manitowaning dates only from 1838. Anderson's dream of making this Indian community a model of Anglican prosperity failed in the 1840s and 1850s, partly because of the lack of sustained government support and partly because of the more effective Roman Catholic missionary activities at nearby Wikwemikong. The opening of the island to non-Indian settlement in 1862 brought Manitowaning a brief economic boom; by 1880 it was the island's largest village, servicing local agricultural, lumbering and tourist operations. During the next 20 years, Gore Bay and Little Current surpassed Manitowaning in both size and function, and since 1900 it has been mainly a trade and tourist centre.

MATT BRAY

Mankiewicz, Francis, filmmaker (b at Shanghai, China 15 Mar 1944). Trained in film in London, Eng, he made industrial films after returning to Canada in 1968. With *Le Temps d'une chasse* (1972), the story of a hunting weekend as seen by a young boy, he made a stunning directorial debut in feature films. He then directed 2 dramas for the CBC in English and a feature film for TV in French. His next film, *Les Bons Débarras* (1980), in which a young girl manipulates the adult world around her, was a popular and critical success.

PIERS HANDLING

Manly, Charles MacDonald, painter (b at Englefield Green, Eng Sept 1855; d at Toronto 3 Apr 1924). He was a founding member of the Toronto Art Students' League and first gained repute for his superb watercolours and pen-and-ink drawings published annually in the League's calendar (1893-1904). The confident, illustrative quality of his pen-and-ink work is a marked contrast to the softer, atmospheric treatment of his paintings, as in *Evening on the Conestogo* (1909), a clear reflection of his British heritage and late 19th-century training. Manly painted primarily landscapes for some years, with F.H. Brigden in Ontario, Québec and the Maritimes. He was elected to the Ontario Soc of Artists in 1876, became its president in 1903 and became an associate of the Royal Canadian Academy of Arts in 1890. He spent his last 20 years as a highly regarded instructor at the Central Ontario School of Art and Design (later Ontario College of Art).

ERIK J. PETERS

Mann, Cedric Robert, physical oceanographer (b at Auckland, NZ 14 Feb 1926). He came to Canada in 1949 to study physics at UBC and was involved in marine acoustics research 1953-61 at the Naval Research Establishment, Dartmouth, NS. He initiated, developed and led the deep-sea OCEANOGRAPHY program of the Atlantic Oceanographic Laboratory at the BEDFORD INSTITUTE OF OCEANOGRAPHY 1961-75 and was director of the laboratory 1975-78. Director general of the Bedford Inst 1978-79, he was appointed director general of the Institute of Ocean Sciences, Pat Bay, BC, in 1979. He is best known for his work on the Gulf Stream system, oceanic silicate distributions, the overflow of deep water in Denmark Str, and his leadership of the *Hudson* '70 expedition around the Americas. In 1974-75 he undertook a study of physical and chemical oceanography in Canada.

G.T. NEEDLER

Mann, Sir Donald, railway builder (b at Acton, Canada W 23 Mar 1853; d at Toronto 10 Nov 1934). Mann studied for the Methodist ministry but took up work in the lumber camps of Ontario and Michigan. In 1879 he was in charge of the barge that brought the first railway locomotive to Winnipeg. He completed a number of earth-moving and grading contracts on the CPR's prairie and mountain main line in the 1880s. With James ROSS, William MACKENZIE and Herbert HOLT, he built a number of branch lines in western Canada, Maine, and in S America and China. In 1895 he joined Mackenzie to purchase and complete the Lk Manitoba Ry and Canal Co, which later became the CANADIAN NORTHERN RY. Rapid expansion and numerous amalgamations transformed the Canadian

Northern Ry into a transcontinental system by 1915. Financial difficulties, however, led to nationalization in 1918, and the subsequent merger of the Canadian Northern with other government railways to form the Canadian National Railways. After 1918 Mann devoted himself to mining and other smaller business ventures. He was created a KB in 1911. T.D. REGEHR

Reading: T.D. Regehr, *The Canadian Northern Railway* (1976).

Mann, Kenneth Henry, freshwater and marine biologist (b at Dovercourt, Eng 15 Aug 1923; naturalized Canadian). Mann is an aquatic biologist whose wide experience ranges from the taxonomy and biology of freshwater leeches to the production of inshore marine ecosystems. He is best known for his work in the analysis of the production of aquatic systems, and was influential in the International Biological Programme, in which production of many ecosystems was compared. Mann's production studies have included fish in the R Thames in England and the lobster/sea urchin/kelp complex off eastern Canada. He has written several books and more than 100 research papers in his field and lectured and worked widely overseas. Mann was chairman of the biology dept at Dalhousie 1972-78 and professor 1972-80, when he became director of the Marine Ecology Laboratory, BEDFORD INSTITUTE OF OCEANOGRAPHY, Dartmouth, NS.

Mann v the Queen A. Mann had been charged in 1966 with careless driving pursuant to a provincial highway traffic Act. He challenged the constitutional validity of the provincial offence, arguing that Parliament, by establishing an offence of dangerous driving, had made the matter a question of CRIMINAL LAW, which according to the Constitution Act, 1867, falls under the exclusive legislative jurisdiction of Parliament.

A majority of the Supreme Court of Canada upheld the constitutional validity of the careless driving provision, stating that the province could legitimately create driving offences that required proof of mere negligence. In their view, the charge of dangerous driving under the CRIMINAL CODE required proof of both negligent driving and MENS REA. In other words, they held that the offence of dangerous driving required proof of advertent negligence, while that of careless driving under the provincial legislation was concerned with inadvertent negligence. However, the court did not define what it meant by "advertent negligence." It is not clear whether the accused must have actual foresight that his or her driving could create a dangerous situation or whether it is sufficient that a reasonable person would have realized the situation was dangerous. A. PRINGLE

Manning, Ernest Charles, politician, Christian layman, premier of Alberta 1943-68 (b at Carnduff, Sask 20 Sept 1908). From modest beginnings as a student at William ABERHART's Prophetic Bible Institute in Calgary, Manning eventually became premier of Alberta and one of Canada's most effective provincial leaders. He was reelected 7 consecutive times and retired in 1968 at the peak of his power. Manning grew up in a conventional Saskatchewan farm family and as a teenager was drawn to Aberhart's religious radio broadcasts. He studied with Aberhart and later became the institute's executive secretary. He joined Aberhart's Cabinet as provincial secretary but his role in policy making was initially limited by a bout of tuberculosis. Nevertheless, he enjoyed Aberhart's confidence, and when Aberhart died from liver disease in 1943 Manning was chosen leader of the SOCIAL CREDIT Party and premier. His first challenge was the wartime popularity of the CO-OPERATIVE COMMONWEALTH FEDERATION; in the 1944 election he opposed the CCF's demand for nationalization of private utilities and won handily.

Manning's stewardship of Alberta affairs for the next 25 years was marked by cautious financial conservatism and cautious social reformism. After the discovery of the giant LEDUC oil field in 1947, the government saw the promise of rich revenues to finance "good government"; successful oil policies attracted capital and maximized oil exploration and development. The industry grew rapidly, provincial revenues soared and funds were poured into planned expansion of the educational, health and transportation facilities that brought Alberta into the modern era. Manning's administration was clear of corruption and, despite huge budgetary surpluses, government growth was controlled. The combination of low taxes — Alberta has been free of a sales tax except for a few months in 1936 — and efficient services, plus Manning's unchallengeable rectitude, proved politically invincible. His unease at the "leftward" drift of federal politics, especially after the election of Lester PEARSON's Liberals in 1963, led him to oppose several federal policies, including compulsory national medicare. He fielded his own non-compulsory, subsidized medical-care scheme, but in the end Alberta was forced to join the federal plan.

Frustrated by the major parties' unwillingness to offer the voters clear-cut philosophical choices, Manning published an appeal for a reordering of Canadian politics. In *Political Realignment: A Challenge to Thoughtful Canadians* (1967), he called for a regrouping of forces into a social-democratic party and a "social conservative" party, offering a free economy plus a humanitarian concern for the truly needy. None of the parties showed much interest in this proposal.

In 1968 Manning resigned as premier. He left no designated successor, and 3 years later the Social Credit government, under Premier Harry STROM, was defeated. In 1970 Manning was summoned to the Canadian Senate. He was given honorary degrees by several universities and was made a companion of the Order of Canada. In 1981 he was the first recipient of the Alberta Order of Excellence, and he received the National Humanitarian Award from B'Nai B'rith in 1982. He continued his weekly religious broadcasts on radio stations across Canada and the US. JOHN J. BARR

Mannix, Frederick Charles, businessman (b at Edmonton 21 Oct 1913). As a young man he worked in the construction camps of his father's company, Fred Mannix Co. The elder Mannix sold control of the company to a US-based firm in the 1940s, but Frederick Charles regained control after his father's death in 1951 and built it into an international giant with diverse interests in oil, coal, pipelines, earth moving, and industrial plants. By 1983 Mannix owned or controlled a network of 132 companies, including Loram International, Techman Engineering, Pembina Resources and Manalta Coal (the largest coal producer in Canada), and commanded corporate assets estimated at $1 billion. He was also director of the Royal Bank and Stelco. An intensely private man, Mannix was involved in a widely publicized court battle with the Alberta government over the expropriation of his ranch, S of Calgary, for a park. EARLE GRAY

Reading: Earle Gray, *Wildcatters* (1982).

Mansel Island, 112 km long by 48 km wide, is the smallest of 3 islands lying across the entrance to HUDSON BAY. Its topography features a gently undulating limestone lowland with elevations not exceeding 100 m. The entire island was submerged under higher sea levels at the end of the last glaciation. A legacy of this marine transgression is the particularly striking relic beach deposits and elevated former shoreline features. The island itself is an outcrop of ancient resistant marine sediments and is part of an elongated escarpment extending 725 km along the N and E margin of Hudson Bay. DOUG FINLAYSON

Manske, Richard Helmuth Frederick, scientist (b at Berlin, Ger Sept 1901; d at Guelph, Ont 7 Sept 1977). In 1906 Manske immigrated with his family to Macklin, Sask. After studying at Queen's and U of Manchester and spending 5 years in the US, he returned to Canada in 1931 to the National Research Council, Ottawa. Appointed director of Dominion Rubber Co (now UniRoyal) Research Laboratories at Guelph, Ont, in 1943, he retired in 1966 and joined U of Waterloo as adjunct professor of chemistry. His studies of the plant alkaloids span some 50 years and resulted in over 150 research publications and 17 volumes of a standard reference monograph. His other interests ranged from music, astronomy, bird-watching and Greek philosophy to the culinary arts. Elected to the RSC (1935), he was president (1964) and honorary fellow (1967) of the Chemical Inst of Canada and received its medal (1959) and the Morley Medal of the American Chemical Society (1972). RUSSELL RODRIGO

Manuel, George, Shuswap Indian, political organizer, author (b at Neskonlith IR, BC 17 Feb 1921). A widely respected, self-educated man and clever political strategist, Manuel was second president (1970-76) of the National Indian Brotherhood during intense local level Indian protest and numerous important court decisions affecting Indians. He helped establish the NIB and its member organizations as a force to be reckoned with in Indian affairs. A worldwide traveller in support of indigenous peoples, he emulated the principles of frugality, community development and leadership-by-example as espoused by Tanzanian Julius Nyerere. Manuel thrust Canadian Indian affairs onto the world stage at the UN and elsewhere and in 1975 became founding president of the World Council of Indigenous Peoples, from which post he promoted the concept of indigenous peoples as the "Fourth World." J. RICK PONTING

Manufacturing in Canada had its beginnings early in the 18th century, but it was not until the late 19th century, with the development of electricity and a national political objective, that it achieved significant growth. Throughout the 20th century, manufacturing has contributed significantly to the economic well-being and prosperity of Canadians. Manufacturing provides equipment for exploring, developing, extracting, processing and distributing resources from LAND, OCEANS and FORESTS; for example, hydroelectric generators, fishing vessels, railway locomotives, farm machinery, mining equipment and supplies, machines for making paper, and machinery for transforming OIL AND NATURAL GAS and COAL into chemicals, TEXTILES, paints, etc. Durable goods are manufactured for HOUSING, TRANSPORTATION, COMMUNICATIONS, EDUCATION, recreation, entertainment, personal and health care — ranging from refrigerators, AUTOMOBILES, TELEPHONES, pianos, aircraft, windows and doors to tea kettles. Personal goods are manufactured for CLOTHING, FOOTWEAR, recreation, entertainment, health care; for example, dresses, shoes, suits, boots, bandages, books, video displays, TOYS AND GAMES, etc. Manufactured edible goods include beverages, butter, bread, cheese, milk, processed fruits, FISH, meats and VEGETABLES. Manufacturing also includes machinery and equipment to package, handle, distribute, store and record all other manufactured goods.

The export of manufactured goods enables Canadians to earn foreign currencies for travel and vacations and to purchase imported goods. In 1984, about one-third of the total production of Canadian factories was exported. Manu-

facturing is a major purchaser of raw materials and services; Statistics Canada data show that, for every 3 new jobs created in manufacturing, about 3 more jobs are created, ie, one each in the service sector, the RESOURCE sector and in a related manufacturing industry. To illustrate this point, steel is manufactured from IRON ORE, coal and other materials, which are mined and transported by RAILWAYS, SHIPS, trucks and conveyors (all manufactured goods). Executives, salespeople, engineers and others in the steel companies use all modes of transportation and types of accommodation and purchase many services (eg, data processing, communications, legal, accounting).

History

Manufacturing in Canada began with flour mills. The first gristmills were built in New France in the 17th century and, by 1840, there were 400 in UPPER CANADA and LOWER CANADA producing flour for domestic and foreign sale (*see* FLOUR MILLING INDUSTRY). Iron smelting began in 1730 at the FORGES ST-MAURICE near Trois-Rivières, Qué. By the mid-1740s, this foundry supplied New France's total armament requirements as well as stoves and household utensils. Canada's first steamboat, the ACCOMMODATION, was built in 1809 by the Eagle Foundry of Montréal, which made all the more than 100 parts for its engines (*see* SHIPBUILDING). The ROYAL WILLIAM was, in 1833, the first ship to cross the Atlantic wholly under steam power. Its engines were manufactured by St Mary's Foundry in Montréal.

Several events in the last half of the 19th century stimulated substantial growth in Canada's manufacturing industries. The first was CONFEDERATION in 1867. With political unification and self-government came geographic expansion, construction of the CANADIAN PACIFIC RAILWAY, and new settlement bringing population increases, skills and capital. In 1871 a group of businessmen founded the CANADIAN MANUFACTURERS' ASSOCIATION dedicated to promoting the growth of manufacturing. Eight years later, John A. Macdonald's NATIONAL POLICY established protective tariffs to encourage domestic processing of Canadian materials. Newly established factories, processing products for domestic consumption (eg, LUMBER, grains, animal products), survived and prospered even during the economic depression of the late 1870s and early 1880s. During this period, the discovery of electricity and the subsequent harnessing of some of Canada's vast hydro resource provided industry with an efficient, low-cost source of electrical energy (*see* HYDROELECTRICITY). At the same time the extent of the MINERAL wealth beneath the Canadian SHIELD began to be realized, stimulating great interest in Canada's growth potential. WWI stimulated industrial development and diversification, especially in such industries as steel, shipbuilding, nonferrous metals and PULP AND PAPER. By 1920 manufacturing directly employed 600 000 workers, about 17% of the total labour force at that time. The worldwide depression of the 1930s reduced economic activity and stifled industrial progress in Canada as in other countries, but Canadian industry expanded and diversified dramatically during WWII. There was swift growth in heavy industries (vehicles, aircraft, armaments, shipbuilding and steel) and spectacular development in ALUMINUM, electrical apparatus, communications equipment, toolmaking and CHEMICALS. By the end of the war, manufacturing directly employed over 1 million workers, more than 25% of the labour force.

Postwar Developments

Between 1945 and the 1980s, manufacturing has accounted for 22-24% of Canada's total real output of goods and services. Employment has roughly doubled, from 1 to 2 million, but this represents a decline in the proportion of total employment because output per worker in manufacturing has risen about two-thirds again as fast as national productivity. Manufacturing productivity gains have, in fact, contributed about one-third of the gains in real per capita income since WWII. In this period Canada's manufacturing industry has been strongly affected by developments in ELECTRONICS, ENERGY-price escalation (especially in the mid-1970s) and trade liberalization resulting from renegotiation of parts of the General Agreement on Tariffs and Trade (GATT) and from the drastic changes in the state of international competition.

Electronics The first industrial computer was introduced in Canada in 1957, and since then computer TECHNOLOGY has found widespread use in manufacturing — for production and sales planning, inventory control, accounting and payroll, personnel records, market analysis, business planning, evaluating strategies, etc. In the early 1980s, the use of computer-aided design (CAD), computer-aided manufacturing (CAM) and ROBOTICS technologies has increased rapidly. Electronics spurred the explosive growth of Canada's TELECOMMUNICATIONS industry, which reached worldwide stature in this period. Canadian manufacturers participated in the AEROSPACE INDUSTRY by designing and producing communication satellites and components for spacecraft and aircraft (*see* SPACE TECHNOLOGY).

Energy The rapid rise in world oil prices had a stimulating effect on the development of Canada's rich energy resources, ie, oil, bitumen, gas, coal, hydro and URANIUM. Demand increased for machinery and equipment for exploring and developing energy resources, for producing energy in a usable form and distributing it. The increase permitted Canadian manufacturers to achieve internationally competitive scales of operation, and Canadian-manufactured machinery and equipment have been used in energy development and production throughout the world (*see* MEGAPROJECTS; OCEAN INDUSTRIES).

Trade Three developments in trade policies and practices in this period affected Canadian manufacturers substantially: the Canada-US Auto Pact; the General Agreement on Tariffs and Trade (GATT); and the world competitive environment, particularly the emergence of lesser developed countries. The 1965 Automotive Products Trade Agreement (known as the Auto Pact) between Canada and the US created a conditional, duty-free environment which has allowed the Canadian and US industries to rationalize according to appropriate economies of scale, resulting in efficient industries that serve an integrated Canada-US market. The Auto Pact benefited both countries at different times. Canada did gained substantially more production, an increase in trade and productivity, a greater share of N American automotive employment and lower consumer prices, but in 19 years Canada's deficit under the Auto Pact was some $4 billion.

Canada was one of 23 major trading nations that signed the original GATT treaty in 1947. GATT is a multilateral agreement signed by 85 nations and 30 provisional signees; its rules call for elimination of discriminatory treatment in international commerce in order to maximize the use of world resources and thereby raise living standards. GATT membership is a national commitment to the principle of "freer trade." There have been 7 rounds of GATT negotiations (1947, 1949, 1951, 1956, 1961, 1967, 1979). Between 1966 and 1983 the share of Canadian production exported increased from 18.8% to 32%; increases occurred in almost all product categories. The value of export shipments of manufactured goods in 1983 was almost $63.5 billion. With "freer trade," the volume of manufactured goods imported into Canada has increased. Canada's degree of trade exposure is high by international standards, though it varies from sector to sector. For example, groups of industries that operate on a localized basis (eg, parts of FOOD AND BEVERAGES, metal-fabricating and nonmetallic mineral products) naturally have low trade exposure, and activity in the domestic economy is more important. Resource-oriented sectors (eg, primary metals, paper and wood products) have a high export orientation and a lower import penetration of the domestic market. Sectors that tend to be more rationalized on a N American basis (eg, the MACHINERY AND EQUIPMENT INDUSTRIES) have offset high import penetration with success in export markets. Sectors such as textiles, LEATHER products and ELECTRICAL APPLIANCES have been facing high import penetration with little offsetting exports (although exports are increasing in many categories).

The state of international competition has changed drastically since the late 1950s and early 1960s. At that time, Europe and Japan were largely preoccupied with postwar rebuilding and with the development of internal markets; Canada's share of the world's exports of manufactured goods rose from 4.5%-6%. The emergence of Japan and Europe as industrial

Exports and Imports by Sector 1983 (Millions$)

	Imports	*Exports*
Food and beverage	2 920	3 985
Tobacco	38	15
Rubber and plastics	1 154	821
Shoes and leather products	649	102
Textile industries	1 664	355
Knitting mills	481	14
Clothing	735	213
Wood industries	524	4 975
Furniture and fixtures	308	384
Newsprint, pulp and paper	856	8 150
Printing and publishing	1 223	360
Steel and primary metals	3 130	6 503
Metal fabricating	1 863	961
Machinery	9 586	3 930
Transportation equipment	21 578	23 264
Electrical products	5 085	2 325
Nonmetallic minerals	871	508
Petroleum refineries	673	1 291
Chemicals	4 783	3 579
Scientific and leisure goods	4 443	1 308
Total manufacturing	62 745	63 517

Manufacturing Production by Region (1981)
(Source: Statistics Canada and CMA Economics Department)

	Western Provinces	*Ontario*	*Québec*	*Atlantic Provinces*
	Percentage of Canadian Production			
Food and beverage	26	41	26	7
Tobacco	—	58	42	—
Rubber and plastics	na*	65	22	na
Shoes and leather products	5	55	39	1
Textile industries	4	46	48	2
Knitting mills	5	29	64	2
Clothing	12	25	61	2
Wood industries	59	17	20	4
Furniture and fixtures	13	56	30	1
Newsprint, pulp and paper	23	32	34	11
Printing, publishing and allied	20	50	28	2
Steel and primary metals	14	59	25	2
Metal fabricating	17	57	23	2
Machinery	22	62	16	—
Transportation equipment	5	73	20	2
Electrical products	6	68	25	1
Nonmetallic minerals	30	46	20	4
Petroleum refineries	30	34	27	9
Chemicals	16	61	22	1
Scientific and leisure goods	6	70	23	1
Total manufacturing	19	50	26	5

* Data not available

powers has meant tougher competition across the board for Canadian manufacturers. But, as these economies have become more advanced and as costs have risen, competition has been based increasingly on product quality and technology rather than on price (*see* INDUSTRIAL QUALITY CONTROL). This emphasis has meant intensified competition in the domestic and international markets in such sectors as transportation equipment (including automobiles), machinery and electronic equipment. At the same time, INDUSTRIALIZATION among lesser developed countries (LDCs) has focused on sectors producing labour-intensive, low-technology, highly transportable goods. Therefore, increasing import penetration from LDCs has created significant problems in Canada in such sectors as clothing, certain textiles, the lower range of the footwear market, and consumer electrical products.

Canada's Manufacturing Structure

The value of goods shipped by Canada's 35 000 manufacturing establishments was almost $230 billion in 1984. Fuel and electricity cost $6.5 billion; materials and supplies $135 billion; wages and salaries $46 billion. Despite remarkable expansion in manufacturing in the western provinces, Ontario and Québec still dominate most industries, accounting for half and just over a quarter of Canada's manufacturing output, respectively. Many consumer goods industries are concentrated in these 2 provinces, which have well over half the country's population. Among these industries are food and beverages, TOBACCO, shoes and leather products, clothing, FURNITURE AND FIXTURES, transportation equipment, electrical products, and scientific and leisure goods (*see* sporting-goods industry). Resource-based manufacturing industries are spread more evenly across the country, eg, wood industries, newsprint, pulp and paper, steel and primary metals, non-metallic minerals, petroleum refineries and chemicals. As resource development continues in the 1980s, resource-based manufacturing will grow in the western and Atlantic provinces. The western provinces now account for a significant and growing proportion of the metal-fabricating and machinery output. East Coast offshore development will provide opportunities for increased manufacturing in the Atlantic provinces. *See also* FOREIGN INVESTMENT.

ROY A. PHILLIPS

Maple (*Acer*), genus of TREES and shrubs of the maple family (Aceraceae). Of the 125 species found worldwide, over 2/3 grow in China; 10 are native to Canada. Maples are a major constituent of eastern deciduous forests. Sugar, black, silver, red and striped maples are found in the East; mountain maple occurs eastwards from Manitoba; Manitoba maple in Saskatchewan and Manitoba; bigleaf, Douglas and vine maples in BC. The tree may be large, medium-sized or small, depending on species. The leaves are opposite, usually simple, lobed and have 3-9 veins. The paired, winged fruits are a food source for birds and small mammals; deer and moose eat young twigs and leaves. Maples grow in various soils and at varying altitudes but prefer deep, moist, fertile soils. The great commercial value of the hard, durable maple wood is overshadowed by the worldwide fame of MAPLE SUGAR and syrup. The maple leaf has long been considered an appropriate emblem for Canada. Maple leaves were used in coats of arms granted (1868) to Ontario and Québec and the new Canadian coat of arms granted in 1921. The leaf was used on regimental badges in WWI and WWII and was confirmed as an official national symbol in 1965 with the proclamation of the national flag.

ESTELLE LACOURSIÈRE

Maple Ridge, BC, District Municipality, pop 32 232 (1981c), area 26 709 ha, inc 1874, is located on the N bank of the FRASER R between Pitt Meadows and Mission. The commercial centre, Haney, is 40 km E of downtown Vancouver. Its northern area is rugged and mountainous; the western section flat and open. Rapid growth in recent years stems from the development of large tracts of residential land. Forestry and agriculture are the leading resource sectors, along with lumber mills on the Fraser, logging in the northern area, dairying in Pitt Meadows and mixed farming in Maple Ridge. In 1981 the Maple-Meadows Industrial Park was opened. Golden Ears Provincial Park at Alouette Lk has the highest day use in the province. Whonock Lk Municipal Park is heavily used as a swimming and picnic area.

ALAN F.J. ARTIBISE

Maple Sugar Industry Maple syrup is a unique agricultural product. The sweet sap of the sugar MAPLE (*Acer saccharum*) was known and valued by the native peoples of eastern N America long before the arrival of European settlers. An Iroquois legend tells of the piercing of the bark of a maple and the use of the "sweet water" to cook venison, a happy accident which established the culinary tradition of maple-cured meats. French settlers probably learned from the Indians how to tap trees to obtain sap and how to boil it to reduce it to sweet syrup or sugar slabs to be stored for later use. The Ojibwa called the "sugaring off" period the "maple moon" or "sugar month." The tradition of sugaring off became established in communities in the deciduous forests of N America and has survived to the present time.

World production of maple sugar is limited to the Maple Belt, the hardwood FOREST stretching from the midwestern US through Ontario, Québec and New England and into the Canadian Maritimes. In the fall, the sugar maple lays down concentrated sugars in the rays of the tree; these sugars mature during winter and are harvested while the frost is still in the ground. The sap flow is stimulated in spring as the days become warmer and temperatures rise above 0°C during daylight, followed by below-freezing nights. Within the tree positive pressures (as high as 165 kPa or 1.6 atmospheres) produce a natural flow of sap that is tapped by boring holes into the tree. The clear sap rushes out of these holes and into the collection system. As the pressure drops during the day, the sap flow slows down and stops. Negative pressure is then found within the tree, and it begins to absorb water through the root system. The next



Mature sugar maple tree (*Acer saccharum*), with details of leaf (*artwork by Claire Tremblay*).



Spring scene in the maple sugar industry, showing the smokehouse (*artwork by Claire Tremblay*).

day, as the tree warms up, positive pressure is restored and the pumping action yields another flow. The process continues for about 6 weeks in early spring. At the end of that time the sap takes on a cloudy appearance and the sugar content drops off dramatically. During the height of the sugaring season, sap contains about 2.5% sugar; towards the end of the season less than 1%. During the maple harvest, the tree will give up about 7% of its sap; tests confirm that this does no long-term damage to the tree. Many of the tapped trees are well over 100 years old.

There are various sap-gathering methods. Traditional bucket collection, although still used throughout the Maple Belt, is being replaced by a vacuum-tubing system that reduces labour and creates a more sanitary environment for collection. Once the maple sap is collected, it is evaporated into syrup. The dilute raw material is reduced to remove excess water; nothing is added. It takes approximately 151.4 L of maple sap to produce 3.8 L of pure maple syrup. Water can be removed from sap by using various systems, from wood-fired evaporators to reverse osmosis systems that separate water from the sugar molecules at high pressure. However, the sugarhouse remains the focal point of maple-syrup production; each sugar maker has one of his own.

There are about 20 000 maple-syrup producers in N America. Of the total world production of 16.9 million kg for the 1983 crop year, Canada produced 11.2 million kg and the US 5.7 million kg. Within Canada, Québec produced nearly 10 million kg; Ontario 780 000 kg, NB 380 000 kg; and NS 103 000 kg. During a normal crop year, some 22.7 million kg of syrup would be produced worldwide; the small 1983 crop resulted from poor spring weather conditions.

Maple syrup is a pure, natural sweetener, the only other liquid natural sweetener being honey. Maple syrup has an abundance of trace minerals that are essential to good nutrition: potassium, magnesium, phosphorus, manganese, iron, zinc, copper and tin, as well as calcium in concentrations 15 times higher than honey. It contains only one-tenth as much sodium as honey, an important consideration for those on a salt-restricted diet. Maple syrup is graded according to colour, flavour and density; standards are prescribed by law. It must be in the range of 65-67% Brix (a hydrometric scale for sugar solutions) or 32-34% on the Baumé scale (for liquids heavier than water). Anything less or more cannot be graded and sold as pure maple syrup.

The US is the major consumer. Small amounts are exported to Europe, principally to W Germany and France. The industry is developing new markets for this uniquely N American product and a strong industry is developing. In the early part of the 1970s, the traditional buyers were the large food companies. When the US Food and Drug Administration reduced the minimum volume of maple syrup that must be listed as an ingredient in products sold as "maple syrup" and "maple sugar" from 15% to 2%, sales plunged dramatically and the industry experienced a major crisis. Efforts were made to develop a new market aimed directly at the consumer and the growth of this market has rejuvenated the industry.

Production of pure maple syrup has been encouraged by provincial and federal governments, resulting in an expansion of the crop over the last several years. As the industry continues to grow, production innovations will be needed, and research is underway in both Canada and the US to make the industry more efficient. But for the foreseeable future, the traditional sugarhouse and the family operation, so evocative of Canada's pioneer past, will remain.

LEO H. WERNER

Maquinna, or Mukwina, meaning "possessor of pebbles," Nootka chief (fl 1778-95?). Maquinna was the ranking leader of the Moachat group of Nootka Sound Indians on the W coast of Vancouver I during the early years of European contact. Following James COOK's 1778 visit, NOOTKA SOUND became an important fur-trading centre. Maquinna controlled the FUR TRADE and emerged as the dominant Indian leader in the Sound, operating as a middleman. Maquinna was also involved in dealings with British and Spanish representatives who visited Nootka Sound as the 2 nations asserted rival claims to the area. While Maquinna had achieved his position among the NOOTKA by traditional means, he was a leader whose role was changing because of the Europeans' impact. His power and prestige were enhanced by new wealth from the fur trade but, at the same time, he had to lead his people through new and sometimes difficult situations. His successor assumed the name of Maquinna.

ROBIN FISHER

Reading: Robin Fisher, *Contact and Conflict* (1977).

Marani, Ferdinand Herbert, architect (b at Vancouver 8 Aug 1893; d at Toronto 18 July 1971). Marani graduated from U of T in 1920 and shortly thereafter established a practice in Toronto. His partnerships include Marani and Morris (1947-59) and Marani, Rounthwaite and Dick (1964-71). His designs, which are noted for his contemporary translation of the Georgian tradition, include the original BANK OF CANADA building in Ottawa, the Medical Arts Building in Toronto and the Canadian Forces Headquarters in Washington, DC. Marani served in WWI and WWII and was a chairman of the Ontario Assn of Architects and of the Ontario College of Art.

ANDREA KRISTOF

Marathon Running, *see* LONG-DISTANCE RUNNING.

Marathon Swimming takes place on open water for distances in excess of 1500 m. Most marathon swims are across established bodies of water such as channels, lakes or straits. The best known and most prestigious is the crossing of the English Channel, a distance of approximately 34 km. Marathon swimmers aim to win races or set records such as first crossing, fastest time, youngest or oldest swimmer, first double or triple crossing, or most crossings by the same person. Most are professionals and swim for the prize money available to winners or record breakers. Matthew Webb, the first person to swim the English Channel without the aid of a life jacket, tried to cross the rapids and whirlpool below Niagara Falls in 1883 but drowned in the attempt.

Canadian long-distance swimmers have been among the world's best. The first to draw public attention was Toronto's George Young. In Jan 1927 he won the first Catalina Swim (32 km). His feat stimulated an interest in long-distance swimming, and was responsible for the introduction of the Marathon Swim, a highlight of the CANADIAN NATIONAL EXHIBITION in Toronto. In Aug 1927, the first "Professional Swim Championship of the World," for 21 miles (34 km), was staged at the CNE. Young did not win this event until 1931. In 1950, he was named the Canadian swimmer of the half century. The CNE world championship swims, at various distances, continued until 1937, then were cancelled owing to waning public interest. They were resumed in 1948, and by 1949 Cliff LUMSDON, of New Toronto, had emerged as an outstanding swimmer. He won the CNE men's world championship in 1949 and repeated in 1950, 1952 and 1953. In 1955, he won the Marathon Swim of 32 mi (51.5 km), and was perhaps the finest swimmer of his day in the world. Marilyn BELL, of Toronto, became a household name in 1954. In July she was the first woman to complete the 26-mile (42-km) Atlantic City, NJ, marathon race, and in Sept became the first person to complete the arduous 34-km crossing of windswept Lake Ontario. In 1955 she was the youngest to swim the English Channel, and in 1956 crossed the dangerous Straits of Juan de Fuca in record time. Bell was awarded the LOU MARSH TROPHY in 1954 as Canada's outstanding athlete. Both Lumsdon and Bell were coached by Gus Ryder, founder and coach of the Lakeshore Swim Club of New Toronto.

In the 1970s, 2 Canadian swimmers dominated long-distance swimming. Cindy Nicholas, of Scarborough, Ont, at age 16 made a record crossing of Lake Ontario in 1974, and one year later made her first of 10 English Channel crossings, setting a record for the crossing from France to England. In 1976 she was the women's world marathon-swimming champion, and in 1977 set the Channel round-trip speed record. By 1978, she had earned the title "Queen of the Channel" for the most crossings by a woman (6), and in 1979 she lowered her time for the 2-way crossing of the Channel.

Loreen Passfield, of Etobicoke, Ont, was ranked the world's top woman marathon swimmer in both 1977 and 1978.

BARBARA SCHRODT

March, Mary, *see* DEMASDUWIT.

Marchand, Félix-Gabriel, lawyer, journalist, playwright, premier of Québec (b at St-Jean, LC 9 Jan 1832; d at Québec City 25 Sept 1900). Marchand, one of the last "vrai rouges" and an important transitional figure in Québec political life, assumed leadership of the shattered provincial Liberals in 1892 and led them to victory in 1897, promising, in a direct challenge to the Roman Catholic Church, to restore political control over education. The church blocked Marchand, however, and controlled education until the 1960s. Under Marchand the Liberal Party became an agent of industrial expansion, welcoming foreign capital and technology, developing Québec's vast hydroelectric-power potential and exploiting its forest resources. Although bitterly criticized, these policies were the foundation of Liberal political success for more than a generation.

BERNARD L. VIGOD

Marchand, Jean, union leader, politician (b at Champlain, Qué 20 Dec 1918). After completing a social-science degree in labour relations at Laval (1942), he became an organizer for the Fédération de la pulpe et du papier (Confédération des travailleurs catholiques du Canada). Secretary general of the CTCC from 1947, he was elected president 1961. During the 1950s, with other unionists, intellectuals and reform members of the Québec Liberal Party, he helped bring about the defeat of the Union Nationale government (1960). His union central, renamed the CONFEDERATION OF NATIONAL TRADE UNIONS in 1961, worked closely with the Liberal government of Jean LESAGE and won some legislative reforms, such as the right of government employees to form unions and to strike. Critical of the rise of

SEPARATISM in Québec in the early 1960s, he was persuaded by PM Lester PEARSON to join the federal Liberal Party in 1965 to enhance the francophone presence in Cabinet and defend the cause of Québec federalism. He agreed on condition that 2 longtime friends, Pierre TRUDEAU and Gérard PELLETIER, be allowed to join him. He held several important Cabinet posts, resigning in 1976 to run in the Québec provincial election to try to prevent the PARTI QUÉBÉCOIS from coming to power. He failed in both objectives. He was appointed to the Senate in Dec 1976; selected Speaker in Mar 1980, he played a central role in the 1981 debate over reform of the Constitution. Appointed president of the Canadian Transport Commission he resigned from the Senate in Dec 1983. M.D. BEHIELS

Marchand, Jean-Omer, architect (b at Montréal 28 Dec 1873; d there 11 June 1936). After training at the École des beaux-arts, Paris, he started a practice in 1903 and began a series of grand public buildings in Montréal, which included the rebuilt chapel of the Collège et Grand Séminaire de Montréal (1903), the Maison-mère des Soeurs de la Congrégation de Notre-Dame (1905), the City Hall Annex (1912) and the McTavish Reservoir Pumping Station (1929). Marchand was associated with John A. PEARSON in the design of the PARLIAMENT BUILDINGS at Ottawa after the 1916 fire. Marchand was an avid collector of fine furniture, artworks and rare books on architecture, now in the architecture libraries of U de M and UQAM. ROBERT LEMIRE

Marchand, Leonard Stephen, politician, agronomist (b at Vernon, BC 16 Nov 1933). Len Marchand was the first Indian federal Cabinet minister and the second native member of the federal Parliament after Louis RIEL. Through early involvement with the N American Indian Brotherhood, he left a career as agricultural research scientist in1965 to work as special assistant to 2 successive Cabinet ministers. He was elected Liberal MP for Kamloops-Cariboo in 1968, and was minister of state for small business 1976-77 and minister of state for the environment 1977-79. Defeated in 1979, he returned to BC as administrator for the 5-band Nicola Valley Indian Administration, and was appointed to the Senate in 1984. A low-profile politician considered successful in his ministerial roles, Marchand represented a liberal-individualist approach to business, environmental and Indian issues. This, and his qualified support for his party's native policies, set him apart from the mainstream both of Indian and of environmentalist activism. BENNETT MCCARDLE

Marchildon, Philip Edward, baseball player (b at Penetanguishene, Ont 25 Oct 1913). He was pitching in a semiprofessional Ontario league when discovered at a Barrie tryout camp. He joined the Philadelphia Athletics in 1940 and, despite a 3-year interruption for war service, won 68 major league games before retiring in 1950. In 1947, 14 of his 19 wins for the 5th-place Athletics were against first-division teams. WILLIAM HUMBER

Marco Polo, sailing ship of 1625 tons launched in April 1851 from the building yard of James Smith, Courtney Bay, Saint John, NB. It was the most famous ship built in NB, cutting a week off the previous record run from England to Australia, completing the round trip in less than 6 months and earning the title "Fastest Ship in the World." She remained in the Australian trade for 15 years before being bought by Norwegian owners for the Québec timber trade. It ran ashore at Cape Cavendish, PEI, in 1883. JAMES MARSH

Marcotte, Gilles, journalist, critic, professor, novelist, essayist (b at Sherbrooke, Qué 1925). Marcotte has been one of the best-known and most-respected Québec intellectuals. First a journalist at *La Tribune*, then at *Le Devoir* and *La Presse*, Marcotte worked for Radio-Canada and the NFB before becoming literature professor at Université de Montréal in 1965. He has been active in publishing, notably *Écrits du Canada français*, since 1954 and has written a series of columns in *Actualité*. Often consulted and interviewed, the winner of many major prizes, Marcotte has been at the centre of every kind of literary activity. He has written 2 novels, *Le Poids de Dieu* (1962) and *Retour à Coolbrooke* (1965) and a spare and sombre narrative, *Un Voyage* (1973). The novelist, a master of narrative technique, sometimes lacks daring and spontaneity; he has some difficulty in *seeing* and being seen. The critic has no such problems. Marcotte's collection of essays, *Une* LITTÉRATURE QUI SE FAIT (1962), is a benchmark in the evolution of Québec critical thinking, opening new horizons on Saint-Denys GARNEAU and on such themes as solitude, exile and vertigo. *Le Roman à l'imparfait* (1976) is an original analysis of the experiences of 5 novelists struggling with characters who are themselves writers, storytellers, readers: Bessette, Ducharme, Blais, Godbout and Ferron. In *La Littérature et le reste* (1980), an exchange of letters with André Brochu, Marcotte develops and systematizes his theoretical ideas with grace and wit. LAURENT MAILHOT

Marcuse, Judith Rose, née Margolick, dancer, choreographer, teacher, director (b at Montréal 13 Mar 1947). Her broad international background in ballet and modern dance has made Marcuse a versatile choreographer. Trained initially in Montréal, Marcuse attended Britain's Royal Ballet School 1962-65 and studied subsequently in Canada and the US. She danced with a number of leading companies, notably Les GRANDS BALLETS CANADIENS, 1965-68, the Bat-Dor Dance Co of Israel 1970-72, and England's Ballet Rambert 1974-76. Although Marcuse still performs, she has become increasingly occupied as a choreographer, creating works for Canadian and foreign troupes. She founded the Judith Marcuse Dance Project Soc in 1980 which emerged as a full-fledged performing ensemble in 1984. Marcuse has won both the Jean A. Chalmers Award for Choreography (1976) and the Clifford E. Lee Award for Choreography (1979). MICHAEL CRABB



Judith Marcuse performing in *Spring Dance* (*photo by David Cooper*).

Maria Chapdelaine (1916), a novel embodying the spirit of French Canada at its most lyrical, was based by author Louis HÉMON, an expatriate Frenchman, on his experiences in the Lac Saint-Jean district of Québec. Church and farm provide a physical and symbolic setting for the romance, as the seasons and feast days provide a mythic temporal framework for its action. Following the death of her mother and that of her lover François Paradis, Maria must choose between 2 suitors: Lorenzo Surprenant, who tempts her with the riches of America, and Eutrope Gagnon, the boy next door. She unselfishly accepts Gagnon, thereby ensuring the survival of family and community and affirming the traditional values of rural French Canada. Frequently reprinted both in Canada and in France, *Maria Chapdelaine* has been filmed 3 times, most recently by Gilles CARLE (1983). W.H. Blake's translation (1921), beautifully illustrated with woodcuts by Thoreau MACDONALD, remains the standard English edition. MICHÈLE LACOMBE



The *Marco Polo*, famous NB clipper that earned the title "Fastest Ship in the World" (*courtesy New Brunswick Museum*).

Marie Calumet (1904), novel by Rodolphe Girard, narrates with Rabelaisian gusto the mock-heroic adventures of a female picaro, inspired by a French Canadian variant of the old folk song about the bride who was given too much to eat at her wedding. Marie is the middle-aged maid hired by Father Flavel, the curate of St-Ildéfonse, to replace the comelier but less efficient Suzon. A fearsome and God-fearing gourmet cook recommended by his friend Father Lefranc, the liberal pastor of St-Apollinaire, Marie is wooed and eventually won by Narcisse, Flavel's timid but faithful hired hand. Girard's humour, gently satirizing the priest's all-too-human frailties and depicting rural life in Québec with realism and an ear for dialect, led to his denunciation by the church and dismissal from *La Presse*. His friend Albert Laberge supervised an expurgated edition (1946) translated by Irène Curie (1976); a facsimile of the 1904 text appeared in 1969, a new edition in 1973.

MICHÈLE LACOMBE

Marie de l'Incarnation, née Marie Guyart, founder of Ursuline order in Canada, mystic, author (b at Tours, France 28 Oct 1599; d at Québec C 30 Apr 1672). As a child, Marie Guyart, daughter of a master baker, showed unusual spirituality. Her husband, Claude Martin, died in 1619 after 2 years of marriage, leaving her with a 6-month-old son and a bankrupt business. Urged to remarry, she withdrew into secluded meditation and prayer and on 24 Mar 1620 experienced a mystical and emotional "conversion." She decided to withdraw from the world, but her sister and brother-in-law called on her to help their failing carrier business. Under Marie the business prospered but visions continued to haunt her. In 1632, though heartbroken at leaving her son Claude, she entered the Ursuline cloister at Tours. She took her vows in 1633 and taught Christian doctrine for 6 years. From her reading of the *Relations des Jésuites* and her visions she concluded that her vocation was in Canada. With 3 Ursulines and Mme de LA PETRIE she landed at Québec 1 Aug 1639 and established a convent in the lower town. In 1642 it moved to a permanent stone building in the upper town. She worked zealously at educating French and Indian girls, wrote numerous theological and spiritual treatises, an Iroquois catechism and Algonquian and Iroquois dictionaries, and kept abreast of public affairs.

CORNELIUS J. JAENEN

Reading: J. Marshall, ed, *Word from New France: The Selected Letters of Marie de l'Incarnation* (1967).

Marie-Rose, Mother, name in religion of Eulalie Durocher, educator (b at St-Antoine-sur-Richelieu, LC 6 Oct 1811; d at Longueuil, Canada E 6 Oct 1849). As housekeeper to a brother at the Beloeil presbytery 1831-43, she became alarmed at the lack of rural schools. When Bishop Ignace BOURGET of Montréal was unable to form a local community of the Sisters of the Holy Names of Jesus and Mary, a teaching order in Marseilles, France, Durocher accepted in 1844 to become founder and first superior of a Canadian religious community of the same name. Recognized as a woman of exceptional virtue, she brought to her work unflagging enthusiasm and unequalled ability. In the 1870s Bourget expressed the hope that she would be beatified, and on 23 May 1982 this wish was fulfilled by Pope John Paul II.

SISTER MARGUERITE JEAN S.C.I.M.

Marie-Victorin, Frère, brother in the Écoles chrétiennes community, botanist, teacher (b Conrad Kirouac at Kingsey-Falls, Qué 3 Apr 1885; d at St-Hyacinthe, Qué 15 July 1944). Son of a prosperous merchant, Kirouac grew up in Québec C. At 16 he joined the Frères des Écoles chrétiennes in Montréal. His postulant and early teaching years were often disrupted by illness, but long periods of convalescence allowed him to study BOTANY. As teacher at the Collège de Longueuil from 1905, Marie-Victorin stimulated student life, founded a study circle and published several literary works. However, botany took more and more of his time. Around 1908 he published his first scientific articles. He was named professor of botany at U of M in 1920. There followed 25 years of intense scientific and social activity. At the Botanical Inst, which he founded in 1922, Marie-Victorin gathered a small research team which included Jules Brunel, Ernest Rouleau, and Jacques ROUSSEAU. As his monumental *Flore laurentienne* (1935) shows, Marie-Victorin was above all a taxonomist. However, the importance he gave to phytogeography and the evolution of American flora paved the way for ecologists like Pierre DANSEREAU.

As ardent propagandist of "scientific cultivation" and of a nationalism like that of Lionel GROULX, Marie-Victorin was a major Québec intellectual and political figure in the 1930s. He took part in founding the Association canadienne-française pour l'avancement des sciences and the Société canadienne d'histoire naturelle, in organizing the Cercles des jeunes naturalistes and, most notably, in creating the Montréal Botanical Garden. He became a member of the RSC in 1924. Marie-Victorin was at the height of his power as a scholar and leader when he died in an automobile accident during a botanizing excursion.

RAYMOND DUCHESNE

Marion, Léo Edmond, organic chemist, administrator, educator (b at Ottawa 22 Mar 1899; d there 16 July 1979). After studying at Queen's and McGill and spending a year at University of Vienna, Marion became R.H.F. MANSKE's assistant at the National Research Council Laboratories. When Manske left NRC in 1942, Marion became chief organic chemist. His dedication to basic research, and the support of E.W.R. STEACIE and C.J. MACKENZIE, enabled him to build an internationally recognized school of alkaloid chemistry. At the NRC he directed the pure chemistry division 1952-65 and acted as VP (scientific) 1963-65. He was president of the RSC, and editor in chief of the *Canadian Journal of Research*, and contributed to the early growth of the chemistry departments of U de M and Carleton, ending his career as dean of pure and applied science at Ottawa. He received an OBE, many honorary doctorates and awards.

O.E. EDWARDS

Mariposa Folk Festival, *see* FOLK FESTIVALS.

Maritime Provinces PRINCE EDWARD ISLAND, NOVA SCOTIA and NEW BRUNSWICK cover 134 584 km^2, just a little more than 1% of Canada's land surface. The populations of Nova Scotia at 847 445, New Brunswick at 696 405 and PEI at 122 510 constituted 7% of the Canadian total of 24 343 180 (1981c). As part of a nation that has placed great stress on unlimited size and almost limitless space, and also on western development, Maritimers have often found themselves, as the 20th century has unfolded, pushed to the periphery of Canadian development.

The Maritimes constitute a cluster of peninsulas and islands which form the NE extension of the Appalachian highlands and are also significantly affected by the Atlantic Ocean. The tension between the pull of the continent and that of the Atlantic has, over the centuries, shaped the region's cultural, social, political and economic development. For much of its human period — both before and after European settlement — the Maritime region was a homeland for a distinctive group of people. Before the arrival of the first Europeans, the MICMAC, who constituted a single linguistic and cultural entity, inhabited all of present-day peninsular Nova Scotia, Cape Breton I, PEI and southern and eastern New Brunswick. Only in the upper Saint John R Valley were the MALISEET, who spoke a somewhat different Algonquian dialect but had much in common with their Micmac neighbours. With the coming of the French, especially in the early 17th century, the Micmac-Maliseet hegemony over the region was challenged. From its beginnings in 1604 French ACADIA gradually came into existence, a territory roughly encompassing that now covered by the Maritime provinces. Though made up largely of isolated settlements, Acadia was united by a common language, culture and economy. By 1763 France was compelled to surrender its last remaining outpost in Acadia-Nova Scotia (*see* LOUISBOURG) to the British. Thus in 150 years, the region had passed from Micmac-Maliseet control to the French; then, after 1713, to the dual sovereignty of France and Britain; and finally after 1763 to undisputed British control.

Once Britain controlled the entire region, ethnic heterogeneity characterized its settlement. Acadians, New Englanders, foreign Protestants from present-day W and E Germany and Switzerland, English, Irish, Scots and a mixture of LOYALISTS provided Nova Scotia, New Brunswick (created in 1784 for the Loyalists) and PEI with their unique ethnic composition. This basic Anglo-Saxon and Acadian ethnic mix was virtually unaffected by the hundreds of thousands of European immigrants who, carefully bypassing the Maritimes, flooded into Canada, especially after 1900.

At CONFEDERATION in 1867, the Maritime provinces had little in common with Canada. The region's development had been radically different and, furthermore, a Maritime distinctiveness had been significantly influenced by the interplay of 3 major forces: those of the Atlantic, New England and Britain. The Atlantic was for many inhabitants of the area a frontier of space and abundance, and for them its metaphors coloured many of the cultural expressions of their region. Its powerful appeal helped to provide, for some, not only an escape from the grim and often mundane realities of everyday existence, but also a sense of acute fatalism affected by the conviction that the environment could never effectively be mastered.

The second formative force, not only at Confederation but also throughout the post-Indian period, was that of neighbouring New England. Until the AMERICAN REVOLUTION shattered the Anglo-American empire, the Maritime region was "New England's Outpost," and even in the 1980s economic, cultural, religious and social ties between the regions have been surprisingly strong.

The British connection was the third formative force. After France's direct exercise of power in N America was eliminated, Britain's influence over the Maritimes was unrivalled. The arrival of thousands of Loyalists during and after the American Revolution, and the tens of thousands of British immigrants who settled in the region during the 19th century, reinforced Britain's influence. The interaction of these forces before 1867 gave the inhabitants of Nova Scotia, New Brunswick and PEI a strong sense of provincial identity. They did not view themselves as Maritimers, and certainly not as Canadians, but rather as British Islanders, British Nova Scotians or British New Brunswickers.

It may be argued that the Maritime provinces have never fully recovered psychologically from the traumatic experience of Confederation and the sudden end in the late 19th century of the golden age of "Wooden Ships and Iron Men" (*see* MARITIME SHIPPING HISTORY). Before Confederation, many Maritimers believed that their region had unlimited economic potential and that theirs was the most sophisticated and best administered of all the British colonies possessing RESPONSIBLE GOVERNMENT. It was felt that the Maritimes had a special role to play in the evolution of a new British Empire. The development of this sense of destiny came to a sudden halt after

Population of the Maritime Provinces (000s)

	NS	NB	PEI
1871	388	286	94
1891	450	321	109
1911	492	352	94
1931	513	408	88
1951	643	516	98
1971	789	635	112
1981	847	696	123

Confederation when the Maritimes found themselves left out of the westward transcontinental thrust of the new Canada, bypassed by immigrants to the interior, and lacking natural and human resources for INDUSTRIALIZATION. Most Maritimers believed the identity of the villain was obvious: the federal government in Ottawa. The proof was there — before Confederation there had been widespread prosperity and the entire region had shared a feeling of optimism and pride. After Confederation there were prolonged economic recessions and a growing sense of collective inferiority and bitterness.

The anti-Confederation feeling, especially strong in Nova Scotia, provided the emotional substance to much of Maritime regional protest, particularly 1867-1930. Maritimers tended to remain quiet until those periods of extreme economic crisis when their discontent and their suspicion of "Upper Canada" and "Upper Canadians" could be channelled into regional political protest (*see* REPEAL MOVEMENT). The MARITIME RIGHTS Movement of the 1920s was the last significant manifestation of regional protest and anti-Confederation feeling. Because the movement had never sought political involvement outside the traditional 2-party system, it could not transform the regional grievances into a permanent political framework. Even the Conservatives, who had been champions of the movement, soon became Conservatives first and Maritime Righters second. Maritime Rights made good political rhetoric. It could help win elections, could be carefully stored until the next election, and did not demand political action or political sacrifice. It made more sense for pragmatic Maritimers to avoid the possible confrontation towards which the thrust of their regional complaints was driving them. To deviate from the 2-party system was considered political suicide. Evidently central Canadian progress and development could not be reversed by "paranoid" regional protest separated from "power politics."

The mood of the Maritime region had obviously changed by the end of the 1920s. One reason was economic resurgence after 1927, when a construction and tourism boom encouraged industries also revived, as did the traditional markets in Britain and the US. Capital development gave new importance to the pulp and paper industry. But revival was largely restricted to areas such as the Annapolis Valley, Cape Breton, Halifax County and Saint John. Elsewhere the decline continued, and consequently there was a steady exodus of young Maritimers — at least 300 000 from 1900 to 1930, of whom fully three-quarters went to the US. The social costs of such emigration are incalculable, but it seems reasonable to assume that those with ambition and initiative more often left the region than stayed. The remaining population resigned itself to a collective fate only as promising as their individual prospects of success. For most, the Maritime Rights Movement had led to "cynicism and apathy"; a feeling of dependence had replaced regional pride and the cutting edge of alienation had been worn smooth by a prevailing indifference to change.

By the late 1970s the Maritimes had undergone a remarkable transformation of collective identity. No longer were Maritimers the most vociferous critics of Confederation and Canada; they had become, in an ironic twist of historical development, ardently Canadian. They had been able to move beyond the point of merely stressing their Maritime distinctiveness to a position where they could, at the same time, freely discuss and contemplate their powerful emotional attachment to Canada. When a person is able to admit to being an ardent Islander, New Brunswicker or Nova Scotian and an ardent Canadian at the same time, it reveals an ability to integrate 2 quite different, but not incompatible, levels of identity. According to Northrop FRYE, this dynamic tension between the imaginative sense of locality and the attachment to Canada is the essence of whatever the word "Canadian" means. Nova Scotians are Nova Scotians, Islanders are Islanders, and New Brunswickers are New Brunswickers, because as one Maritime premier put it in 1967, "we're Canadians before we're anything else." *See also* ATLANTIC PROVINCES.

GEORGE A. RAWLYK

Reading: E.R. Forbes, The Maritime Rights Movement, 1919-1927 (1979); W.S. MacNutt, *The Atlantic Provinces* (1965); George A. Rawlyk, ed, *Historical Essays on the Atlantic Provinces* (1967).

Maritime Rights, regional protest that climaxed in the 1920s. Essentially a reform movement, it was triggered by the region's declining influence in CONFEDERATION and its inability to protect important interests in transportation, tariffs, port development and federal subsidies. Promoted by newspapers, boards of trade, Maritime clubs, Acadian "national" conventions, farm organizations and some trade unions, the agitation included frequent delegations to Ottawa, economic conferences, propaganda pamphlets and cross-country speaking tours. An amorphous movement, its leadership was legion, and included Nova Scotians H.S. Congdon, W.H. Dennis and F.B. McCurdy; New Brunswickers A.M. Belding and A.P. Patterson; and Prince Edward Islander A.E. MacLean.

Regional issues encouraged major shifts in the popular vote against unsympathetic federal governments. In 1921 Liberals swept 25 of 31 seats; in 1925, amid worsening depression, Conservatives won 23 of 29. In 1926 the Mackenzie King government appointed British lawyer Sir Andrew Duncan to investigate Maritime discontent. His recommendations of freight-rate reductions and subsidy increases were implemented, but suggestions for subsidies based on fiscal need and the use of transportation to encourage regional development were ignored. Although hopes once raised turned to cynicism in the GREAT DEPRESSION, regional resentment and vestiges of co-operation remained the movement's legacies.

ERNEST R. FORBES

Reading: Ernest R. Forbes, *The Maritime Rights Movement, 1919-1927* (1979).

Maritime Shipping History to 1900 The shipping industry in the Maritimes began in the 18th century and reached its zenith in the last half of the 19th century. In 1878, the peak year in Canadian ownership of vessels, 7196 ships were on registry in Canadian ports, and the total gross tonnage (a rough measure of cargo-carrying capacity) of these vessels was 1.3 million registered tons. Official government figures suggest that by 1878 Canada possessed the fourth-largest merchant marine in the world, with only the UK, the US and Norway possessing larger merchant fleets. By 1878, 70% of all Canadian tonnage was owned and registered in the MARITIME PROVINCES (NS, NB and PEI), Québec had 18.6% and Ontario 10.2%. After 1878 the shipping industry in the Maritimes declined, until by 1910 it had only 29% of all Canadian tonnage on registry. Québec had 25%, Ontario 30% and BC 14%.

Small SAILING SHIPS were built in Nova Scotia in the early 1700s for local use. With the establishment and growth of settlements such as Halifax, Saint John and Shelburne in the late 18th century, many more, larger vessels were built for use in the trade with the West Indies, the American colonies and Britain. The first great shipbuilding boom occurred during the Napoleonic Wars, when shipbuilding and shipowning were closely linked to the rapid growth of the TIMBER TRADE between BNA and Britain. Steep tariff duties were imposed on timber imported to Britain from the Baltic countries, and Napoleon's Continental Blockade of Britain seriously hindered European supplies. The Maritime provinces then became the principal suppliers of timber to Britain, and the result was a growing demand for ships to carry it. Maritimers frequently sold both timber and ships in the British market: huge ships were often broken up and sold as timber to avoid duties. Demand continued after the Napoleonic Wars, partly because the preferential tariffs remained in place (*see* TIMBER DUTIES). By the 1860s Canadians supplied almost one-third of all new ships in Britain.

For the manufacture of ships Maritimers had plentiful supplies of softwood (particularly spruce) and a growing number of skilled shipbuilders. Although vessels built in the Maritimes may not have been as durable as British or American vessels built of oak (although many of these were hurriedly constructed from poorly seasoned timber), the price per ton of the Canadian-built vessel was much lower. This advantage was a major reason for the Canadian penetration of British shipping markets.

The rapid and frequent sale of vessels in Britain does not mean that a shipowning industry failed to develop in the Maritimes. Many merchants and timber exporters owned ships in the first half of the 19th century, either to facilitate the export of timber, fish and other products of the Maritimes, or to engage in general trade in the N Atlantic. One major merchant-exporter was Samuel CUNARD of Halifax, who created a substantial shipping business in Nova Scotia, Britain and the West Indies in the 1820s and 1830s. In 1840 Cunard began his successful transatlantic steamship line, after winning the contract to carry mail from Britain to the US. Meanwhile, other merchant-exporters were building large fleets. Saint John became the largest shipbuilding and shipowning centre in the Maritimes. Only half of all tonnage built in and around Saint John was sold in Britain before 1850, and tonnage on registry in the port grew 4% annually between 1826 and 1877. Shipowning grew because of the need for carrying capacity to transport exports from the Maritimes to Britain, Europe and the West Indies, and to transport imported goods and immigrants to BNA. The provision of a relatively cheap transportation service was critical to the growth of the export-based economy of the Maritimes.

The shipowning industry reached its peak in the 1860s and 1870s when several factors encouraged merchant-shipowners to move beyond the local Maritime trades and to engage in many world trades. First, the British market for sailing vessels began to decline, and so the opportunity to make a quick profit from selling a new vessel gradually disappeared. Canadians therefore retained their vessels and employed them in increasingly far-flung trade. Second, exports from the US to Britain and Europe continued to grow, but during and after the AMERICAN CIVIL WAR the American merchant marine declined. Enormous opportunities appeared in the shipping of American exports, and these opportunities were reflected in relatively high freight rates. Vessels from the Maritimes specialized in carrying wheat, petroleum, cotton and tobacco from American ports to Britain and northern Europe. In the 1860s and 1870s most oceangoing vessels from the Maritimes re-

mained in the N Atlantic, but appeared less often in their home ports; over two-thirds of all entrances into port by oceangoing vessels were into the US, Britain or Europe. Some vessels plied more distant trades, carrying guano or wool from S America, rice from the Far East, and coal or iron to Australia. In the 1880s these long-distance trades became more important because steam-powered vessels were less effective competitors than the sailing vessels had been, but the N Atlantic still remained the major trading area for Maritime fleets.

The new generation of vessels in the 1860s and 1870s was larger and better-built than ever before. Most oceangoing vessels had 3 masts and were rigged as ships or barques; they were generally between 400 and 2000 tons. The largest sailing vessel built in Atlantic Canada was the W.D. LAWRENCE, of 2458 tons. The average service life of these softwood sailing vessels rose from about 8 years in the 1840s to about 14 years in the 1880s, and this increased the chances of making a profit in the industry. Most of their masters and a large proportion of the sailors were from the Maritimes, but masters relied increasingly upon sailors born in other (particularly European) countries. The assumption that sailors on Canadian vessels were unusually uneducated and poorly disciplined is probably untrue: their literacy rates were as high as those for the general population, and, over time, vessels were able to sail with fewer men per tonne, which suggests that labour performance, as well as technology, may have improved.

There is no simple explanation for the decline of shipbuilding and shipowning in the Maritimes after the 1870s. It is often assumed that the industry failed because it was a sailing-ship industry, and after the 1870s wooden sailing ships could not compete with iron-hulled steamers. This explanation is not satisfactory because Maritimers knew about the advantages of iron and steam, and they might have purchased (and perhaps even built) such vessels themselves. Furthermore, there were still profits to be made from sailing vessels in the 1880s, even as Maritimers were withdrawing from the industry. Norwegians and others continued to employ sailing vessels after 1900, and various estimates suggest that reasonable profits could be made. Maritime shipowners were certainly discouraged by declining freight rates in the 1880s, but they appear to have withdrawn from the shipping industry because they perceived new opportunities for investment in landward industries in Canada. Canadian industries received substantial protection from the NATIONAL POLICY tariffs of 1879, and investment in new industries in the Maritimes grew rapidly in the 1880s. Although the Canadian government offered some protection to shipbuilders, there was little capital assistance for either shipbuilding or shipowning. Even Canadian coastal shipping was left unprotected, since foreign vessels were allowed to enter Canadian coastal trades. The old export trades in timber and fish were stagnating and offered little incentive to build new fleets. Canadian exporters required cheap shipping services, and these services could be provided by British, Norwegian and other fleets. In these circumstances investment capital shifted from the maritime sector to a broad range of landward industries. Maritimers continued to use sailing vessels in coastal trades and in fishing well into the 20th century, but as Canadians became preoccupied with INDUSTRIALIZATION, railways, and the development of the North-West, the age of "wooden ships and iron men" came to an end. *See also* MARCO POLO.

ERIC W. SAGER

Reading: D. Alexander and R. Ommer eds, *Volumes Not Values* (1979); C.A. Armour and T. Lackey, *Sailing Ships of the Maritimes* (1975); C.W. Crowell, *Novascotiaman* (1979); J. Fingard, *Jack in Port* (1982); L.R. Fischer and Eric W. Sager, *Merchant Shipping and Economic Development in Atlantic Canada* (1982); R. Ommer and G. Panting, eds, *Working Men Who Got Wet* (1980); S.T. Spicer, *Masters of Sail* (1968); F.W. Wallace, *Wooden Ships and Iron Men* (1924).

Markerville, Alta, UP, pop 57 (1981c), located 25 km SW of Red Deer. Founded 1888 by Icelandic settlers and named Tindastoll, after a mountain in Iceland, it was renamed for longtime Alberta dairy commissioner C.P. Marker, who had a government creamery located there. Markerville was the home of Icelandic poet Stephan G. STEPHANSSON, whose restored homestead is now a museum and provincial historic site (opened 1982). ERIC J. HOLMGREN

Marmot, large, diurnal, burrowing RODENT of the SQUIRREL family, native to Eurasia and N America. Marmots are rotund and stocky, weigh 2-9 kg, and have thick fur, short bushy tails and small ears. Of 13 species, 4 occur in Canada, inhabiting grassy areas and rocky slopes of mountains and lowlands. Yellow-bellied, hoary and Vancouver Island marmots (*Marmota flaviventris, M. caligata, M. vancouverensis,* respectively) are found only in the western provinces; the woodchuck (possible corruption of Cree, *"wuchak"*) or groundhog (*M. monax*), in patchy distribution throughout Canada, excluding Newfoundland. The Vancouver Island marmot, found only in Canada, inhabits a few subalpine sites on the island. Marmots eat green plants and can become pests in vegetable gardens. They signal danger by shrill calls. Marmots hibernate in burrows for 4-8 months in winter; on awakening they may be almost half their autumn weight. Females bear 2-9 young after hibernation. The whimsical observance of Groundhog Day (Feb 2) recognizes marmots' impending emergence from a long winter's rest (much later in colder climates). *See* ENDANGERED ANIMALS. J. MARY TAYLOR

Marquette, Jacques, Jesuit priest, missionary, explorer (b at Laon, France 10 June 1637; d at the mouth of a river later called the Père Marquette R, Mich 18 May 1675). Contemporaries regarded Marquette as a gifted linguist who founded the St-Ignace Mission and opened the Illinois country to missionaries. In the popular mind he is inextricably bound to Louis JOLLIET and the discovery of the Mississippi.

Father Marquette was ordained on 7 Mar 1666 and sailed for New France where he served at Sault Ste Marie and at the mission to the Huron and Ottawa at Chequamegon (SW shore, Lk Superior) before he founded the mission of St-Ignace on the Straits of Mackinac. Late in 1672 Marquette received orders from his superior, Father Dablon, to accompany Louis Jolliet. The expedition departed St-Ignace for the Mississippi on 17 May 1673 and reached lat 33°40′ N lat near the mouth of the Arkansas R by mid-July. On 30 Sept they returned to the mission of St-Francis-Xavier (DePere, Wis) by way of the Illinois R and Lk Michigan. Exhausted and ill from the Mississippi voyage, Marquette journeyed back to the Illinois late in 1674 and opened the mission of La Conception among the Kaskaskia (an Illinois tribe). By spring 1675 he was too ill to continue his work and departed for St-Ignace but died on the NE shore of Lk Michigan.

C.E. HEIDENREICH

Marriage and Divorce Marriage remains one of the most important social institutions in Canada. Marriages can be dissolved through annulment or divorce, both of which involve a judicial decree and remarriage to another person can occur only after a previous marriage has been legally terminated through either device. There is, however, another form of marriage (the so-called common-law marriage) that does not involve a legal ceremony. This is a form of cohabitation that gradually confers rights and obligations to its participants which are not identical with but similar to those acquired through legal marriage. They are acquired through the act of living together and, where applicable, having a child together. Different provinces have different laws recognizing common-law marriages under different circumstances. Québec does not recognize common-law marriages.

Since the 1960s, marriage and divorce in Canada have been undergoing profound changes which have substantially altered the meaning of marriage, the probability of its ending in divorce and the circumstances attached to marriage. The vast majority of people (90%) marry at some point in their lives, although a substantial proportion will eventually divorce. In 1981 the average age at first marriage was 23.5 for brides and 25.7 for grooms. This has implications both during the marriage and towards its end. Women live on average longer than men (the life expectancy for a female born in 1986 has been estimated at 76.9 years and for a male born in the same year at 70.2 years) and a woman is therefore much more likely to die as a widow while a man is much more likely to die as a husband.

Until very recently, a rather strict division of labour between husbands and wives was the rule in the majority of marriages. In general, husbands were held responsible for the economic well-being of the family, and were considered the breadwinners, while wives were considered responsible for childcare, HOUSEWORK, keeping the FAMILY in good emotional and physical health, and generally for many of the service functions associated with families. In addition, farm wives worked on the farm and many wives in working-class households took in boarders or sold their household services in other ways to non-family members, contributing directly to their family's income. Since the beginning of the 1980s, however, the majority of Canadian wives are in the labour force, earning an independent income and participating in the economic functions traditionally associated primarily with husbands. This situation has reduced the economic dependency of wives on husbands and therefore shifted the balance of power within marriages. It has also meant that the majority of preschool children are cared for by somebody other than a parent during substantial portions of their day. In 1981, 52.2% of all preschool children (age 0 to 5) were in some form of shared child-care arrangement and 60.8% of all mothers with school-age children were in the labour force. Nevertheless, housework still tends to be seen primarily as a female task. Since 1978, all provinces have substantially changed their FAMILY LAWS, generally with the aim of assigning equal responsibility to husbands and wives with respect to all types of family responsibilities, including housework, child care and provision for the financial well-being of the family. As a consequence, in divorce settlements, housework and childcare are now generally recognized as one way in which a spouse can contribute to a family's overall economic well-being, and through which a spouse develops some claim to matrimonial assets.

Divorce law is under federal jurisdiction. In 1968 Canada's first unified divorce law was passed. At the time, divorce was made easier to obtain, although considerable legal and other difficulties remain. Divorce may now be obtained on the basis of a matrimonial offence (previously the only basis on which divorce was available) or on the basis of marriage breakdown. In the latter case, a couple must have lived 3 years apart before they can obtain a divorce. The divorce rate has been steadily rising in the latter part of this century but, following the changes in the divorce law, there was a sharp increase (from 54.8 divorces per 100 000 population in 1968 to 124.2 in 1969) and the increase since that time has continued at an accel-

erated pace. By 1980 there was a 40% chance that a marriage would end in divorce and, if current trends continue, the percentage will continue to increase. Divorce rates alone, however, are not a sufficient indicator of marriage breakdown because they do not include judicial separations, migratory divorces (ie, those granted in other countries) and desertions. Reasons for the tremendous rise in the divorce rate, a phenomenon that has occurred in virtually all industrialized countries, are not entirely clear, but contributing factors probably include longer life expectancies, which increases the possibility of differences in the individual development of wives and husbands; the greater labour force participation of women and improved SOCIAL SECURITY, which has meant wives are less economically dependent on their husbands than in the past; the lessening of religious and social sanctions against divorce; and the movement towards a more individualistically oriented ethic which stresses self-actualization over maintenance of the family unit. All of these factors suggest that an increased divorce rate may be an indication that the expectations about marriage have risen and that today many people prefer a divorce to an unhappy marriage.

Where there are dependent children involved (this tends to be the case of slightly more than 50% of all divorces in the 1970s to early 1980s) divorce usually leads to the formation of one-parent households (*see* POVERTY). These households are primarily female-headed, because more than 75% of all dependent children involved in divorce are assigned to the custody of the mother, and about 15% are assigned to the custody of the father. This pattern has been remarkably stable between 1971 and 1980.

Given that a high proportion of marriages end in divorce, a substantial group of people in their middle years again become available for marriage. The majority of people who divorce remarry, although men are more likely to remarry than women. In 1980, 26.5% of all Canadian marriages contracted involved at least one partner who was previously married, and by far the largest component came from divorced rather than widowed people. Remarriage families involving dependent children who have 2 parents who are still alive but not married to each other have only recently become important as a large-scale social phenomenon. Questions of overlapping and competing responsibilities and rights of stepparents versus biological nonresidential parents are still in the process of being socially defined. Other questions involve the right of access of other relatives (such as grandparents) who are linked through a non-custodial parent to the child, and the relationship between step-siblings.

The trends that have been noted for Canadian families (eg, rising divorce rate and greater numbers of women in the labour force) are not restricted to Canada, but are typical of all highly industrialized nations, although significant national differences remain. Another common trend among industrialized countries is a sharp decline in fertility rates. In Canada, between 1960 and 1980, fertility rates have dropped by more than 50% in all age categories. At the same time, rate of births to unmarried women has increased, from 4.3% of all live births in 1960 to 12.8% of all live births in 1980. M EICHLER

Marriage and Divorce, History of Canadians have always followed the marriage pattern dominant in Western societies, eg, relatively late marriage, companionable unions and a significant proportion of individuals who remain unmarried. Before WWII, 9 out of 10 adults in Canada apparently had married at least once in their lives. The average age of grooms at first marriage was between 25 and 29, of brides, between 20 and 25.

Then, as today, 3 basic factors influenced the opportunity to marry and the timing of marriage. First, is the ratio of marriageable males to females. In Canada this ratio has varied widely over time. Normally the numbers of bachelors and spinsters have been more or less equal, but unmarried men often outnumbered unmarried women in times of high immigration and in frontier areas, while the converse was generally true in the growing industrial cities of central Canada from 1850 onward. Second, the strong tendency of men to marry women younger than themselves has affected the marriage chances of prospective brides and grooms in quite different ways. The selection of potential spouses for a woman has always been greatest when she was young; for males, on the other hand, the choice of mates expanded steadily as the males aged. Third, economic factors have always affected marriage opportunities, especially for men. Until recently a man could not marry until he could support a wife and the children who, almost inevitably, would soon follow.

Long before the founding of Canada, the Catholic and Protestant churches had established that marriage was a lifelong, exclusive union of one man and one woman who freely consented to join their lives for procreation and mutual comfort. But the various Christian denominations were divided on several issues. The Roman Catholic Church held marriage to be a sacrament; Protestants simply considered it sacred or blessed by God. Catholics believed the marriage bond lasted until death while Protestants admitted the possibility of divorce and remarriage in limited circumstances. Catholicism prohibited a broad range of unions among kinfolk, but offered some leeway in enforcing its rules; Protestantism imposed fewer restrictions on who one could marry, but did so absolutely. Despite these differences, broad agreement on the fundamentals of Christian marriage existed in western Europe after the Reformation.

From the dawn of European settlement in Canada, the marriage system reflected these traditions. As a result, the Christian concept of marriage has predominated throughout the history of Canada, even though notable exceptions have persisted in special circumstances, eg, marriages *à la façon du nord*, the consensual unions of white men and Indian or mixed-blood women in the northwestern fur trade.

Some evidence suggests the existence of arranged marriages among bourgeois families in New France, but for the most part men and women have always chosen their own spouses. Ethnicity, religion and class have played an important role in the process of mate selection, for Canadians have tended to marry within their own social groups. No doubt material concerns have never been far from view in many matches as well. Yet within these boundaries (and occasionally outside of them) personal attraction has been the most important motive for marriage in Canada. Historically the romantic basis of marriage was regarded with ambivalence. Although unions founded on personal choice and emotional attachment offered the promise of happiness and personal fulfilment through companionship, they also required lengthy, private courtship and contained hidden dangers, eg, the possibility of imprudently choosing a spouse by yielding to the dictates of the heart and not the mind. Another danger was the prospect of sexual intimacy before marriage, which was an offence against respectable opinion and religious teaching, and one which carried the risk of childbirth outside marriage. Censure of nonmarital sexual intercourse served 2 important functions. It affirmed high ideals of personal conduct, particularly for women, and it also constituted protection for the interests of women and children whose greatest economic security, before the age of the WELFARE STATE, lay in marriage and family life.

For these reasons, family and community influences exerted strong control over courtship in Canada until almost the end of the 19th century. Couples exploring the possibility of marriage courted largely in their own homes under the watchful gaze of their families. They also passed time together in the homes of relatives and friends, in church, at community events, and out of doors on strolls, sleigh rides and incidental pastimes. These circumstances gave parents an effective control over courtships, especially those of their daughters. In urban middle-class circles, where "calling" and "at homes" formed part of customary social life, a mother admitted to the home only those young men who she considered fit companions for her daughters. The annual "coming out" ceremonies, so carefully arranged by mothers, formally placed young women in a marriage market regulated by adults. Urban working-class families has less influence over their courting young, for their children often worked and boarded away from home after mid-adolescence. Instead the families with whom youths lived often oversaw their conduct, though perhaps with something less than due parental care. In rural communities courtship also fitted in and around the common customs of social visiting, church attendance and everyday recreations.

From the 1880s onward the controls on courtship and youthful social life in Canada gradually relaxed. Parents exercised less formal oversight of late adolescence, though they continued to wield indirect influence through youth clubs, schools, residences, church groups and other institutions which increasingly framed the lives of the young. The transportation revolution after the turn of the 20th century also increased youthful independence. Greater mobility brought freedom from parental and community supervision, especially in larger cities. Generally speaking, the urban young achieved earlier and more extensive freedom than their rural counterparts, for they had easier access to the quasi-privacy that anonymity offers to city dwellers. In these circumstances courtship became an increasingly private matter.

Throughout the history of marriage in Canada the decision to marry has always belonged to the couple. But until the 1880s, a young woman's choice of a spouse was commonly subject to her parents' approval. From time to time, fathers and mothers refused to allow a daughter to wed the man of her choice, the usual justification being that the alliance was not in her best interest. In these circumstances a woman might defy her parents and marry against their will,

Incidence of Divorce in Canada by Year
(Source: Statistics Canada)

Years	*Frequencies*	*Rates per 100 000 population*
1921	558	6.4
1931	700	6.8
1941	2 462	21.4
1951	5 270	37.6
1961	6 563	36.0
1967	11 165	54.8
1968	11 343	54.8
1969	26 093	124.2
1970	29 775	139.8
1971	29 685	137.6
1972	32 389	148.4
1973	36 704	166.1
1974	45 019	200.6
1975	50 611	222.0
1976	54 207	235.8
1977	55 370	237.7
1978	57 155	243.4
1981	67 671	278.0
1982	70 436	285.9

but she did so at the risk of estrangement from her family. The parental veto, however, was a heavily qualified power. Its strength declined as a daughter's age increased, and it could not be used more than once or twice without inviting defiance. During the 1880s women began to free themselves from this restriction, as they did from so many other constraints which until then had affected their lives. Thereafter, they usually married whom they pleased. Men, by contrast, had always been far less limited by parental wishes when choosing a spouse. From the earliest days of colonial settlement they were relatively free agents on the marriage market.

In the past, marriage in Canada was usually a religious rite. Civil marriage has always been possible, at least since the end of the French era, but until recently has been relatively uncommon. The secular custom of a honeymoon after the wedding developed slowly during the 19th century. Initially, only the well-to-do had money and leisure enough for a postmarriage vacation, but after 1850 the practice spread gradually throughout all social levels. The purpose of the honeymoon has changed considerably over time as well. At first, it took the common form of 19th-century social visiting. The recently married couple often travelled with relatives and visited friends and relations in distant communities. But by the end of the century, the honeymoon had become a private holiday for the newly wedded pair.

The history of divorce in Canada contrasts sharply with that of marriage for, while most Canadians married, divorce was extremely uncommon until after WWII. In fact, until that time, Canada had one of the lowest divorce rates in the Western world. Respectable opinion — articulated by social and religious leaders — condemned divorce as a threat to the family, and the strength of this opinion prevented relaxation of Canadian divorce laws. Consequently, access to divorce in Canada was extremely limited until 1968. For most of Canada's first century adultery was virtually the only ground for divorce and, before WWI, only NS, NB and BC had divorce courts, although Alberta, Saskatchewan and Ontario created them during the interwar period. In provinces without access to judicial divorce, the only alternative was an appeal to Parliament for a statutory divorce, an expensive process that limited relief to the wealthy. The most common alternatives were desertion, legal separation and divorce in an American jurisdiction which, though it had no legal force in Canada, seemed to satisfy public opinion. PETER WARD

Marriott, Joyce Anne, poet (b at Victoria 5 Nov 1913). Marriott was a productive poet and poetry-educator in the 1940s, when she was also on the board of the famous pioneer literary magazine *Contemporary Verse* and otherwise active as an editor. She was renowned especially for the narrative poem "The Wind, Our Enemy." Her best-known collection was *Sandstone and Other Poems* (1945), though one of her earlier ones, *Calling Adventurers* (1941), won the Gov Gen's Award. After the war, Marriott stopped writing, only to return eventually with *Countries* (1971) and *The Circular Coast: Poems New and Selected* (1981). She thus proved herself a hardy survivor of the gifted generation of poets whose leading lights were and remain figures like Earle BIRNEY and Irving LAYTON.

Marsh, Leonard Charles, social scientist, professor (b at London, Eng 24 Sept 1906; d at Vancouver 10 May 1982). Marsh came to Canada in 1930 after studies at the London School of Economics. He was director of an interdisciplinary social-science research program at McGill 1930-41 and an early member of the group of social reformers which eventually became the LEAGUE FOR SOCIAL RECONSTRUCTION. He made major editorial contributions to the league's influential book, *Social Planning for Canada* (1935, repr 1975). His *Canadians In and Out of Work* (1940), written almost 2 decades before John PORTER's *The Vertical Mosaic,* was the first significant analysis of the impact of social class on Canadian society. Marsh was research adviser on the federal Committee on Post-War Reconstruction 1941-44 and published his *Report on Social Security for Canada* in 1943 (repr 1975). Although the government paid little attention at the time, most of the major elements in his program had become law by 1966 and the basis of the modern Canadian SOCIAL-SECURITY system.

Marsh was welfare adviser to the UN Relief and Rehabilitation Administration (1944-46), professor and director of research at the School of Social Work, UBC (1948-64) and professor of educational sociology, UBC (1964-72). He retired in 1973 but continued to write and lecture, his writings reflecting his interests, which ranged from cats to music. His contribution to society, considered unparalleled by some, has not yet been adequately evaluated. ALBERT ROSE

Marshall, Kenric Rudolphus, social worker (b at Winnipeg 21 Mar 1915). Educated in Winnipeg, Calgary and Toronto, Marshall worked in YMCA facilities at army camps during WWII and then as recreation director for Guelph, Ont. In 1955 he became executive secretary of the Korean Assn of Voluntary Agencies and consultant to the UN Korea Reconstruction Agency. In 1957 he became area planning director of the Social Planning Council of Metropolitan Toronto and in 1960 national director of the Canadian Save the Children Fund, a post he held until 1978. Marshall, a prominent figure in the involvement of Canadian volunteer agencies in overseas development, also served on several international boards directed to the same end. ROBERT BOTHWELL

Marshall, Lois Catherine, soprano (b at Toronto 29 Jan 1924). Lois Marshall began voice lessons at age 12 with Weldon Kilburn, whom she married 32 years later. Her first major engagement was in 1947 as soprano soloist in Bach's *St Matthew Passion,* with Sir Ernest MACMILLAN conducting the TORONTO MENDELSSOHN CHOIR and the Toronto Symphony. In 1950 she won the Royal Conservatory of Music's Eaton Graduating Scholarship and 2 years later won the Naumberg Award and made her New York debut. Her career included performances of all the great oratorios with the leading orchestras of the world, and she toured Europe, Britain, the USSR, Australia, New Zealand and N America in solo recitals, orchestral performances and concerts. She appeared with most of the important Canadian orchestras, performed at festivals, and joined other soloists such as Glenn GOULD, Louis QUILICO and Maureen FORRESTER. Though crippled by polio as a child, Marshall managed a limited opera career with companies such as the CBC Opera Co, the Canadian Opera Co and the Boston Opera Co. In the mid-1970s Marshall turned to the mezzo-soprano repertoire, especially German lieder. She has received the Molson Prize, is a companion of the Order of Canada, and was music director of Tribach, the festival commemorating J.S. Bach's 300th birthday held in Edmonton in 1985. MABEL H. LAINE

Marsupialia, order of MAMMALS belonging to the infraclass Metatheria, comprising about 250 living species, of which 2/3 are found in Australia. The Virginia OPOSSUM (*Didelphis virginiana*) is the only marsupial found in Canada. Marsupials differ from placental mammals in many anatomical details, especially in the reproductive system. In the vast majority of marsupials, no placenta is formed and the young are born in a premature state after a brief gestation. The young complete their development attached to a teat and protected by skin folds or a fully formed pouch (marsupium). Marsupials and placental mammals evolved at about the same time in the Cretaceous period (140-165 million years ago) from a group of primitive mammals, the pantotheres. The oldest FOSSILS are from the Upper Cretaceous (70-80 million years ago) of N America. Marsupials are found in N and S America and Australia, which they may have colonized, via Antarctica, before continental drift moved Australia to its present location. C.G. VAN ZYLL DE JONG

Reading: C.G. van Zyll de Jong, *Handbook of Canadian Mammals* 1, *Marsupials and Insectivores* (1983).



Carleton Martello Tower, Saint John, NB (*photo by Malak, Ottawa*).

Martello Tower, distinctive masonry FORTIFICATION used in defence of British N America in the first half of the 19th century. The name, which likely derived from references to a stone tower on Cape Mortella in Corsica, was first applied to thick-walled, round stone or brick defence works hastily constructed in Great Britain to resist a threatened invasion by Napoleon. The 16 squat, flat-roofed towers built in British N America from 1796 to 1846 were distributed as follows: Halifax (5), Saint John (1), Québec City (4) and Kingston (6). The Kingston towers, constructed 1846-48 at the height of border tensions with the US, were the most complex in design. None of the towers was ever subject to attack; 11 have survived. JAMES MARSH

Marten (*Martes americana*), slender WEASEL specialized for life in the northern coniferous forests; found from Alaska and BC to Newfoundland and into the US. Males average 60 cm long and weigh 1 kg; females 54 cm and 650 g. The bushy tail is half the body length; feet are large with sharp, climbing claws. The colour is shades of brown with a yellow chest spot and blackish



Marten (*Martes americana*), a slender weasel whose habitat is the northern coniferous forests (*photo by Wayne Lankinen/DRK Photo*).

legs and tail. The large ears are whitish. Marten are solitary, except for the female and kits, which may travel as a group for several months. Expert climbers, they hunt in trees for squirrels and bird nests and on the ground for mice, voles, hares and birds. Insects, berries and even carrion are also eaten. Mating is in July-Aug and the litters of 1-4 young are born Mar-Apr. Sexual maturity occurs at 2 years. The species is highly valued for its soft, lustrous fur. The annual catch in Canada is 20-50 thousand but was once as high as 180 000. Forest fires and overkill have been the main causes of the decline. *See* FUR TRAPPING.
IAN McTAGGART COWAN

Martin, Joseph, lawyer, politician, premier of BC (b at Milton, Canada W 24 Sept 1852; d at Vancouver, 2 Mar 1923). Elected to 4 legislatures he was an agitator more suited to opposition than government. He was elected to the Manitoba legislature in 1883, became attorney general in the GREENWAY government in 1888, and in 1890 sponsored legislation ending the official use of French and public support for separate schools. He represented Winnipeg in the House of Commons 1893-96, and then moved to Vancouver to practise law. Elected to the BC legislature in 1898, he served as attorney general until 1900. In Feb 1900 he was asked to form a government but, unable to muster support, resigned after 3 months. He speculated in real estate and practised law 1903-08 and in 1907 edited and published the *Vancouver Guardian*. His legal business took him to Britain, where he represented East St Pancras at Westminster 1910-18. He nevertheless contested the Vancouver mayoralty in 1914 and founded the *Evening Journal* there in 1916.
HAL GUEST

Martin, Mungo, or Nakapenkim, meaning a potlatch chief "ten times over," or Datsa, meaning "grandfather," Northwest Coast carver painter, singer, songwriter (b at Fort Rupert, Vancouver I *c*1879-82; d at Victoria 16 Aug 1962), stepson of Charlie James (a recognized Kwakiutl carver), and tutor to Henry HUNT and Tony HUNT. As an authority on various aspects of his culture, Mungo Martin helped renew pride in Kwakiutl heritage. Martin was carving during the prohibition of the POTLATCH, and his first commissioned totem pole, *Raven of the Sea*, was carved *c*1900 at Alert Bay. In 1948 UBC asked Martin to take over their TOTEM POLE restoration program. Martin was not only considered an exceptional carver but was of invaluable service to the ethnographers, in the early 1950s recording 200 songs at UBC and at the BC Provincial Museum, Victoria. In 1952 he moved to Victoria to begin a replication program of old poles; the work continues in 1984 with Richard Hunt (son of Henry Hunt) being a carver-in-residence. In 1958 Martin finished the World's Tallest Pole, which stands in Beacon Hill Park, Victoria, and in 1961 he carved his last pole, which rests in Mexico.
GERALD R. McMASTER

Martin, Paul Joseph James, politician, statesman (b at Ottawa, 23 June 1903). First elected to the House of Commons in 1935, Martin quickly took a prominent place in Liberal ranks because of his impressive educational background in philosophy, international relations and law. PM KING appointed him parliamentary assistant to the minister of labour in 1943; he entered Cabinet in 1945 as secretary of state, and in 1946 became minister of national health and welfare. Faced with a government becoming increasingly conservative on social issues, Martin managed to introduce a system of health grants and, by threatening resignation, made PM ST. LAURENT accept national health insurance. He also undertook diplomatic assignments for the King and St. Laurent governments. In 1955 he negotiated an agreement that allowed the expansion of UN membership. Martin ran unsuccessfully for the Liberal leadership in 1948 and 1958. In 1963 PM PEARSON appointed Martin secretary of state for external affairs, a portfolio he held until 1968, when he tried again for the leadership but lost to Pierre TRUDEAU. He was appointed government leader in the Senate (1968-74) and high commissioner to Britain (1975-79).
JOHN ENGLISH

Martin, Ronald Albert, painter (b at London, Ont 28 Apr 1943). After finishing high school in 1964, Martin established a studio in London. He worked there until he moved to Toronto in 1983. His first one-man show was held in 1965 and since then he has exhibited widely. He represented Canada at the Venice Biennale in 1978. Martin's gridlike "World Paintings" of 1970 were succeeded by a series of large one-colour paintings in which the colour was applied vigorously by hand. From 1974 to 1980 he worked exclusively with black. In 1981 he began working again with colour organized in a grid structure.
DAVID BURNETT

Martin, William Melville, lawyer, premier of Saskatchewan (b at Norwich, Ont 23 Aug 1876; d at Regina 22 June 1970). He was the second premier of Saskatchewan 1916-22, serving with considerable skill during a difficult transition period. Educated at U of T and Osgoode Hall, Martin moved to Regina in 1903 to practise law. Elected to the House of Commons for Regina in 1908 and re-elected in 1911, he resigned from Parliament in 1916 and led the provincial Liberals. He was elected to the legislature in a by-eletion in 1916 and was re-elected in the general elections of 1917 and 1921. On his voluntary retirement from politics in 1922 he was appointed a judge of the Saskatchewan Court of Appeal. He became chief justice of the Supreme Court of Saskatchewan in 1941 and held that post with distinction until 1961.
D.H. BOCKING

Martini, Paul, figure skater (b at Toronto 2 Nov 1960). Favoured to win the 1984 Olympic gold medal in pair skating at Sarajevo, Yugoslavia, Martini and partner Barbara UNDERHILL gave 2 disappointing performances and finished in 7th place. They made a comeback a month later to defeat the Olympic gold medalists, Elena Valova and Oleg Vassiliev from the Soviet Union, and won the gold medal at the world championships in Ottawa.
TERESA MOORE

Martre, Lac la, 1777 km^2, elev 265 m, max length 76 km, is located in the NWT, 50 km W of Rae-Edzo and 150 km NW of Yellowknife, and 346 km S of the Arctic Circle. The settlement of Lac la Martre is located at the SE corner of the lake. The lake is fed by Lac Grandin and several smaller lakes and streams, and drains SE into the North Arm of GREAT SLAVE LK. Originally, it appeared as Martin Lk (in Aaron Arrowsmith's map of MACKENZIE's journey of 1789), but later took on its present name, presumably owing to the abundance of pine marten (*Martes americana*) in the area.
DAVID EVANS

Marxism is a basic world view first developed by Karl Marx and Friedrich Engels in the 19th century. It has been adopted as the official ideology of communist governments in Europe, China, Cuba and elsewhere. It has spawned diverse movements, eg, Marxist-Leninism, Maoism, Christian Marxism, Marxist Humanism and Trotskyism, all of which can be found to some degree in Canada.

As a method of analysis, Marxism emphasizes the development of the forces of production — machinery, technology, labour skills, and the interaction among SOCIAL CLASSES, ie, who does the work and who gives the orders, who has the right to possession, ownership or consumption of the product. It also examines (in a method called "dialectical materialism") the way this "economic base" influences and shapes the superstructure of society, ie, the FAMILY, school system and political system as well as art and culture, religion and all systems of ideas.

Marxism recognizes that massive historical transformations have produced new social systems, eg, slavery, feudalism, capitalism and socialism, which alter every aspect of daily life. But all hitherto existing social systems, according to Marxism, are divided into socioeconomic classes. The ruling class expresses its dominance through its ability to force the subordinate classes to turn over a portion of the products they produce (or the value of these products) to itself. One social system is distinguished from another in the way this economic surplus is extracted and the manner in which it is utilized. Surplus extraction is the basis of exploitation in the Marxist analysis and the basis of class conflict, which in turn is the fundamental dynamic in historical transformations. According to the Marxist analysis, when capitalism can no longer extract sufficient "surplus value," a major element of which is profit, the result is economic crises and widespread UNEMPLOYMENT. Marxist theory holds that these problems are inherent in the capitalist organization of society, through which ownership of the means of production is confined to a handful of people while the vast majority of people must sell their labour power in order to live, and that only the creation of a new economic order can overcome these problems. It advocates a planned economy that replaces the profit system as the motor force of the economy; public ownership of the major means of production; and economic democracy with community control over economic priorities and worker control over the organization of work.

Marxism was brought to Canada by British worker intellectuals in the first years of the 20th century. It was the dominant ideology in the earliest socialist parties of Canada and was fully adopted by the COMMUNIST PARTY OF CANADA when it formed in 1921. During the Stalin years, Marxism became a religious faith rather than a social science and stagnated in Canada as it did elsewhere, but over the past decade it has flourished, gaining a significant presence in Canadian scholarship. Prominent Canadian Marxist scholars include C.B. MACPHERSON, Stanley RYERSON, Leo Panitch, Bryan Palmer, Gregory Kealey, Michael Lebowitz, Dorothy Smith, Varda Burstyn, Patricia Connelly, R. James Sacouman, Pauline Vaillancourt, Jorge Niosi, Gilles Bourque, Carl Cuneo and John Saul.
C. GONICK

Mary Celeste, brigantine built in 1861 at Spencer's I, NS, and originally named *Amazon*. She was wrecked off Cape Breton in 1867, salvaged, sold and in 1868 registered at New York and renamed *Mary Celeste*. In 1872 she was found adrift off the Azores, with no sign of her crew. The mysterious disappearance caused wild speculation, but the fate of the crew will never be known.
JAMES MARSH

Marystown, Nfld, pop 6299 (1981c), inc 1951, is a shipbuilding and fish-processing centre, comprising the settlements of Marystown (formerly Mortier Bay) and Creston, on the E side of the Burin Pen. Marystown, having one of the finest natural harbours in Newfoundland, has been promoted historically as a free port. Probably frequented by French and BASQUE



fishermen in the 16th and 17th centuries, the area was settled predominantly by English and Irish fishermen by the early 1800s. In 1966 a shipyard and fish plant were constructed, providing much-needed alternative employment. One of the most efficient and best-equipped shipbuilding and ship-repair facilities of its size in N America, the yard is a crown corporation and produces mainly stern trawlers for the Newfoundland fishing industry, although it has the capacity to design and build vessels of all types up to 85 m long. JANET E.M. PITT

Mascarene, Paul, born Jean-Paul, military officer, colonial administrator (b in Languedoc, France 1684/85; d at Boston, Mass 22 Jan 1760). A Huguenot émigré, Mascarene served throughout New England and Atlantic Canada 1710-40 as a military engineer and fluent negotiator with the Acadians and Indians. He was one of the first (1720) to analyse Great Britain's weakness in Nova Scotia, recommending a stronger military presence and unqualified loyalty from the ACADIANS. Mascarene became interim colonial administrator 1739, governor 1744, and successfully held Annapolis Royal against repeated French attacks 1744-46. He attributed his victory to the military support sent by Gov William Shirley of Massachusetts, and to his own policy of extracting neutrality rather than loyalty from the truculent Acadians, a tactic he vigorously defended as politically expedient. Mascarene returned to New England in 1751 and eventually settled in Boston.

LOIS KERNAGHAN

Masks were worn in religious and social ceremonies by native peoples throughout N America, and served to intensify the presence of the mythical animal or supernatural person represented. In the North, on the Northwest Coast, among some of the Plains tribes and all the eastern tribes, masks made of wood, basketry, pottery or hide were carved, painted and decorated with shell, bark, fibre, hair or feathers. They might depict either males or females. The designs and colours were always symbolic, and sacred masks had prescribed methods of consecration and handling. The most famous masks are those of the FALSE FACE SOCIETY. *See also* NATIVE PEOPLE, RELIGION; NORTHWEST COAST INDIAN ART.

RENÉ R. GADACZ

Mason, John, governor of the English colony in Newfoundland (b at King's Lynn, Eng 1586; d at London, Eng 1635). In 1615 he was appointed the second governor of the colony at Cuper's Cove (Cupids, Nfld), succeeding John GUY, and arrived in 1616 accompanied by his wife. He explored much of the island and used his findings in the first English map known to be based on personal survey and in writing *A Briefe Discourse of the New-Found-Land* (1620). He left in 1621 for New England, where he founded the colony of New Hampshire.

MICHAEL J. MCCARTHY

Masse, Marcel, politician (b at St-Jean-de-Matha, Qué 27 May 1936). He was a student of history and political science at U de M and abroad in London and Paris, and taught high school in Joliette, 1962-66. A strong Québec nationalist, he was a member of the Québec Assembly, 1966-73, and held several ministerial posts in the UNION NATIONALE government, 1966-70. He ran for the leadership of the UN in 1971, losing by only 21 votes and leaving the party to sit as an independent a few months later. In 1973 he joined a Montréal engineering firm. He was an unsuccessful federal Conservative candidate in 1980 but won election to the Commons in 1984. He was named minister of communications in the MULRONEY government and sat on 3 important Cabinet committees.

NORMAN HILLMER



Vincent Massey was Canada's first native-born governor general and chaired an influential royal commission on the arts (© *Karsh, Ottawa/Miller Services*).

Massey, Charles Vincent, politician, diplomat, governor general (b at Toronto 20 Feb 1887; d at London, Eng 30 Dec 1967). Vincent Massey is best remembered as Canada's first native-born GOVERNOR GENERAL. He was the grandson of Hart MASSEY who developed the farm-implement company started by Daniel MASSEY into a powerful international corporation, and the brother of actor Raymond MASSEY. His education was at U of T and Balliol College, Oxford, and he lectured in history at Victoria College, U of T, 1913-15. He then joined the army and served as a staff officer in Canada, ultimately working for the war committee of the Cabinet. He was president of Massey-Harris Co from 1921 until 1925 when he joined PM Mackenzie KING's Cabinet. But he failed to win a seat in Parliament, and in 1926 King made him Canada's first minister to the US where he served until 1930. In 1935 King named him high commissioner to Britain, a post he held until 1946. As a diplomat Massey was more successful on the social side than in the hard-slogging details of negotiation, but there was no doubt that in Britain particularly he had access to the highest quarters. His own prime minister, however, mistrusted his judgements on imperial questions, and the relations between the 2 were formal and tense.

After the war, PM Louis ST. LAURENT placed Massey in charge of the Royal Commision on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, a post for which Massey's status as a patron of the arts well fitted him, and his report in 1951 recommended the formation of a CANADA COUNCIL (est 1957). In 1952 Massey became governor general, a post he filled with distinction and in a manner that minimized the break with the past the appointment of a Canadian represented. In 1959 Massey left RIDEAU HALL and went into an active retirement. J.L. GRANATSTEIN

Reading: Claude Bissell, *The Young Vincent Massey* (1981).

Massey, Daniel, manufacturer (b at Windsor, Vt 24 Feb 1798; d at Newcastle, Canada W 15 Nov 1856). A prosperous Methodist farmer near Cobourg, Upper Canada, Massey became interested in farm machinery in the 1830s and invested in a foundry at Bond Head in 1847. In 1849 he moved to Newcastle and established the Newcastle Foundry and Machine Manufactory. Massey's industrious habits and religious temperament were passed on to his son Hart, whose aggressive marketing technique and acquisition of patent rights to the latest American farm-machinery designs contributed to the firms's later success as the Massey Manufacturing Co. In 1890 the firm merged with its chief rival, A. Harris, Son, and Co, to become Massey-Harris Co Ltd (MASSEY-FERGUSON), Canada's largest manufacturer of farm implements. JOSEPH LINDSEY

Reading: P. Collins, *Hart Massey* (1977); M. Denison, *Harvest Trimphant* (1948); M. Gillen, *The Masseys* (1965); E.P. Neufeld, *A Global Corporation* (1969).

Massey, Hart Almerrin, manufacturer, philanthropist (b in Haldimand Twp, Upper Canada 29 Apr 1823; d at Toronto 20 Feb 1896). Son of Daniel MASSEY, he propelled his father's Newcastle Foundry into a dynamic farm-implement producer by mergers, spirited sales and advertising techniques, and acquisition of patents for labour-saving American mowers, reapers and binders that transformed the productivity of Canadian agriculture (*see* AGRICULTURAL IMPLEMENTS). In 1870 he incorporated the Massey Manufacturing Co, which relocated in Toronto in 1879 and expanded significantly with the purchase of the Toronto Reaper and Mower Co, an American branch plant. Massey directed the firm's successful entry into foreign markets; it was the first N American firm of its kind to go abroad. In 1891 he merged A. Harris, Son and Co and other Canadian rivals to form Massey-Harris Co Ltd, of which he was president, 1891-96. A stern employer but genial Methodist patriarch who regarded his business as a trust from God, he contributed to many charitable, educational and religious institutions, and erected Toronto's Massey Music Hall and Fred Victor Mission in memory of his sons Charles Albert (1848-84) and Frederic Victor (1867-90). Massey's son Walter Edward Hart (1864-1901) was president of the firm 1896-1901 and active in advertising and sales activities. He promoted the pasteurization of milk and encouraged cultural endeavours, producing some of Canada's first staff magazines, including the literary journal *Massey's Magazine*, merged (1897) with the *Canadian Magazine*. Hart Massey's last surviving son, Chester Daniel (1850-1926), relinquished in 1901 his managerial responsibilities to Massey-Harris, an increasingly complex public corporation. He devoted himself to public service, administering Hart Massey's estate, reorganized in 1918 as the Massey Foundation, which supported numerous philanthropies and constructed Hart House and Massey College at U of T.

JOSEPH LINDSEY

Reading: P. Collins, *Hart Massey* (1977); M. Denison, *Harvest Triumphant* (1948).

Massey, Raymond Hart, actor (b at Toronto 30 Aug 1896; d at Los Angeles 29 July 1983), brother of Vincent MASSEY. His distinctive voice and craggy good looks made him indelibly associated with the role of Abraham Lincoln both on stage and on film. In Siberia, in Feb 1919, Massey mounted an army minstrel show with the Canadian forces before turning professional in July 1922 with the Everyman Theatre in England. He had already been an amateur at Appleby Coll, Oakville, Ont (1913-14), Oxford (1919-20) and Hart House Theatre, U of T (1921-22). In 1924 he played 2 parts with Sybil Thorndike in *Saint Joan* and in 1931 made his début on Broadway as Hamlet. Notable New York revivals of Bernard Shaw plays in which he starred were *The Doctor's Dilemma* (1941), *Candida* (1942) and *Pygmalion* (1945). His distinguished film career began in 1931 and included over 70 movies ranging from *The Scarlet Pimpernel* to *East of Eden*. In the late 1950s and 1960s he became known to a new generation as Dr Gillespie in the *Dr. Kildare* TV series. DAVID GARDNER

Massey College, Toronto (designed by R.J. THOM, completed in 1963). At the height of international-style architecture in Canada, the design of Massey College seemed to break ranks, to look backwards or sideways, rather than forward. Considered 2 decades later, it appears ahead of its time, a remarkable anticipation of new directions in architecture. It is, as well, simply among the best buildings in Canada. Thom's design was the result of a 2-stage, limited competition held in 1960 by the Massey Foundation. In response to Vincent MASSEY's desire for a building that evoked his Oxford experience, Thom combined informality of layout with all-embracing order, a limited palette of materials dominated by brick and cast stone with richness of detail. *See also* ARCHITECTURAL COMPETITIONS; ARCHITECTURAL STYLES. MICHAEL MCMORDIE

Massey-Ferguson Limited, with headquarters in Toronto, manufactures farm machinery and other equipment. Established in 1847 by Daniel MASSEY as the Newcastle Foundry and Machine Manufactory, the company became a sole proprietorship under his son, Hart Almerrin MASSEY, in 1855, and in 1870 it became the Massey Manufacturing Company. The firm moved to Toronto in 1879 and merged with its chief competitor, A. Harris, Son and Company Limited (est 1857), in 1891. The new Massey-Harris Company, Limited was incorporated in 1891, becoming the largest company of its kind in the British Empire. In 1953 the company merged with the Ferguson companies to form Massey-Harris-Ferguson Limited; the present name was adopted in 1958.

From its earliest days the company acquired the rights to innovative machinery, making agricultural history with the Toronto Light Binder during the late 19th century and in 1927 acquiring the Wallis Tractor. The ideas of Harry Ferguson, developed during the 1920s, also gave the company an edge in tractor technology. In spite of financial difficulties in the early 1980s (necessitating federal government assistance from 1981), Massey-Ferguson continues to manufacture and sell farm and industrial equipment such as tractors, balers and multipurpose diesel engines. It operates plants in Canada and overseas. In 1983 it had sales or operating revenue of $1.9 billion (ranking 45th in Canada), assets of nearly $2 billion (ranking 47th) and 27 609 employees. Its shares are widely held; foreign ownership stands at 73%. DEBORAH C. SAWYER

Massey Hall, designed by C.R. Badgely, was built on Shuter St in Toronto by Hart A. MASSEY as a gift to the city at a cost of $150 000. Known first as Massey Music Hall, it opened on 14 June 1894. Seating capacity of 4000 was reduced to 2765 when the building was redesigned in 1933. It was until the 1920s, when other cities began to erect concert halls, the only building in Canada designed primarily for musical performances. Massey Hall was the home of major local ensembles such as the TORONTO MENDELSSOHN CHOIR and TORONTO SYMPHONY, and the site of performances by great artists of the world, including Ignacy Jan Paderewski, Enrico Caruso and Vladimir Heifetz. It also has been used for many other types of events: a speech by Winston Churchill (1900), boxing matches, movies and folk, rock and jazz concerts. Roy Thomson Hall, completed in 1982, is now the main concert facility, but Massey Hall continues to be used for performances. FREDERICK A HALL

Massicotte, Edmond-Joseph, artist, illustrator (b at Montréal 1 Dec 1875; d at Sault-au-Récollet, near Montréal 1 Mar 1929). After studying at Montréal, Massicotte in 1892 began contributing illustrations depicting the popular customs and traditions of French Canada to such periodicals as *Le Monde illustré* and *L'Almanach du peuple.* The illustrations frequently record traditional customs no longer practised in Massicotte's lifetime. Drawn primarily from his imagination and accumulated documentation (some of it supplied by his brother, archivist Edouard-Zotique), and less frequently from on-the-spot sketches, his works betray a certain lack of dynamism. They give only an impression of authenticity and often impart moralizing, religious and nostalgic sentiments. By reducing and simplifying the number of pictorial elements, he sacrificed a certain sense of lively interaction, which allowed for easy recognition of the subject, however. Massicotte's illustrations, directed at the glorification of Québec rural life, traditions and customs, have become iconographical images for Quebecers. ELIZABETH H. KENNELL

Reading: E.J. Massicotte, *Les Canadiens d'autrefois* (1981).

Masson, Henri Leopold, painter (b at Spy, Belgium 10 Jan 1907). Largely self-taught, Masson combines his narrative abilities with a fluid GROUP OF SEVEN style. He lived in Ottawa from 1921 and began exhibiting nationally in 1938 and internationally in 1946. His themes reflect his belief in the unity of nature and art. Cityscapes and landscapes reveal a sense of place and time. Still lifes and paintings of monks and choirboys, musicians, children, and a great variety of commonplace activities deal with subjects that he considers to convey the essence of life. He uses a loose, vigourous brush style in many media. His best works are full of detail and movement, with a broad range of colour, and convey a sense of immediacy to the viewer. KATHLEEN LAVERTY

Masson, Louis-François-Rodrigue (b at Terrebonne, L C 7 Nov 1833; d at Montréal 8 Nov 1903). An MP 1867-82, Masson was minister of militia and defence 1878-80, encouraging French Canadian participation in the military. Ill health cut short his tenure in the Cabinet. He served in the Senate 1882-84 and again from 1890, and as lieutenant-governor of Québec 1884-87. An industrious amateur historian, he published *Les Bourgeois de la Compagnie du Nord-Ouest,* 2 vols (1889- 90). NORMAN HILLMER

Masterless Men of Newfoundland, legendary outlaw society (*fl* late 18th, early 19th centuries). According to tradition, for which there is little documentary evidence, they were Royal Navy deserters and runaway indentured servants from Newfoundland fishing plantations who fled inland to escape their harsh life. Led by Peter Kerrivan, an Irish-born deserter *c*1750, the Masterless Men are said to have inhabited the wild Butter Pot barrens of the Avalon Pen. Regarded as criminals by the authorities, they lived by hunting, fishing, stealing and illegally trading in isolated villages. They reputedly blazed Newfoundland's first roads, some for practical purposes, others as blind leads to confound pursuers. Two, possibly 4, of them were captured and hanged, but authorities never succeeded in breaking up the outlaw society, nor did they capture Kerrivan, who became a folk hero in Newfoundland lore. In the early 19th century, as social conditions improved, the Masterless Men allegedly moved to outports where they could work as independent fishermen. EDWARD BUTTS

Mathematics is the SCIENCE that studies numbers and spatial relationships. A principal division of mathematics subdisciplines is into the categories pure and applied.

Pure mathematics can be divided roughly into 3 major fields: geometry and topology, algebra and arithmetic, and analysis. It is complemented by logic, which deals with sets, the basic mathematical objects, their axioms and rules of inference.

Geometry studies figures, especially with regard to their rigid properties, and as a deductive science it began, like mathematics itself, with the Greeks. Straight lines, triangles, circles, spheres and cubes are among the first figures studied. A typical theorem, or general statement arrived at deductively, is that a right-angled triangle is characterized by the Pythagorean property (ie, the square of the hypotenuse is equal to the sum of the squares of the other 2 sides). In the early period (600 BC-100 AD), the theory of conic sections (ellipses, hyperbolas, parabolas) was developed, as was trigonometry, important for ASTRONOMY. In addition, formulas for the area or volume of special figures were discovered and proved. The principal later developments were the introduction of co-ordinate geometry (Descartes) and of curvature (Gauss), the central notion of differential geometry. The discovery of non-Euclidean geometry is, in comparison, minor.

In co-ordinate geometry the points of a plane are labeled by 2 co-ordinates, its distances from the 2 axes, and familiar figures become the loci of points satisfying an algebraic equation. Thus, geometry is incorporated into algebra and the way is opened for the introduction of spaces of arbitrarily large dimension, important in mechanics. Curvature, in its simplest form, is a number attached to a surface at a point. The flatter the surface, the smaller the number (positive for a sphere, negative for a saddle-shaped surface).

Topology studies properties of figures or spaces invariant under deformation. It has had its greatest successes in higher dimensions and studies spaces by attaching algebraic and numerical invariants to them. For example, closed oriented surfaces are characterized by their genus (g). For the surface of a ball, $g = 0$; of a doughnut, $g = 1$; and of a pretzel, $g = 2$. The classification of 3-dimensional spaces, of much current interest, is still incomplete. The Gauss-Bonnet theorem connects topology and geometry in a typical way: the integral of the curvature over a closed surface equals $4\pi(1 - g)$.

Algebra studies general properties of the solutions of one or several equations; arithmetic or number theory is the study of solutions in specific domains or fields of numbers. Linear algebra, the highly developed theory of equations of degree one, is of importance thoughout mathematics. The notion of eigenvalues and eigenvectors, which appear geometrically as the principal axes of an ellipsoid, is critical. All of algebra is pervaded by the concept of a group, a collection of elements which can be multiplied, such as operations on a Rubik's cube. The theory of finite groups has made great strides in recent years.

Analysis begins with calculus, the calculation of velocities and tangents (derivatives), lengths, areas and distances traversed (integrals), and maxima and minima. The central notion is that of a function, which expresses the way one variable depends upon another. The integrals of very few functions can be calculated explicitly; the attendant problems for algebraic functions have greatly influenced the development of geometry and arithmetic.

A differential equation is one connecting a function and its derivatives. Partial differential equations arise in all sciences. The equation is ordinary if there is only one independent variable and 2 of the basic problems are stability and the existence of periodic solutions. Much is known but the empirical data, found by computer, outstrip our theoretical understanding. The equation is called partial if there is more than one independent variable. Partial differential equations arise in the study of the propagation of waves and matter. In spite of an enormous theory, there are still basic phenomena that we do not understand, like turbulence, and to which ideas from probability, a discipline in its own right, are often applied. Derivatives and integrals require the use of limits, as do expan-

sions of functions in infinite series, such as a power series or Fourier series. The use of Fourier series, which express a function as an infinite sum of sines and cosines, is indispensable in the study of partial differential equations.

ROBERT P. LANGLANDS

Applied Mathematics

Applied mathematics is any valid mathematics that arises in the evolution and dispatch of real problems. It may use all of the techniques of "pure" mathematics; the 2 differ in the sources of problems addressed and the uses to which solutions will be put. Therefore, applied mathematics can involve ENGINEERING, PHYSICS and other fields, as well as pure mathematics. The evolution and solution of a real problem may be divided into roughly 6 stages, each requiring somewhat different skills. However, there are no sharp boundaries between the stages.

Recognition In industry, the realization that a problem exists will usually come from an engineer, scientist or manager involved in the practical applications of a technology, and in a position to recognize that something needs improvement or that something is going wrong.

Data Collection After a problem has been recognized, some specific data will be required to define it. Such data may be experimental, statistical or both. Therefore, experimental design and statistical analysis are important tools of the applied mathematician.

Formulation When enough data has been collected to define the problem, it must be formulated in a way that is precise enough to work on, ie, a mathematical model must be made of the situation. The model must be simple enough to permit a complete analysis, but also sufficiently close to reality to be relevant to the real problem being considered. In the process, all irrelevant details, and all details of only minor importance, must be suppressed. This narrowing focus permits concentration on major effects. To decide what is of major and what is of minor importance demands considerable *savoir faire* and makes model building probably the most valuable and difficult task of the applied mathematician.

Solution After recognition, data collection and formulation comes solution. Different formulations of a problem are usually possible and, as one formulation may be easier to handle than another, the solution may vary in complexity. Often, general mathematical methods that are applicable in principle are not actually useful. This situation is especially true when a numerical answer, correct to a specified degree of accuracy, and at a reasonable cost of time and manpower, is required. The neatness and simplicity of most textbook problems cannot be guaranteed in the real world; however, neatness or elegance in a solution frequently comes with real understanding of the problem.

Computation Most problems require not only understanding but also an actual numerical solution. Computation of the relevant numbers frequently may be done more quickly and economically without using a computer; however, should a computer be required, proper programming is important. If a fast computer costs $500/h of machine time, a good mathematician can effect a considerable saving through the way he prepares the problem for computation. For example, such problems arise in the computation of 3-dimensional partial differential equations involved in calculations of elasticity, weather predictions, etc.

Communication Since an applied mathematician must make his findings accessible to the people he works for, he must present his work in a style less compact and easier for a nonspecialist to read than that common in most mathematical journals.

MURRAY KLAMKIN

History in Canada

Every Canadian university has a mathematics department and offers one or more programs in this field. The same is probably true of almost every university throughout the world, a reflection of the importance of mathematics in contemporary society. Mathematics came to prominence as a scientific discipline after the Renaissance, during the period historians call the Scientific Revolution (1450-1700), when brilliant astronomer-mathematicians such as Copernicus and Newton discovered the true nature of the solar system, with the sun at the centre and the planets revolving around it. The role that mathematics played in these major discoveries gave the discipline the stature it has maintained to this day.

The evolution of mathematics in NEW FRANCE followed closely on the heels of this newly acquired stature. Although there were no new discoveries, the quality of teaching was virtually equal to that found in colleges in France. The Jesuits founded Collège de Québec in 1635 and started to teach intermediate mathematics there in 1651. Until 1760 students were taught arithmetic, the rudiments of second-degree or quadratic equations, trigonometry, geometry and a little differential and integral calculus — all in one of the 2 final years of the 8-year course of studies. The first full professor was Martin Boutet de St-Martin. In 1678 Louis XIV appointed him to the new royal chair of mathematics and HYDROGRAPHY in Québec City, his wish being that pilots for the St Lawrence R and surveyors and cartographers be trained in the colony. The chair was not abolished until the end of the French regime. The most celebrated appointee to this chair was Louis JOLLIET, the discoverer of the Mississippi R. Soon after Jolliet's death, the chair officially passed to the Jesuits.

After the Conquest, 1759-60, the Collège de Québec had to close, but the SÉMINAIRE DE QUÉBEC, which took over its operations, retained the same classical course structure. Encouraged by Abbé Jérôme DEMERS, the teaching of science and mathematics flourished, particularly around 1840. Soon, however, for sociological and religious reasons, it fell into disfavour. It was not until 1920 that the importance of science was reestablished among Québec Francophones. In that year, Université Laval (Québec City) organized its École supérieure de chimie (which became its faculty of science in 1937) and Université de Montréal established its faculty of science.

Nothing significant in the field of mathematics occurred in English Canada until 1855. Of the few English-language universities in Canada, only University of Toronto offered programs with specializations, one being in mathematics and natural philosophy (the latter term signifying the physical sciences). However, each university had a mathematics and natural philosophy professor. Trained in Great Britain, these few professors brought with them the idea that science and TECHNOLOGY were central to the Industrial Revolution. A Canadian scientific community thus began to take shape and the need for communication among its members was felt almost immediately. In 1856 the *Canadian Journal of Science, Literature and History*, published under the aegis of the Royal Canadian Institute, accepted articles on mathematics and continued to do so until 1912. Professor J.B. Cherriman (U of T) was in charge of the section on mathematics and natural philosophy. In the 1870s the idea arose of more specialized university studies. In 1877 U of T launched its mathematics and PHYSICS programs, which became models for the rest of Canada during the first half of the 20th century. Other universities, eg, Queen's, McGill and Dalhousie, gradually moved in the same direction. During this time, science departments were being subdivided and by 1890 almost all universities (with the exception of McGill) had at least one mathematics (no longer a "mathematics and natural philosophy") professor. At the same time, bursaries were offered for studies in mathematics, 2 each at U of T and Dalhousie.

Three mathematicians merit special mention for the impetus they gave to the establishment and development of mathematics programs at their respective universities: James LOUDON of U of T, Alexander Johnson of McGill and N.F. Dupuis of Queen's. In 1890 all were members of the ROYAL SOCIETY OF CANADA. Founded in 1882, this society was originally divided into 4 sections, one of which was mathematics and natural philosophy. The society reserved a place for the mathematics publications of its members in its *Proceedings and Transactions*, thereby offering a new means of communication for the mathematics community. In 1878 the *American Journal of Mathematics* was founded at Johns Hopkins University, Baltimore, followed in 1886 by the American Mathematical Society which, from 1891 on, published its *Bulletin* and from 1900 on, its *Transactions*. Canadian mathematicians contributed regularly to these journals.

The number of mathematics departments increased during the first 2 decades of this century, as a result of the growing importance of mathematics in professional fields (eg, engineering). The University of Toronto was the first N American university to move into the field of actuarial science (ie, the calculation of INSURANCE and annuity premiums and dividends). The Canadian Institute of Actuaries, a professional society, was founded in 1907. In 1915 U of T awarded the first Canadian doctorate in mathematics to Samuel Beatty, who later became the head of that institution's mathematics department. McGill conferred the second Canadian mathematics doctorate in 1917. The U of T was increasingly taking the lead in Canada and held it until the end of the 1950s. One of the most notable figures in the department was undoubtedly J.C. FIELDS, renowned for his work in algebraic functions and one of those who managed to revive the International Mathematical Congress, meetings of which had been suspended after WWI. The first meeting after the war was held in Toronto in 1924. Fields, reacting to the lack of a Nobel Prize for the field of mathematics, began working to establish an equivalent prize. These efforts were successful in 1932, a few months after his sudden death. The Fields Medal, named in his honour, is now universally recognized as the greatest honour that can be conferred on a mathematician. In 1936 algebraist and geometer Harold S.M. Coxeter joined the department. An example of the high calibre of teaching then being provided in Toronto can be seen in the first years of the American William Lowell Putnam Mathematics Competition. Only undergraduates could participate in this competition and each university entered a team of 3 students. In the first year, 1938, the U of T team won first place over all the American universities. The competition rules prevented U of T from entering a team the following year, but in 1940, it won again, as it did in 1942 and 1946. In the 1983 competition, teams from 4 Canadian universities (Alberta, Memorial, Queen's, Waterloo) ranked among the top 10 (the others being California Institute of Technology, University of Chicago, Harvard, Princeton, University of Washington and Yale).

The end of WWII was a turning point for mathematics in Canada. During the war Canadian mathematicians became aware of their isolation, even within Canada. If they wished to meet, they had to participate in meetings of the American Mathematical Society. They therefore organized the first Canadian mathematical congress, held in Montréal in June 1945. This very successful gathering led to the creation of the Ca-

nadian Mathematical Society. In 1949 the society began publishing the *Canadian Journal of Mathematics*, an internationally recognized publication, to which was added the *Bulletin* in 1958. In 1950, still under the aegis of the congress, Professor R.L. Jeffery, from Queen's, organized a Summer Research Institute in Kingston, which brought together 10 mathematicians to conduct joint research. This type of meeting proved so fruitful that summer research institutes have been held annually in some universities. In the 1950s mathematics departments developed very quickly. Toronto lost its leadership, not because its quality of teaching had declined, but because departments in other Canadian universities had improved — a case of students surpassing their teachers. Graduate studies burgeoned everywhere. Because of the development of STATISTICS, operations research and COMPUTER SCIENCE, industry showed increasing interest in mathematics graduates. However, forecasts of major increases in the student population in the 1960s indicated that there would be a high demand for university professors. With the launching of the first Sputnik by the USSR in 1958, mathematics once again found itself in the public eye, and the "New Math" movement began. In the same year, the NATIONAL RESEARCH COUNCIL OF CANADA began to give grants to mathematician-researchers and 2 new societies were founded: the Canadian Information Processing Society and the Canadian Operational Research Society. The prodigious development of computer science and diversified interests among mathematicians and computer scientists later led to the subdivision of mathematics departments in almost all universities into a mathematics department and a computer science department, the most striking example being the creation in 1966 of the Faculty of Mathematics at the University of Waterloo, with its 5 constituent departments: pure mathematics, applied mathematics, combinatorics and optimization, applied analysis and computer science, and statistics.

In Québec francophone universities returned to the Canadian mainstream around 1945 after successfully overcoming the difficulties generated by the prolonged lack of a scientific tradition in that province. By 1970 the department of mathematics at Université de Montréal had acquired an international reputation under the direction of Maurice L'Abbé, and had established a Centre de recherche en mathématiques appliquées. Dr L'Abbé is now Executive Director of the Science Council of Canada. The early 1970s were truly a golden age for mathematicians in Canada. In 1961 Canadian universities had awarded 11 PhDs in mathematics; this number increased to 94 in 1973. The National Research Council in 1960-61 gave $87 500 for mathematics research; the figure for 1972-73 was $2 461 500. In 1961 there were about 250 university mathematics professors (assistant rank and higher) in Canadian universities; in 1973, about 1300. The Canadian Society for History and Philosophy of Mathematics was founded in 1973 and, a few years later, the Statistical Society of Canada, which now publishes the *Canadian Statistical Review*. In 1974 the International Mathematical Congress again met in Canada, this time in Vancouver.

The Canadian mathematics community, like other scientific communities, is affected by the movement of promising graduates to the US, a fact that further testifies to the level of excellence of instruction in Canadian departments. Mathematicians with international reputations who received their early training in Canada include Cathleen Morawetz (U of T), Courant Institute of Mathematical Sciences, New York; Robert Langlands (UBC), Institute for Advanced Study, Princeton; Israel Herstein (U of Man), University of Chicago; Irving Kaplansky (U of T), University of Chicago; Louis Nirenberg (McGill), New York University; G.F. Duff (U of T), emeritus professor, U of T; Leo Moser (U of Man), U of A (d 1970); W.O. Moser (U of Man), McGill; Raoul Bott (McGill), Harvard. The new generation of Canadian mathematicians includes Robert V. Moody (now working at Université de Montréal), John Mallet-Paret (Brown University, Rhode I), Jerry Marsden (Berkeley), Robert Steinberg (UCLA), Frank Clarke (U de Montréal), Jack Edmonds (U of Waterloo), Stephen Cook (U of T), Marvin Shinbrot (U of Victoria) and David Brillinger (Berkeley).

The 1980s present a number of new challenges to the Canadian mathematics community. Connections seem to have been made among university departments, industry and government in such fields as statistics and computer science, where the future appears to hold promise. However, other areas of mathematics appear more sensitive to difficult economic conditions.

LOUIS CHARBONNEAU

Reading: M. Kline, *Mathematical Thought from Ancient to Modern Times* (1972).

Mathematics and Society The involvement of a society in MATHEMATICS is determined by cultural and functional factors. Mathematics has its own intrinsic beauty and aesthetic appeal, but its cultural role is determined mainly by its perceived educational qualities. The achievements of mathematics are recognized as being among the greatest intellectual peaks attained by mankind and, therefore, are seen as being worthy of study in their own right, while the heavy reliance of mathematics on logical reasoning is seen to have educational merit in a world where rational thought and behaviour are highly valued. Furthermore the potential for sharpening the wit and problem-solving abilities fostered by study of mathematics is also seen as contributing significantly to the general objectives of acquiring wisdom and intellectual capabilities. This cultural aspect affects all Canadians to some degree through our formal educational processes, reflecting the degree to which Canadian society is committed to "liberal" or "humanist" education. In particular, it is a point of view adopted by many professional mathematicians in their teaching and research activities.

The "functional" aspect of mathematics stems from its importance as the language of SCIENCE, ENGINEERING and TECHNOLOGY, and its role in their development. This involvement is as old as mathematics itself and it can be argued that, without mathematics, there can be neither science nor engineering. In modern times, adoption of mathematical methods in the social, medical and physical sciences has expanded rapidly, confirming mathematics as an indispensable part of all school curricula and creating great demand for university level mathematical training. Much of the demand stems directly from the need for mathematical and statistical modelling of phenomena. Such modelling is basic to all engineering, plays a vital role in all physical sciences and contributes significantly to the biological sciences, medicine, psychology, economics and commerce.

In addition, the rapid development of computing power has created its own demand for mathematical techniques and has permitted the implementation of large-scale mathematical models that would have been impractical before. Indeed, development of COMPUTER SCIENCE itself owes much to the contributions of mathematicians, and its continuing explosive growth draws on, and contributes to, mathematical science. For example, the analysis of algorithms, the structure of formal languages, ROBOTICS, logical design, and large-scale scientific computation may be seen as important components of computer science that require, and stimulate, mathematical analysis in their development.

The place of mathematics in society depends on the nature of the society and its ambitions. Canadian society has inherited the European traditions of cultural and scientific freedoms and it is reasonable to assume that these will be maintained. Also, from a prosperity based on the extraction of primary resources, Canada aspires to a leading role on the international scene as an industrialized nation, and as a producer of consumer goods and HIGH-TECHNOLOGY products. These aspirations are strongly influenced by the proximity of the US and, in particular, by Canadian economic dependence on that country. The role of mathematics in Canada, and of all the basic sciences, depends partly on the degree of economic independence chosen by Canadians now and for the future.

These comments indicate the context in which the past and present role of mathematics in Canada must be assessed and suggest a context for the future. They imply, first, that building on existing programs a relatively high level of mathematical literacy must be an objective of the primary and secondary school systems. This is necessary if the layman is to cope with the computer and information revolution and with the ever-increasing use of quantitative methods in governmental decision making. It is also a necessary foundation for the appreciation of modern scientific activities and the history of sciences, as well as for those wishing to participate in technical, scientific or mathematical subjects at a higher level. At the post-secondary level, Canada must maintain a strong tradition for mathematics education in all its forms and continue to maintain an active community of mathematicians engaged in research.

The extent to which such a commitment to mathematics is explicity accepted by the Canadian public is questionable. For a large part of Canada's population, exposure to mathematics has been limited to something less than a current grade 12 high-school curriculum. Hence, the corresponding view of mathematics is narrow, extending little further than arithmetic, with a smattering of algebra, geometry, trigonometry and, possibly, formal calculus. Such exposure cannot extend in any substantive way beyond the state of mathematical knowledge achieved in the 17th century. With this limited view, it is practically impossible to conceive of the extraordinary volume, diversity and value of modern mathematical developments. Consequently, there are widely held misconceptions about the significance and usefulness of mathematics that leave the subject vulnerable to periodic and short-sighted popular demand for functional education. There is now a dearth of students in mathematics (and other fundamental sciences) at the university level. This lack results from materialist attitudes towards education prevalent through Canadian society in the last several years and will undoubtedly create difficulties in the availability of skilled manpower in the future.

The pervasive and ever-increasing use of mathematical methods in science, commerce and government implies that a well-informed public must be mathematically literate to some degree. In practical terms this means that, in the mainstream of primary and secondary education, there must be effective mathematical education, bringing students to a point where they can readily calculate and think in quantitative terms, where information presented graphically or in statistical terms is easily comprehended, and where the logic and precision demanded in communication with computers is appreciated. More generally, there is an ever-increasing need for people who are well trained in mathematics and are confident with the mathematization of problems in the world around us. Unfortunately, at a time when one would look for improvements in this regard, there is evidence that,

at least until recent years, the mathematical skills acquired by pupils in Canadian school systems have declined. Thus, there is a general need to ensure that traditional basic curricula, at least, are well absorbed. There is also evidence that a negative attitude, or a feeling of anxiety, towards mathematics is common in Canadian society and is even shared by many teachers of mathematics, especially at the primary level. Such considerations put responsibility on the mathematics community to recommend improvements in methods and curricula, and on governments and local authorities to ensure that high standards and, especially, proper hiring practices are maintained. *See* SCIENCE AND SOCIETY.

PETER LANCASTER

Reading: Klaus P. Beltzner et al, *Mathematical Sciences in Canada,* Science Council of Canada Background Study No 37 (1976).

Mather, Bruce, composer, pianist, educator, administrator (b at Toronto 9 May 1939). He studied first in Toronto, notably with Godfrey RIDOUT, Oskar MORAWETZ and John WEINZWEIG; then at the Paris Conservatoire with Darius Milhaud, Simone Plé-Caussade and Olivier Messiaen; at Stanford U, Calif; and with Pierre Boulez in Switzerland. A teacher at McGill from 1966, he has also taught at the Brodie School in Toronto and as a visiting teacher at the Paris Conservatoire. He has been a member of the executive of Ten Centuries Concerts and a director-member of the Société de musique contemporaine du Québec. He has performed several pieces of contemporary music, both solo and with his wife, pianist Pierrette LePage. In 1979 he won the Prix Jules-Léger for new chamber music, for his *Musique pour Champigny.* Many of his compositions are for small ensembles.

HÉLÈNE PLOUFFE

Matheson, Ont, UP, pop 966 (1981c), is located 296 km NW of NORTH BAY. Originally a fur-trading post called McDougall's Chute, its name was changed in 1912 in honour of the Ontario provincial treasurer. Located on the Temiskaming and Northern Ontario Ry (Ontario Northland), it initially served as a supply centre for the surrounding lumbering and agricultural communities. It is widely known for the devastating fire of 1916 that officially claimed 233 lives, although the loss was probably much greater. In the 1920s and 1930s gold and asbestos mining began in the area, and more recently tourism has also become important. MATT BRAY

Matheson, Alexander Wallace, lawyer, politician, premier of PEI (b at Bellevue, PEI 11 June 1903; d at Charlottetown 3 Mar 1976). First elected to the PEI Legislature in 1940, Matheson became minister of health and welfare under Premier J. Walter JONES and premier in 1953 when Jones retired to the Senate. Matheson vigorously promoted rural electrification to protect and strengthen farm life. Although the provision of modern services did improve life, the erosion of rural communities continued. Matheson resigned as party leader in 1961 following the defeat of the Liberals in the 1959 provincial election, but was re-elected by a large majority. He served as leader of the Opposition until his retirement from politics in 1965. In 1967 he was elevated to the bench. DAVID A. MILNE

Mathieson, John Alexander, lawyer, politician, judge, premier of PEI (b at Harrington, PEI 19 May 1863; d at Charlottetown 7 Jan 1947). Educated at Prince of Wales College, Charlottetown, he was a schoolmaster and lawyer before his election to PEI's assembly as a Conservative in 1900. He became premier in Dec 1911 after the resignation of the Liberal government. Within a month he led his party to a landslide election victory. As premier he obtained a constitutional guarantee that PEI would have at least 4 federal MPs. In 1917 he resigned to become chief justice of the provincial Supreme Court. He retired in 1943 because of infirmity. IAN ROSS ROBERTSON

Mathieu, Rodolphe, composer, teacher, writer, pianist (b at Grondines, near Québec C 10 July 1890; d at Montréal 29 June 1962). Considered too avant-garde for his time because of Debussy's influence on his music, he gained recognition too late to inspire the generation that followed. Impressed first by the works of Scriabin, to which he was introduced by Alfred LALIBERTÉ, he devoted himself to composing only after studying with Alexis Contant (*c*1910). He then studied in Paris with Vincent d'Indy. In 1923 he received the first grant given to a composer by the Québec government. He taught in several institutions and, in 1929, founded the Canadian Institute of Music. HÉLÈNE PLOUFFE

Matonabbee, Chipewyan leader (b at Prince of Wales's Ft *c*1737; d Aug 1782). A leading hunter of caribou on the barrenlands, Matonabbee grew up in and around PRINCE OF WALES'S FT and was an important middleman in the fur trade between the HUDSON'S BAY CO and other DENE tribes farther W. In the 1750s he was an ambassador among the Cree and made at least one trip to the Coppermine R. Samuel HEARNE is justly famous for his overland voyage to the Arctic Ocean, but it was Matonabbee who organized and made the trip possible, with his leadership and knowledge of the Indian way of travel and living off the land. He was a "leading Indian" of Prince of Wales's Ft — an important position in the fur trade, but not of broader political significance. Bound to the fortunes of the fur trade, he committed suicide when the French destroyed the fort in 1782. DAVID LEE

Matsqui, BC, District Municipality, pop 42 000 (1981c), area 21 290 ha, inc 1892, is located between the Fraser R and the US border, 70 km E of downtown Vancouver. Its name, of Indian origin, likely means "a stretch of higher ground." It is situated in the Central Fraser Valley Regional Dist with LANGLEY on the W, ABBOTSFORD on the E and MISSION on the N. Its economic base is primarily agricultural, including labour-intensive activities such as berry and horticulture production, as well as cash-crop production and animal husbandry. Other elements in the economy include resource extraction (especially sand and gravel), manufacturing, processing, transportation, and trade and services. Clearbrook, the main business area, is one of the valley's main town centres with a developing office and administrative function. Matsqui is served by Fraser Valley College. ALAN F.J. ARTIBISE



Alexander Wallace Matheson, premier of PEI 1953-59 (*courtesy Public Archives of PEI*).

Matthews, Peter, farmer, rebel (b in Marysburgh or Sidney Twp, Qué [later UC] 1789 or 1790; d at Toronto 12 Apr 1838). The son of Loyalists, Matthews was a prosperous farmer and leading figure in Pickering Township. Angry with government development policies he was persuaded to lead his neighbours to join the REBELLION OF 1837. He was captured, tried and executed. RONALD STAGG

Mauger, Joshua, colonial entrepreneur (bap in the parish of St John, Jersey 25 Apr 1725; d at Warborne, Eng 18 Oct 1788). Mauger arrived in Halifax in 1749 and evolved his position as navy victualler into a commercial and property empire, based initially on contraband trade with the French. He became Halifax's largest shipowner, building vessels, plying the coastal and W Indies trade, and supplying rum, lumber, mercantile goods and fish to a network of outpost stores. His distillery produced 50 000 gallons (190 000 litres) annually by 1766, and in a colony totally dependent on rum revenue, Mauger's position was preeminent. Although based in England after 1760, he used agents and his own influence to protect his NS interests and undermine the colonial administration. He was credited with the removal of Jonathan BELCHER, Lord William CAMPBELL and Francis LEGGE, governors hostile to the mercantile ascendancy. Mauger's complex involvement with NS underscores the bonds of subservience and influence that hindered that colony's early development.

LOIS KERNAGHAN

Reading: J.B. Brebner, *The Neutral Yankees of Nova Scotia* (2nd ed,1969) and *New England's Outpost* (1927).

Maugerville, NB, UP, pop 249 (1981c), is located on the SAINT JOHN R, 8 km SE of FREDERICTON. It was founded by New England planters from Essex County, Mass, in 1763-64 and named in honour of Joshua MAUGER, who aided settlers in gaining title to their lands. Situated on rich alluvial soil in the Saint John Valley, it was the first successful English-speaking settlement on the river. During the AMERICAN REVOLUTION most inhabitants openly supported the American cause; several took part in an attack on Fort Cumberland in 1776, the only armed uprising against British authority in NS. When the province of NB was created at the end of the war, Loyalist leaders held the old Yankee residents suspect for their past sympathies and divided the township, retaining the name Maugerville for the upper half and renaming the lower section Sheffield. The growth of the mast-and-timber trade brought prosperity and the rich farmlands, flooded annually by spring freshets, provided much of the produce consumed in Saint John and Fredericton throughout the 19th and early 20th centuries. Today the farmers struggle to survive. The river, once bustling with sloops, barges and paddle-wheelers, now carries only pleasure craft. Yet the proud independent character of the first settlers is still evident in the farms tilled by their descendants. JIM SNOWDON

Mavor, James, scholar (b at Stranraer, Scot 8 Dec 1854; d at Glasgow, Scot 31 Oct 1925). Economist, economic historian, second professor of political economy and constitutional history at U of T, Mavor created a modern department of political economy, introduced the teaching of commerce at the honours level and began Canadian contract research in the social sciences. Educated in Glasgow, Mavor originally inclined towards socialism, but moved to the right before coming to Toronto. His representations brought the DOUKHOBORS to Canada. He wrote on many topics, including the economic history of Rus-

sia, Canada's wheat economy, Manitoba government telephones, Ontario Hydro and applied economics. He ceased to teach in 1922 and retired in 1923. His descendants have been prominent in drama and the arts; his influence on Toronto's social sciences was felt into the late 1970s. IAN DRUMMOND

Maxville, Ont, Village, pop 836 (1981c), inc *c*1891, located SE of Ottawa. It began around 1869 and expanded rapidly when the Canada Atlantic Ry est a station there in 1881. It got its name from the many "Macs" of its Highland Scottish neighbourhood. Its population was 749 by 1901, but since has been virtually unchanged. With little industry, its main economic function has been to supply merchandise and services to the surrounding farm community. Less tangibly, but not unimportantly, it has emotional significance for scots as a surviving concentration of the old "Scottishness" of its country, Glengarry. The Glengarry Highland Games, held annually in Maxville since 1948, are among the more successful of their kind, attracting some 20 000 every summer. The novelist Ralph Connor (Charles William GORDON) and British financier Sir Edward Peacock were born at St Elmo, 3 km NW of here. ROYCE MACGILLIVRAY

Reading: Royce MacGillivray and Ewan Ross, *A History of Glengarry* (1979).

Maxwell, Edward, architect (b at Montréal 31 Dec 1867; d there 14 Nov 1923). He apprenticed in Boston with Shepley, Rutan & Coolidge, who won a competition (1891) for the new Montréal Board of Trade. Maxwell returned to Montréal to supervise construction, and the contacts he made with prominent members of the Board of Trade helped to assure his success. In 1892 jeweller Henry BIRKS hired him to design a new store facing Phillips Square — now one of the city's architectural ornaments. Maxwell also designed numerous CPR stations and hotels, including the major western terminal at Vancouver (1897). The country estate planned for Louis-Joseph FORGET at Senneville, Qué (1899), is a fine example of his residential work.

His younger brother **William Sutherland Maxwell** (b at Montréal 14 Nov 1874; d there 25 Mar 1952) became his partner in 1902. William had studied at the École des beaux-arts in Paris, and the beaux-arts style is reflected in the design and planning of the Maxwells' buildings at this time, eg, in the Royal Bank branch at Westmount (1903) and the CPR station at Winnipeg (1904). Their grandest and most memorable works — the Legislative Buildings at Regina (1907) and the Montreal Art Assn Gallery (1911; now the Museum of Fine Arts) — display a skill at planning and composition that ranks with the best beaux-arts designs of the period. Their final achievement was the St-Louis wing and tower block of the Château Frontenac Hotel at Québec C, which was completed in 1924, a year after Edward's death.

Although William continued to practise, his work consisted mainly of additions and alterations to buildings designed earlier by the firm. Without the support of his brother, he seemed unable to revive the high level of creativity that had kept their office at the front rank of the architectural profession in Canada. ROBERT LEMIRE

May, Wilfrid Reid, "Wop," airman (b at Carberry, Man 20 Mar 1896; d at Provo, Utah 21 June 1952). He was a novice pilot on the Western Front being hotly pursued by Manfred, Freiherr von Richthofen, when the "Red Baron" was killed on 21 Apr 1918. May might have been his 81st victim but instead went on to become one of Canada's leading bush flyers in the postwar era, winning the MCKEE TROPHY in 1929. During WWII he helped set up the BRITISH COMMONWEALTH AIR TRAINING PLAN and was a pioneer in aerial "search and rescue" techniques.

BRERETON GREENHOUS



Mayflower, common name for the trailing arbutus (*Epigaea repens*), the provincial floral emblem of Nova Scotia (*photo by Mary W. Ferguson*).

Mayflower, common name for the trailing arbutus (*Epigaea repens*), a creeping, woody, evergreen PLANT belonging to the heath family (Ericaceae) and native to eastern N America. The only other member of the genus (*E. asiatica*) is native to Japan. The name mayflower derives from the very fragrant, white or rose-coloured, bell-shaped blossoms that appear during that month, and sometimes in Apr. Ants are attracted to the globular, capsule-shaped fruit. The mayflower grows in acidic sandy or peaty soils from Newfoundland to Manitoba, and has been the PROVINCIAL FLORAL EMBLEM of NS since 1901. It is grown from seed because transplanting produces poor results. CÉLINE ARSENEAULT

Mayfly, or shadfly, common names for small, fragile, soft-bodied INSECTS comprising order Ephemeroptera [Gk, "living a day"]. About 2000 species are known worldwide; 300 in Canada. Eggs are deposited on clean, flowing water. The larval stage is aquatic and lasts a few months to 2 years, depending on the species. Larvae obtain oxygen through abdominal gills. Most feed on algae and particles of detritus; a few are predatory. Transformation to the terrestrial adult usually occurs at water surface. Mayflies are unique among winged insects, usually having 2 adult stages: the subimago, a rather dull creature with translucent wings, molts again within a few minutes to 24 hours, to the sexually mature adult. Adults do not feed; most live only 1-2 days. Their long, shiny bodies end in 2 long appendages (cerci). The wings are membranous: forewings are large; hindwings, small or absent. Mayflies are an important food for fish and provide models for fishermen's lures. G. PRITCHARD



"Wop" May, WWI fighter pilot and one of Canada's leading bush pilots in the postwar era (*courtesy Public Archives of Canada/C-57580/W.R. May Coll*).

Maynard, Hannah, née Hatherly, photographer (b at Bude, Eng 17 Jan 1834; d at Victoria 15 May 1918); **Maynard, Richard James,** photographer (b at Stratton, Eng 22 Feb 1832; d at Victoria 10 Jan 1907). The Maynards immigrated in 1852 to Bowmanville, UC, where Richard opened a boot and shoe business. Hannah learned photography, possibly in 1859 when Richard was in BC prospecting for gold. In 1862 they moved to Victoria, where Hannah began her "photographic gallery." Richard, who may have learned photography from her, did a panorama of Victoria harbour in 1864, and a decade later began a 20-year career as a landscape photographer, rivalling Hannah's portrait work. Among Richard's commissions were tours to inspect Indian villages (1873, 1874), an expedition to the Queen Charlotte Is (1884) and a trip to the Pribilof Is (1892). Hannah's most interesting photographs include experiments in the early 1890s with multiple images of herself and a young grandson, and photosculptures, where people are made to resemble statues or busts.

DAVID MATTISON

Reading: David Mattison, "The Multiple Self of Hannah Maynard," *Vanguard* (Oct 1980); C.W. Wilkes, *The Magic Box (1980).*

Mayne Island, 2327 ha, pop 546 (1981c), is one of the GULF IS in BC. The island is named for British surveyor Lt R.C. Mayne. Excavated Indian middens near Active Pass suggest habitation for at least 5000 years. Active Pass, separating Mayne and GALIANO islands, has large salmon runs and, because of tidal upwellings, large feeding waterfowl populations. Mayne I was the hub of the Gulf Is at the turn of the century on the strength of its resort hotels and wharves, which handled passenger ships plying the Str of GEORGIA between Victoria and New Westminster or Vancouver. Today, with the other islands, it is a retirement and summer tourism centre. PETER GRANT

Mayo, YT, UP, pop 398 (1981c), is located on the Stewart R at the mouth of the Mayo R, 407 km N of WHITEHORSE. Originally called Mayo Landing, it was named after Alfred S. Mayo, an early prospector and trader. It became the landing point for riverboats on the Stewart R after gold was found nearby (1902). In 1919 the discovery of silver-lead deposits at Keno Hill transformed the town into a major transshipment point for ore. In 1949 a road was built to the Klondike Hwy and, as the riverboats went out of service, Mayo declined. H. GUEST

Mayor, *see* MUNICIPAL GOVERNMENT.

Mazankowski, Donald Frank, politician (b at Viking, Alta 27 July 1935). After a period as president and general manager of an automobile and farm machinery dealership, Mazankowski was elected to the House of Commons as Conservative MP for Vegreville, Alta, in 1968. Bright and popular, he chaired the PC caucus 1973-76 and served as minister of transport and minister responsible for the CANADIAN WHEAT BOARD in the CLARK government, 1979-80. He won the respect of the media, Opposition politicians and his officials, and registered a series of solid achievements, notably in the area of rail transportation. He was again named minister of transport by PM MULRONEY in 1984, as well as member of 2 important Cabinet committees.

NORMAN HILLMER

Meadowlark, robin-sized bird with bright yellow breast marked by a black crescent. Like BLACKBIRDS and ORIOLES, it belongs to the Icter-

inae subfamily. Two species occur in Canada. Although their appearance is very similar, their songs are distinct. The western meadowlark (*Sturnella neglecta*) has an elaborate, flutelike song; that of the eastern meadowlark (*S. magna*) is a shorter, clear whistle. The former species occurs from the West Coast to eastern Ontario, the latter from central Ontario through the St Lawrence Valley. The eastern meadowlark ranges S through Mexico and Central America to Brazil. Although some meadowlarks winter in southern Canada, most migrate a few hundred miles S. Meadowlarks nest on the ground in open grasslands, laying 3-7 eggs in a well-concealed, domed nest. They feed on insects during the breeding season and on weed seeds in fall and winter. R.J. ROBERTSON

Meagher, Blanche Margaret, diplomat (b at Halifax, NS 27 Jan 1911). Meagher taught in Halifax 1932-42, when she became one of a few pioneering women in the Dept of External Affairs. She served under H.L. KEENLEYSIDE in Mexico and Norman ROBERTSON in London, Eng, impressing them with her sound and independent judgement. From 1958 to 1961 she was ambassador to Israel, the first Canadian woman to hold that rank. She was from 1962 ambassador to Austria, and at the same time governor for Canada on (and later chairman of) the International Atomic Energy Agency. When ambassador to Sweden, 1969-73, she negotiated with representatives of the People's Republic of China towards the establishment of Sino-Canadian diplomatic relations. NORMAN HILLMER

Meat-Processing Industry The Canadian slaughtering and meat-processing sector is made up of companies engaged in abattoir or packing operations. Products include fresh, chilled or frozen meats; cured meats (smoked, pickled or dry salted); fresh or specialty sausages; canned meat preparations; animal oils and fats; and tank-house products such as bone, blood, feather and meat meals and dry rendered tankage.

The meat industry in Canada had its beginnings in 1605, when the French established PORT-ROYAL. A priority of the settlers was to develop animal husbandry so that the settlement could have a reliable, year-round source of meat and milk (*see* ANIMAL AGRICULTURE). Most Acadian farmers kept sheep and pigs and by the 1720s as many as 500-700 cattle and 2000 sheep were being exported each year to LOUISBOURG. In 1677 there were 3107 cattle and 85 sheep in NEW FRANCE. By the mid-1700s, the industry was well established, with an animal population of 50 013 cattle, 28 022 sheep and 28 562 hogs.

Meat slaughtering and processing is a highly regulated industry (*see* FOOD LEGISLATION). The first regulations in New France were passed in 1707 and made it illegal for a butcher to kill an animal without first informing a king's officer. The Crown's representative was required to carry out an inspection at the time of slaughter. The purpose was to prevent unnecessary slaughter and to ensure that the meat was fit for human consumption. Another early law, enacted in LOWER CANADA in 1805, was the Act to Regulate the Curing, Packing and Inspection of Beef and Pork, which required that all beef and pork be inspected upon slaughter. Until the early to mid-1800s, most of the meat processed for human consumption was handled by farm and village butchers, but by 1850 the meat packer emerged. During the early to mid-1800s, many local packers (actually large-scale butchering operations) engaged in slaughtering, curing and packing pork in salt during the winter months (the term "packer" came from the last function). Many leading companies in Canada's meat industry began between 1850 and 1870. F.W. Fearman set up operations in Hamilton, Ont, in 1852, sugar curing and smoking meats. William E. Davies, a major force in the late 1800s, began business in Toronto in 1854 and, in 1874, built the first continuous hog-slaughtering facility in Canada in Toronto. In 1867 John Duff opened a retail business in Hamilton that eventually became part of Essex Packers Ltd.

The use of refrigerated railway cars in the 1860s and 1870s had a major impact. During the 1870s, mechanical refrigeration was introduced and soon adopted by meat processors. By 1871 the livestock population (about 2.5 million cattle, 3.2 million sheep and 1.4 million hogs) was large enough to support a sound packing industry. During the 1870s there were 193 packing plants employing 841 people. Annual sales were about $3.8 million and capital investment was $419 000. In 1879 the brothers Pat and John BURNS left Ontario for Winnipeg, which had only just been connected by rail with the East. Pat initially supplied beef to gangs laying rail and later established P. Burns & Co, later Burns Foods Ltd, western Canada's largest meat-packing company for most of a century.

From 1880 to 1890 the industry grew rapidly. The number of plants increased from 203 in 1880 to 527 in 1890. Most were small, but sales grew strongly, from nearly $4.1 million in 1880 to $7.1 million in 1890. During the 1890s many small companies were absorbed into larger operations; by 1900 only 57 packing facilities remained. However, capital investment more than doubled over this period, climbing from $2.2 million in 1890 to $5.4 million by 1900. Employment jumped from 1690 to 2416 and sales climbed from $7.1 million to a new peak of $22.2 million.

In 1906 J. G. RUTHERFORD, veterinary director and livestock commissioner for Canada, convened a meeting in Ottawa to discuss federal meat inspection with the major meat exporters: William Clark Co, Montreal; George Matthews Co Ltd, Hull, Qué; William Davies Co, Toronto; Harris Abattoir Co Ltd, Toronto; Gunns Ltd, Toronto; Whyte Packing Co, Stratford, Ont; F.W. Fearman Co Ltd, Hamilton, Ont; Canadian Packing Co, London, Ont; P. Burns & Co, Calgary, Alta; and Gordon-Ironside & Fares, Winnipeg, Man. On 3 Sept 1907 federal meat inspection became a reality: the Meat and Canned Foods Act and Regulations required antemortem and postmortem veterinary inspections of all food animals the meat of which would cross provincial or international borders. The law set rigid sanitation standards for plants using the federal inspection service. After 1907 the meat industry grew steadily except for periods following the 2 world wars. In both cases the industry had expanded to meet heavy wartime demand and was left with capacity far exceeding peacetime domestic and export demands. Consequently, some consolidation was needed.

The Modern Industry By 1950 the structure of the industry was firmly in place and 3 classes of companies emerged. Traditional, full-line slaughtering packers slaughter all species and process carcasses into fresh, cured, smoked, cooked and canned meats, sausage products, etc. Nonslaughter processors purchase carcass meat and prime cuts from slaughterers and specialize in one or more secondary processing operations. Purveyors prepare portion-ready cuts, mainly for hotels, restaurants and institutions. Industry growth continued into the 1960s, strengthening in the 1970s and 1980s. There were 157 companies in 1950, 210 by 1960. Employment increased from 20 522 to 25 946 and annual sales climbed from $757 million to $1.06 billion. In 1982 the value of factory shipments reached $7.9 billion.

Slaughtering and meat processing is highly regulated in Canada. All companies engaged in interprovincial or export trade must be federally inspected. The regulations cover not only meat entering and coming from the plant, but also plant sanitation procedures and plant construction. Over 95% of all meat and meat products produced in Canada comes from federally inspected plants. The industry must also comply with provincial legislation and often with municipal health requirements. The main federal agency involved with the meat industry is Agriculture Canada, particularly the Food Inspection Directorate, the Livestock and Poultry Division and the Meat Hygiene Division.

The industry is represented nationally by the Canadian Meat Council in Scarborough, Ont, with regional offices in Montréal and Winnipeg. All member companies operate federally inspected production facilities. In 1970, 453 plants were in operation; in 1981, 501, distributed as follows: Nfld, 4; PEI, 5; NS, 7; NB, 5; Qué, 130; Ont, 181; Man, 32; Sask, 32; Alta, 64; and BC, 41. Between 1970 and 1982 employment grew from 31 099 to 34 390 and the annual value of shipments jumped from about $2.1 billion to over $7.9 billion. But the cost of operations grew equally dramatically; materials and supplies increased from nearly $1.7 billion in 1970 to $6.3 billion in 1982. Costs of fuel and electricity rose from $11.4 million to $77.6 million.

Like other FOOD AND BEVERAGE sectors, the meat industry has very low profit margins, usually about 1.8% net profit on sales (in a straight meat-packing operation, it can be as low as 0.75%). Traditionally the meat industry has been a big exporter; exports are now about 15% of total sales. In 1982, 122 plants exported meat products to 72 countries; exports of red and fancy meats and edible by-products earned nearly $800 million. Pork exports accounted for 25% of Canadian pork output. In 1982 the industry processed 3.8 million cattle at federally inspected plants and moved 13.4 million hogs into production. *See* BEEF CATTLE FARMING; GOAT FARMING; HOG FARMING; RABBIT FARMING; SHEEP FARMING. ROBERT F. BARRATT

Mechanical Engineering, branch of ENGINEERING that deals with the design, construction and operation of machines. Machines are designed for an enormous variety of purposes, but most fall into 3 broad categories: energy conversion machines, including engines, heat exchangers, refrigerators, heat pumps, furnaces, motors, brakes, windmills and turbines; MANUFACTURING machinery, including lathes, drills, rolling mills, assembly-line robots and hand tools; and TRANSPORTATION machinery, including all vehicles, conveyors and pipelines, with their compressors and pumps. Mechanical engineering plays a role in the production of all goods and commodities; moreover, many consumer goods (eg, domestic appliances) are machines. Mechanical engineering contributes to AGRICULTURE through farm machinery; to the forest products industries (LUMBER AND WOOD; PULP AND PAPER) through FOREST HARVESTING equipment, sawmills, pulp mills, etc; to the MINING industry through mining machinery and ventilation equipment; to the PETROLEUM INDUSTRY through exploration and drilling equipment; to the CONSTRUCTION INDUSTRY through construction equipment, and ventilation, air conditioning, heating, plumbing and vertical transportation equipment in buildings; to the transportation industry through engines, vehicles and materials-handling equipment; to the ELECTRIC-POWER industry through hydraulic and steam-generating equipment; to the metals industry through furnaces, materials-handling equipment and forming machinery, eg, rolling mills and forges (*see* IRON AND STEEL INDUSTRY; METALLURGY).

History Mechanical engineering can be said to have started with the Industrial Revolution, when the advent of the steam engine as the source of large amounts of controlled mechani-

cal power produced a qualitative change in manufacturing TECHNOLOGY. It has evolved as advances in materials, control technology and design methods have led to continued improvements in machines of all kinds. The last 3 decades have seen an acceleration of that evolution, as the rapid growth of research in the engineering sciences provided the basis for quantitative improvements in machines, which continued to become more efficient, faster, more precise, more economical and capable of performing more functions. The growth in industrial uses of computers in CAD/CAM (Computer-Aided Design/Computer-Aided Manufacturing) in the last decade has increased that acceleration even more. Today, it appears that mechanical engineering stands on the threshold of another revolution, the result of the advent of cheap and reliable microelectronic devices, particularly sensors of various kinds and microprocessors which can be incorporated into machine elements (*see* MICROCHIPS). With microelectronics, machines can be "smart," ie, they can sense their environment and select the optimal response to it (*see* ARTIFICIAL INTELLIGENCE). The advent of smart machines will change what mechanical engineers do, what they must know and how they must be educated.

Canadian mechanical engineers have made many world-class contributions to technology, including self-propelled combines, harvesting equipment for forest industries, pulp and paper production machinery, and hydroelectric turbine generators. More recent achievements include the CANDU NUCLEAR-POWER generating system, the aircraft engines of the PT-6 family developed by Pratt & Whitney Canada, Ltd, the SNOWMOBILES and LRC trains designed by Bombardier, Ltée, and the CANADARM manipulator for the NASA Space Shuttle developed by Spar Aerospace Ltd.

Education and Societies Technical training in Canada probably began in the workshops of railways, factories and some schools. Formal courses in mechanical engineering followed establishment of schools and colleges of engineering or practical science in eastern Canada in the late 19th century. In 1982, 24 Canadian universities offered accredited, 4-year degree programs, leading to an honours bachelor's degree. Most also offered postgraduate programs leading to the master's and PhD degrees. Degrees and diplomas in Mechanical Engineering Technology, with courses of study ranging from 2 to 4 years, are offered at institutes of technology and at numerous community colleges.

Canadian mechanical engineers have 2 principal professional and technical organizations: the mechanical engineering branch of their provincial engineering association and the Canadian Society for Mechanical Engineering. CSME was founded in 1970 as a constituent society of the Engineering Institute of Canada. Both the provincial associations and CSME hold technical meetings and produce publications containing professional and technical news. CSME also publishes *Transactions* in which research developments are reported. A biennial technical conference, the Canadian Congress of Applied Mechanics, provides a forum for discussion of current research. Canadian mechanical engineers are also active in many foreign and international technical societies. *See* MACHINERY AND EQUIPMENT INDUSTRY.

T.A. BRZUSTOWSKI

Medal, decorated piece of metal, usually a disc, awarded for merit or issued to commemorate an event or person. Medals have essentially the same significance in Canada as elsewhere in the Western world. Usually little noticed, they are nevertheless honoured. A distinction is commonly made between military medals, worn on the person as marks of official commendation, and other sorts. In English the latter are often



"Kebeca Liberata" medal (reverse), silver, designed by Jean Mauger and struck in France, 1690 (*courtesy Public Archives of Canada*).

differentiated, somewhat inaccurately, as "medallions"; in French, "médaille" is understood comprehensively and "médaillon" given its correct applications.

Although a few early medals alluding to Canada were created in France and Britain as commemorative pieces, Canadians became more familiar with medals through the British military; when Canadians began to sponsor medals for their own purposes, after about 1850, they looked primarily to British sources. At the turn of the 20th century, many medals were being struck in Canada, by Ellis of Toronto and then by Caron of Montréal, and Canadians ordered medals from France as readily as from Britain; few came from the US. Since WWII Canadian medals have generally been designed and fabricated at home. There is, however, no specifically Canadian school of design, Canadian medals today reflecting broad international trends rather than particular heritages. Québec, though more influenced by France, does not have a markedly distinctive medallic tradition, but recent Prix du Québec medals have been innovative in design.

The National Medal Collection, at the Public Archives of Canada, Ottawa, contains medals of all types, and the Canadian War Museum, Ottawa, has the leading military collection. Château Ramezay, Montréal, and the Glenbow Museum, Calgary, have notable medal collections.

Military Medals and Civilian Bravery Awards Canadians know military medals through the striped ribbons often worn by people in uniform. Emanating from the sovereign, official medals were traditionally the same as the British, until the establishment of Canada's own HONOURS System. Since combat awards have effectively lapsed since the KOREAN WAR, the ribbons most commonly seen today represent commemorative or long-service medals, or United Nations medals for PEACEKEEPING operations.

There have been Canadian recipients of all 13 British military gallantry awards, given for 3 levels of bravery. The VICTORIA CROSS is open to all ranks of all services, but the others vary according to rank or service. Officers' decorations are crosses, whereas those for other ranks are circular. The Canada Medal, established 1943, was never awarded. Current DECORATIONS FOR BRAVERY, instituted within the Honours System in 1972, are not military awards.

Campaign medals rewarded participation rather than individual conduct. The first, the Military General Service Medal, covered a period including the WAR OF 1812. Canadian recipients included militiamen and Indians. Among the clasps identifying particular battles were those denoting the BATTLE OF CHÂTEAUGUAY, CRYSLER'S FARM and Ft Detroit. The Canada General Service Medal, for the years 1866 and 1870, recognized service against the FENIAN raids and in the RED RIVER REBELLION, and the North-West Canada Medal recognized service in the NORTH-WEST REBELLION. The first war medal for Canadians only was the Canadian Volunteer Service Medal of WWII, and the first British war medal with a distinct Canadian version was for the Korean War. Medals also went to members of 19th- and 20th-century arctic expeditions. Military commemorative medals for jubilees and coronations went originally to contingents sent to England, but distribution later widened, eventually to include selected civilians. The 1967 Canadian Centennial Medal and the Canadian 1977 Queen Elizabeth II Silver Jubilee Medal resemble military medals and are worn as such, but they were widely distributed throughout the whole community. Long service and good-conduct medals, originally British, then for colonial forces, gave way in 1930 to a number of Canadian awards. In 1949 all were replaced by the single Canadian Forces Decoration.

The Police Exemplary Service Medal was instituted in 1983 within the Canadian Honours System. Other police and firefighting medals are awarded by provincial governments, local authorities or unofficial bodies. Before the institution of Canada's own decorations for bravery, Canadians received British awards, including the GEORGE CROSS, for heroism in nonmilitary circumstances. Early in this century the Dept of Marine issued, in the name of the Canadian government, medals for lifesaving at sea.

Commemorative and Prize Medals The earliest medal directly pertaining to Canada was the French "Kebeca Liberata" medal celebrating the repulse of a British attack on Québec in 1690. Later French and British medals commemorated Canadian events of the 18th century. Unique to Canada were the special medals presented to Indian chiefs at treaty signings and on other significant occasions. These imposing, normally silver, medals were often worn around the neck.

Early Canadian medals included Catholic medalets, TEMPERANCE medals and individually engraved presentation pieces. Educational and agricultural prizes became popular after about 1850, and the 1860 visit of the Prince of Wales inspired an upsurge in medals. CONFEDERATION was commemorated by a magnificent allegorical medal.

In 1873 the Governor General Medals, personal gifts awarded mainly for academic achievement, were inaugurated. They portray each successive incumbent with spouse on the obverse, and the coat of arms on the reverse. Originally made by Wyon in England, they have been struck since 1947 at the Royal Canadian Mint. Some provinces issue lieutenant-governor medals as academic awards. Only the Québec series (1884-1966) regularly bore the portraits and arms of the respective incumbents. Until 1934 they were usually struck in France, and thereafter in Montréal by Lamond.

Noteworthy commemorative medals were the Québec Tercentenary Medal (1908), the George-Étienne Cartier Centenary Medal (1914) and the Confederation Diamond Jubilee Medal (1927). Many prize medals are given at Canadian universities, the earliest having been awarded at McGill. Other educational institutions, municipalities, learned or professional associations and sports or hobby clubs issue prize or commemorative medals. In 1924 the ROYAL SOCIETY OF CANADA established its first of 12 now awarded.

Canada's 1967 CENTENNIAL inspired many medals. Commercial mints, especially the Franklin Mint (formerly Wellings), subsequently began to manufacture commemorative medals directly for the collectors' market. Agricultural fairs spawned many medallic souvenirs and awards. The Toronto Exhibition (later CANADIAN NATIONAL EXHIBITION) inaugurated its impressive series

of medals in 1879. Each year since 1897 there has been a different medal, first struck by Ellis, then by Roden and Birks.

Medallic Art Despite its long-respected status in Europe, the art of the medal has not been much appreciated in Canada until recently. Formerly, medals represented a venerable honorific tradition, but their appearance had only to be dignified and conventionally correct. The earliest medals produced in Canada combined customary heraldic, decorative and typographical elements; some emulated the classical style of the British family of medallists, the Wyons, who supplied many medals to Canada. Early Canadian medals were the work of unidentified engravers. Today many of the stylistically conservative medals produced in Canadian mints are similarly unsigned.

The first medals by well-known Canadian artists were created early in the 20th century by Louis-Philippe HÉBERT and Alfred LALIBERTÉ, both of them sculptors who had been to France. Emanuel Hahn and Robert Tait MCKENZIE, also distinguished sculptors, designed medals between the wars. Since the 1960s Dora DE PÉDERY-HUNT, a medallist of international reputation, has designed many struck medals, but has also familiarized Canadians with the cast medal, now favoured by many European artists. A number of Canadian artists have been inspired by her example, sometimes creating medals purely as works of art. Canadian pieces are regularly included in the major biennial exhibitions of contemporary medallic art staged in Europe by FIDEM (Fédération Internationale de la Médaille). The limited "consumer" base still hampers Canadian medallic art, although a few mints, notably the Royal Canadian Mint, Lamond, Lombardo and Sherritt, strike a significant number of commissioned medals. *See also* COINAGE.

N.M. WILLIS

Media Ownership Western societies are relying increasingly on communication through various media and relatively less on face-to-face contact to organize and co-ordinate activities, disseminate knowledge and information, educate and entertain. It is expected that mediated communications will expand in importance as we enter the INFORMATION SOCIETY.

Conditions of access to the media — the implicit and explicit rules governing who may and who may not distribute messages, the nature of the messages distributed, the terms under which messages may be received and by whom — are of vital political, social and cultural importance. Those individuals and groups that possess and exercise relatively unencumbered rights to distribute messages through the media can influence large audiences and thereby help shape societal development; conversely, those who are prevented from so participating are muted and may be politically ineffectual.

Two important and interrelated factors help determine conditions of access to the media: the pattern of ownership, which shapes incentives for media use; the bundle of rights accompanying ownership, which can modify, or even eliminate, restrictions that could otherwise inhere in ownership. The bundle of rights and duties is primarily an outcome of law, but also may be influenced by traditions and ethical precepts adhered to by the owner. *See* COMMUNICATIONS LAW.

The pattern of media ownership has 4 major constituents:

Owner Characteristics Owners may be distinguished by the sector in which they reside: government, private, co-operative. Within each sector additional distinctions can be made. Government, eg, comprises 3 levels, each of which can, in principle, have media holdings. Moreover, managers of government-owned media can have varying degrees of independence from their proprietors, depending on the goals set for the media. Likewise, in the private sector, many variations are possible: ownership can reside with family-run businesses; with large, professionally managed, publicly traded corporations; with religious, political or social organizations for reasons extending well beyond profit incentives; and so on. Particularly troublesome, from a public policy perspective, is conglomerate ownership of the media, where by media holdings constitute but a portion of the firm's economic domain; conglomerate ownership can create incentives for the manipulation or suppression of news that impinges on the diversified activities of the parent company. Other important characteristics of owners include nationality and language. In media studies, media owners are also often classified by social class in order to detect possible bias resulting from social stratification.

Concentration of Control Concentration refers to the number and size of competing outlets within a market or audience grouping, eg, newspapers in a community. Concentration indicates the degree of monopoly power enjoyed by the media owner(s) and hence the owners' power in determining conditions of access within the relevant market. The "marketplace of ideas" is premised on notions of equitable access to the media by all segments of society.

Cross Ownership refers to common control over different media genres (eg, print, film, electronic). It indicates the extent to which intermedia competition thrives or is restricted.

Vertical Integration is the extent to which media owners create, select or otherwise determine messages. It exemplifies the interrelationship between media ownership and the variable bundle of rights and duties accompanying ownership. The telephone industry, for instance, although largely monopolized and dominated by conglomerate enterprises, is proscribed by law from tampering with the messages transmitted. Moreover, access to telephone facilities for message originators must be provided by telephone companies on a "just and reasonable" basis, without "undue preference" or "unjust discrimination"; regulatory bodies (at the federal level of government, the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION) endeavour to ensure that these conditions are met. In declaring telephone companies to be common carriers, government has reapportioned rights from the owners of the medium to the general public in order to diffuse control over the origination and reception of messages in this inherently monopolized medium (*see* TELEPHONES).

The Canadian newspaper industry is a contrasting example. Current legal conceptions of press freedom, originating in a former era of greater newspaper competition, endow owners with much autonomy in selecting and creating editorial content, subject to general laws pertaining to libel, sedition, obscenity and official secrecy (*see* LAW AND THE PRESS). In the past, when newspaper competition was more vigorous and entry into publishing easier, this policy of apportioning rights to the owners of the press as surrogates for the public, rather than with the public directly, may not have been unduly restrictive inasmuch as individuals who lacked a forum could (in theory) start a new paper (*see* NEWSPAPERS).

Newspaper competition has dwindled in recent decades, however; indeed, some critics conclude that freedom of the press now resides principally with the few companies that own newspapers. The 1981 Royal Commission on Newspapers (Kent Commission) questioned the desirability of maintaining the owners' current high level of power over editorial content.

In 1980 2 chains, Southam and Thomson, together accounted for 59% English-language daily newspaper circulation and for 48% of national daily newspaper circulation. SOUTHAM INC published 14 daily newspapers and owned nearly 50% of 2 other dailies. It also published 39 business periodicals, including the weekly FINANCIAL TIMES. It had a substantial interest in radio, television and cable-vision systems through SELKIRK COMMUNICATIONS LTD. Thomson Newspapers Ltd, the other major Canadian chain, owned 40 Canadian dailies and 12 weeklies. The Canadian operations, however, constituted but a small portion of the multinational conglomerate whose activities extended into wholesaling and retailing, real estate, oil and gas, insurance, travel and tourism, financial and management services, high technology communications, trucking, and so forth. In Canada, Thomson controls Hudson's Bay Co and its subsidiaries. Other major daily newspaper companies in Canada include TORSTAR CORPORATION, the Sun Group, the IRVING GROUP, Gesca (a subsidiary of POWER CORPORATION) and QUEBECOR INC.

The monopolistic nature of newspaper publishing can be further highlighted by noting that, in 1984, only 6 communities enjoyed local competition among 2 or more newspapers in the same language with separate ownership. Moreover, the major common source of news-gathering and distribution for all dailies, CANADIAN PRESS, is owned by the dailies, with Southam and Thomson being the largest participants. Through subsidiaries, such as Broadcast News, Canadian Press also serves the broadcasting industry.

The Royal Commission on Newspapers recommended measures to stimulate competition, erode monopoly and decrease the editorial autonomy of the owners. None of the commission's major recommendations have been implemented by the government.

Ownership of the periodicial press is also highly concentrated. MACLEAN HUNTER LTD in 1979 accounted for about 32% of English-language and about 40% of French-language consumer magazine ADVERTISING revenues. In 1978 Maclean Hunter received 56% of revenues accruing to English-language business periodicals and 61% of revenues flowing to French-language business periodicals. Maclean Hunter also has a strong presence in Canadian radio, television, cable television, and in daily newspapers (through the Sun Group). The second-largest business periodical publisher is Southam which, in 1978, accounted for 30% and 27%, respectively, of the English and French business press (*see* MAGAZINES).

While a vibrant and competitive domestic BOOK PUBLISHING industry exists in Canada, the industry is nonetheless dominated by foreign owners. Although Canadian-controlled companies produced about 78% of the new Canadian titles published in 1979, Canadian firms accounted for under one-third of total revenues from book sales in Canada.

BROADCASTING, which is predominantly Canadian owned, is less highly concentrated than either telephones or newspapers, although levels of concentration are still quite high. The most recent data compiled indicate that in 1975 the 2 largest television broadcasters, BATON BROADCASTING INC and Télé-métropole, together accounted for 24% of private-sector advertising revenues, and that the 4 largest companies (including Southam-Selkirk Communications Ltd and Western Broadcasting) accounted for 40% of revenues. However, the existence of a strong public-sector component, represented by the CANADIAN BROADCASTING CORPORATION and certain provincially sponsored networks, increased ownership diversity. These government-owned undertakings do not pursue profit maximization as the private sector does, and consequently conditions of access are liberalized for the system as a whole. In addition, for both the

private and public sectors, access is to some extent regulated by the CRTC; without Canadian content quotas as administered by this body, Canadian performers and other creative talent would largely be foreclosed from private-sector television owing to the cost disadvantage facing Canadian productions compared to American imports.

The 10 largest radio chains in 1975 controlled 75 stations, accounting for 44% of private-sector revenues. The 4 largest, CHUM LTD, Standard Broadcasting, Western Broadcasting, and Southam-Selkirk, are also major television broadcasters. For example, in addition to owning 21 radio stations from Vancouver to Halifax, Chum Ltd owns 5 television stations and is licensed to program a national music video channel for cable systems.

The CABLE TELEVISION industry, termed a component of the broadcasting system by the Broadcasting Act, is also highly concentrated nationally. The largest multisystem owner, ROGERS CABLESYSTEM INC, in 1980 accounted for 30% of Canadian subscribers, while the top 3 companies (Rogers, Télécable Videotron Ltée and Maclean Hunter) accounted for about 50% of subscribers. Cable systems are local monopolies. Conditions of access to cable systems are subject to regulation by the CRTC.

Industrial incentives for concentration of control stem primarily from the pursuit of profit. Profits can be increased by raising revenues, by lowering costs, or both. Monopoly control gives a firm power to increase prices whereas competition erodes this power; consequently, concentration of control can allow higher revenues. Likewise, costs per viewer or reader can be reduced as a firm increases its audience, since the costs of the content tend to be stable as additional audiences are reached. One method of increasing audience size is by eliminating competitors.

Similarly, vertical integration between the means of transmission (the media proper) and the content transmitted is an outcome of the quest for profit. Vertical integration can shore up or create monopoly at stages of production that otherwise would be competitive. In 1923, for example, Famous Players Canadian Corporation attained dominance of FILM exhibition through its vertical integration with Paramount Pictures (US); these proprietary links enabled Famous Players, under the guidance of N.L. Nathanson, to seize control of its principal rival by eliminating the latter's major source of feature films.

Levels of concentration, cross ownership and foreign ownership are outcomes of government policy, both explicit and implicit. Government bears explicit responsibility for ownership patterns and the accompanying bundle of rights and duties in broadcasting insofar as each broadcasting undertaking is licensed by the government. Government is implicitly responsible for ownership patterns, and for the accompanying bundle of rights and obligations, in nonregulated media industries. Canada's weak combines legislation allowed K.C. IRVING to acquire all 5 English-language daily newspapers in NB; it sanctioned the same-day closing of rival papers owned by Thomson and Southam in Ottawa and Winnipeg, respectively; and approved Thomson's sale to Southam of its interest in the Vancouver *Province* while Southam was proprietor of the Vancouver SUN. It may well be that the power of media owners to shape public opinion is feared by government to such an extent that monopolies can be formed and can persist with little likelihood of redress.

Existing patterns of ownership are being strained by technological developments, principally the integration of cable television with communication satellites and the replacement of analog transmission by digital transmission techniques (*see* SATELLITE COMMUNICATIONS). These developments have 2 main effects. First, they increase national and international communications at the expense of local and regional communications owing to the economies of scale attained through larger audiences and the technological ease with which these larger audiences can be reached; eg, the electronic transmission of the Toronto GLOBE AND MAIL via satellite to Vancouver (and other communities) for local printing, and the proliferation of specialty television services delivered nationally by cable systems interlinked by satellite. Second, previous distinctions between telephone, television, print, film, data communication, and so forth are being eroded as all forms of mediated communication are increasingly encoded digitally for electronic transmission; the differences that remain concern the bandwidth used and the nature of the terminal device to which the messages are destined.

These trends have important implications for ownership patterns and on conditions of access. First, to the extent that national and international communications are economically favoured by these technological developments, access by local groups seeking a local audience may become increasingly difficult; national and multinational ownership of communications firms may be favoured rather than local and regional ownership. Second, since distinctions among hitherto separate media are being blurred, an increasing number of mergers can be expected among erstwhile print, electronic and film concerns that wish to decrease direct competition. Third, inasmuch as the means of transmission exhibits strong monopolistic characteristics (one domestic satellite carrier, Telesat Canada; one cable company in each market; one telephone company in each locality), measures to prevent vertical integration between message origination and selection on the one hand and transmission on the other become even more vital.

ROBERT E. BABE

Reading: P. Audley, *Canada's Cultural Industries* (1983); W. Clement, *The Canadian Corporate Elite* (1975); W. Lippman, *The Public Philosophy* (1955); G. Marcel, *Man Against Mass Society* (1978); Royal Commission on Newspapers, *Report* (1981).

Medical Devices Industry, sometimes referred to as the health-care products industry, is made up of companies that manufacture, import or export diagnostic or therapeutic products used in health treatment, including those for veterinary use. Imports play a dominant role in supplying the domestic market and the proportion of imports allowed into Canada duty free is very high. As a result, distributors outnumber manufacturers and many manufacturers also import complementary lines.

Products in the medical devices industry range from relatively low-technology, mass-produced items such as surgical dressings to highly capital- and technology-intensive industries manufacturing radiation-therapy devices, heart pacemakers and computer-assisted diagnostic equipment. The most recent survey of the industry was done in 1978 by the Dept of Industry, Trade and Commerce. Of the 178 companies responding, almost half were entirely Canadian owned, about 10% had minority Canadian participation, and the remainder were entirely foreign owned. About 16 000 people were employed in the medical devices industry in 1977; the industry is heavily concentrated in Ontario and Québec, which accounted for about 87% of employment. In the same year, about 485 companies manufactured or distributed medical devices in Canada and about $9.4 million was spent on research and development in radiation, diagnostic and therapeutic equipment, clinical laboratory instrumentation and diagnostic, therapeutic and monitoring equipment.

The combined value of domestic and export markets for health-care products was estimated at about $860 million in 1977; the value of exports was estimated at about $60 million. Imports supplied about 75% of the domestic market; exports represented more than 20% of domestic shipments. Both provincial and federal governments have programs and incentives to encourage exports. Considering Canada's small population, its share of total world markets for medical devices (3% in 1977) is large.

Medical devices are controlled by Health and Welfare Canada regulations authorized by 8 federal Acts. Two bureaus administer the regulations. The Bureau of Medical Devices ensures that only safe and efficient medical devices are sold in Canada and watches for potential hazards, deficiencies in performance and unsubstantiated claims made by manufacturers. The Radiation Protection Bureau sets standards for radiation safety. The hazards of X-ray machines, MICROWAVE equipment, and LASER and ultrasonic devices are evaluated and controlled by regulation.

The industry in Canada is represented by the Canadian Assn of Manufacturers of Medical Devices (CAMMD), a trade association that includes manufacturers, distributors and importers. The CAMMD Award for Medical Achievement is presented annually to an outstanding Canadian for work in health care carried out in Canada.

T. SYKES

Medical Drug Abuse Although medicines have been misused for as long as they have been available, a universally accepted definition of the term "drug abuse" does not exist. Broadly, drug abuse can include any failure to comply with the prescribing physician's orders, eg, forgetting to take medication or taking less or more than directed. Commonly, however, the term "drug abuse" denotes the self-administration of psychoactive substances in a deliberate attempt to alter mood, perception, thought and behaviour. In addition to the illicit drugs, several classes of prescription medications affect brain function in this manner. If a psychoactive substance produces effects perceived as beneficial (either as a pleasurable sensation or as relief from a state of depression or anxiety) the user may take the drug repeatedly. The cycle of administration and reward may become so well established in some users that they become psychologically and possibly physically dependent on the drug and other more constructive methods of coping with problems become less important. Social problems, family breakdowns and unemployment may result (although it is true that such problems may have initially encouraged the use of mood-altering drugs). Medical complications are also common; individuals develop a "tolerance" for the drug, ie, as the body adapts to the presence of the substance and the desired effect decreases in intensity, users compensate by increasing the dosage, thus also increasing the risk of dangerous side effects (eg, barbiturate-induced cessation of breathing). When administration is discontinued suddenly, the body continues to compensate for the drug; with many drugs, this unmasked compensation causes withdrawal symptoms, which are usually opposite to the initial effects of the drug. For example, withdrawal from sedatives is characterized by signs of hyperexcitable nerve cells (anxiety, tremors and, in severe cases, seizures and hallucinations) while withdrawal from stimulants is characterized by lethargy and mood depression.

The psychoactive prescription drugs subject to abuse can be categorized as opioid analgesics, sedative-hypnotics and stimulants. Other drugs used in PSYCHIATRY, such as the antipsychotic tranquillizers, the antidepressants and lithium, produce effects that normal individuals find unpleasant and they are therefore seldom used

for nonmedical reasons. However, they are not always taken as directed, and their misuse can cause untoward effects.

Opioid analgesics (sometimes termed narcotic analgesics) are either derived from the opium poppy or manufactured synthetically. They include heroin, morphine, methadone, meperidine and codeine. They are used medically primarily for the relief of pain, although they are also employed to suppress a cough, and occasionally in the treatment of severe diarrhea. Their dependence liability is generally high, and for this reason, some (such as heroin) may not be prescribed legally in Canada. Over the past 10 years, nonmedical users of prescription opioids in Canada have increased so greatly in number that they outnumber heroin users in some treatment populations. Users obtain drugs illegally by means of forged prescriptions, by thefts from pharmacies or by feigning the symptoms of a painful, difficult-to-diagnose disorder (eg, low back pain). Favoured drugs include the analgesics meperidine (demerol R), oxycodone (in the form of Percodan R) and codeine, and the cough suppressants hydromorphone and hydrocodone (in Dilaudid R and Novahistex DHR cough syrups, respectively). Unlike street heroin, prescription opioids are pure, and many are effective when taken by mouth. Oral use also eliminates the risks associated with injection. Those dependent on prescription opioids suffer the same side effects as heroin users and are treated in the same manner, ie, by methadone substitution or in drug-free therapeutic communities. Because of the high dependence liability of opioids, physicians are more reluctant to prescribe them for patients with chronic pain. Other nonpharmacological therapies are being explored. In terminally ill patients, effective and long-lasting pain relief is of primary importance and analgesics are not withheld unless the side effects become life threatening. The difficulty is making these drugs readily available to those who need them while restricting their availability to illicit users.

The many prescription drugs that slow the activity of the central nervous system are called sedative-hypnotics. They include the barbiturates, general anesthetics, antianxiety tranquillizers (eg, benzodiazepines) and a number of nonbarbiturate sedatives. These substances are prescribed to relieve anxiety, to induce sleep, to prevent or treat epileptic seizures, or to produce surgical anesthesia. All can create dependence in some individuals.

The barbiturates have been used since the early 1900s. Although their dangers were universally recognized (severe respiratory depression, high-dependence liability and life threatening withdrawal reactions), safer alternatives did not exist until recently. The number of prescriptions has decreased significantly, however, since the introduction of the benzodiazepines into Canada in the 1960s. The short-acting barbiturates such as secobarbital (seconal R) are still used illicitly, since they take effect quickly and produce the most euphoria. They are often administered to enhance the effects of other sedative-hypnotics or to terminate the unpleasant effects of a long stimulant binge.

The benzodiazepines (13 different kinds were being sold in Canada by 1984) were originally thought to be unusually safe and to have a very low dependence liability. For this reason they are heavily prescribed both for treatment of anxiety — eg, diazepam (in Canada sold under 10 trade names, including Valium, and generically by 3 companies), chlordiazepoxide (Librium R), oxazepam (Serax R) — and for induction of sleep, eg, flurazepam (Dalmane R) and triazolam (Halcion R). Physicians agree that these drugs are safe for short-term uses (ie, less than 4 weeks), but the value of long-term drug therapy is questionable. When long-term administration of tranquillizers is stopped, the original symptoms of anxiety often reappear. This state may be temporarily enhanced by the emergence of withdrawal symptoms, which are generally less severe than those induced by barbiturates or alcohol, but can still motivate the individual to resume drug use. Some evidence suggests that the long-term use of these drugs can adversely affect memory and other aspects of brain function. Physicians are increasingly reluctant to prescribe benzodiazepines for longer than a month without supervision. In Canada, as elsewhere, they are prescribed to women about twice as frequently as to men, and to the elderly much more often than to the young (*see* WOMEN AND HEALTH). Those suffering from chronic diseases are also likely to receive these medications. These imbalances have generated considerable discussion about prescribing practices, particularly among those who feel that tranquilizers are being prescribed to women for problems that could be best handled by more constructive means. Although Canadian data suggest that the great majority of benzodiazepine users (between 90-95%) take their medication as prescribed, given the large number of prescriptions, the remaining 5% constitute a significant number of individuals, some of whom require medical assistance to stop use. Benzodiazepines (especially diazepam) are sometimes used nonmedically, often to enhance the effects of other psychoactive drugs including alcohol.

The nonbarbiturate sedative hypnotics offer few therapeutic advantages over the benzodiazepines. Of these, methaqualone has been the most heavily abused, although the problem does not appear to be as severe in Canada as elsewhere. This drug is no longer manufactured legally in the US, although small amounts are still made in Canada. The licit supply available for diversion of this drug to the street has decreased, but illicit consumption of other drugs of this class may increase as a consequence.

The term "stimulants" refers to a broad category of agents that includes the amphetamines and related drugs, as well as cocaine, caffeine and nicotine. The amphetamines were formerly prescribed for several disorders such as obesity, mood depression and lethargy. However, their ability to produce profound stimulation and euphoria led to epidemics of use in Japan, Sweden, the US and other countries. Because of their high dependence liability and their ineffectiveness as long-term appetite suppressants, their use as "diet pills" was strictly curtailed in Canada in 1972. The prescribing of amphetamine and methylphenidate (Ritalin R) was limited to a few disorders that included the treatment of hyperactive children and of narcolepsy. The use of some drugs (eg, phenmetrazine) was discontinued altogether, and other less potent appetite suppressants such as diethylpropion (Tenuate R) were reclassified as controlled drugs under the Food and Drugs Act. Since the mid-1970s there has been a significant drop in the abuse of both licitly manufactured amphetamines and illegally synthesized methamphetamine. However, the consumption of illicit cocaine and of over-the-counter mild stimulants (such as ephedrine, phenylpropanolamine, caffeine and propylhexadrine), which are sold as decongestants and "wake-up" preparations, has risen. All of these drugs, when taken in sufficient quantities, can produce toxic side effects.

KEVIN O'BRIEN FEHR

Reading: R. Cooperstock and J. Hill, *The Effects of Tranquillization: Benzodiazepine Use in Canada* (1982); T. Cox et al, *Drugs and Drug Abuse* (1983).

Medical Education There are 3 distinct phases of medical education. The first is undergraduate education, in which students with prior university education (the minimum requirement is 2 years) are taught the basic knowledge, skills and attitudes of the physician. Upon completion of undergraduate study students are awarded the degree of medical doctor (MD). Second, to be eligible for a licence to practise, all MDs must complete at least one year of internship during which time they work under supervision in a hospital or clinic, gaining practical experience and being given increasing responsibility for the care of patients. Many graduates choose to undertake a minimum 2-year training program leading to the certificate of the College of Family Physicians of Canada; others enter 4- or 5-year programs leading to certification in one of the 44 medical specialties recognized by the Royal College of Physicians and Surgeons of Canada. The third and most recently developed phase is continuing medical education. This includes all programs of independent or supervised study through which practising physicians seek to keep abreast of the latest developments in medicine of concern to them.

Undergraduate and postgraduate education is provided exclusively by Canada's 16 university medical faculties. Continuing education is provided by the medical faculties, by various national, regional or local professional societies, by hospitals or pharmaceutical companies, and by other agencies or groups.

History of Medical Education in Canada The first program of medical education in Canada was created in 1824 at the Montreal Medical Institution, which 5 years later became the Faculty of Medicine at McGill University. By the turn of the century, schools had been established at McGill, University of Toronto, Laval (which had schools both in Québec City and Montréal — the latter eventually becoming the Medical Faculty of Université de Montréal), Queen's, Dalhousie, University of Western Ontario and University of Manitoba. An eighth school at University of Alberta in Edmonton was opened in 1913. By 1950 additional schools had been established at University of Saskatchewan, University of Ottawa and University of BC.

Two events in the early 20th century profoundly affected the quality of medical education in Canada. The first was the publication in 1910 of Medical Education in the United States and Canada by the Carnegie Foundation for the Advancement of Teaching. Written by Abraham Flexner and based on his visits to the 155 schools of medicine then existing in the 2 countries, the publication proposed that acceptable schools of medicine must have high standards for the admission of students, must be part of and subject to the rigorous academic standards of a university, must base their educational programs on a scientific approach to medicine and must encourage the scholarly research of their faculties.

So profound was the impact of the Flexner Report that within 15 years of its release most of the schools identified as substandard (nearly half of the total) had closed their doors forever. Although no Canadian schools were closed, standards at the weakest were greatly improved. The second important influence was the formation of the Medical Council of Canada in 1912. The council established a single standard examination for the graduates of all medical schools in Canada which was eventually accepted by all provincial medical licensing authorities as a criterion for awarding licences. As a result, the quality of medical education across the country became more standardized and, just as important, medical graduates became free to move from one part of the country to another with the reasonable expectation that their credentials would be recognized and accepted.

The next major influence on medical education was the publication in 1964 of the report of the Royal Commission on Health Services. The commission, under its chairman Mr Justice Emmett HALL, was established to investigate the provision of health services. It concluded that

the supply of physicians provided by the 12 medical schools was insufficient to meet the country's needs without continued reliance on high levels of immigration of physicians trained in other countries. This led to the almost immediate establishment of new schools at McMaster University, University of Calgary and Memorial University, and to the accelerated development of the school at University of Sherbrooke. Along with the opening of these 4 new schools, existing faculties increased their enrolments. As a result, the total enrolment of first-year medical students in Canada rose from 1133 in 1964 to 1882 by 1982.

Different Approaches to Medical Education Prior to WWII the curricula in Canadian medical faculties had generally evolved from that first established at McGill, which was in turn based on the Edinburgh model. Strong emphasis on bedside teaching was introduced at McGill by William OSLER in the 1880s. The curriculum consisted of 2 years of lectures and laboratory exercises in the basic sciences of (with greater or lesser emphasis) anatomy, physiology, biochemistry, bacteriology, pathology and pharmacology, followed by 2 years of clinical instruction in hospital wards. The Flexner tradition, with its emphasis on the theoretical basis of the fundamental medical sciences, shaped the basic sciences teaching. In contrast, clinical instruction emphasized the practical aspects of medical care and was based almost entirely on the exposure of students to hospital patients.

Scientific knowledge, much of which was quickly absorbed into medical practice, increased dramatically during and after WWII. Consequently the already crowded curriculum of medical students expanded as well. At about this time a new breed of clinical teachers appeared in the medical schools. Young men and women, attracted by the increasing support available for research and by the opportunities a research career could offer, were no longer satisfied with training only in the clinical disciplines but sought a broader and more profound theoretical grounding in one or more of the basic sciences. They became the forerunners of the new generation of clinical scientist-teachers who now strongly influence all medical faculties.

By the late 1950s and early 1960s Canadian medical faculties were staggering under the stresses of a rapidly expanding body of knowledge that could not be adequately conveyed in the curriculum then in use. Medical students became increasingly frustrated and vocal about the volume of information they had to learn, the relevance of which was not always apparent. In response, most schools started introducing students to patients in the first rather than the third year, in order to provide a framework of relevance for the basic sciences that still had to be taught. To accommodate the change, basic science laboratory exercises were either reduced in number or eliminated.

Many schools adopted integrated or "systems" curricula in which the basic and clinical features of such systems as the cardiovascular, musculoskeletal, respiratory or digestive were taught in integrated blocks. The students learned, in a co-ordinated sequence, the basic sciences of the particular system as they were learning its clinical features, diagnosis and management. It was expected that the systems approach would provide students with a conceptual framework on which they could base their diagnosis and treatment. In the "new" curricula, lecture and laboratory were no longer relied upon as the principal educational tools. Seminars and tutorials were emphasized. To cope with the growing body of knowledge that had to be absorbed, schools also encouraged students to assume more responsibility for their own education, and to develop their problem-solving skills.

The most radical of the new curricula, and one that attracted worldwide attention, was the "problem-based learning" approach adopted at McMaster. In this curriculum, small groups of students, under the guidance of an instructor, worked together in collecting and integrating information, either from books and journals or from faculty consultants, to solve problems devised for them by the faculty. The program emphasized teamwork between students and faculty. The faculty made no pretence at providing students with an encyclopedic fund of medical knowledge, but assumed that after the experience of a problem-based curriculum students would have developed the ability and self-reliance to deal with the clinical problems they might encounter in practice. Critics of the program claim that the performance of its graduates has been consistently below the average for graduates of other Canadian schools and that failure rates have been higher. On the other hand, graduates of McMaster have been accepted into some of the most prestigious post-graduate training programs in N America and elsewhere, where they have received highly favourable ratings. The curricula at McMaster and Calgary are both concentrated into 3 undergraduate years, with only a month of vacation per year. Both faculties admit older students, generally in their mid- or late twenties, who are assumed to be mature and experienced enough to cope successfully with such demanding programs of study.

In contrast, the universities of Montréal and Saskatchewan admit younger than average students. The 5-year programs of these schools are designed to provide students with greater opportunities to "ripen" into their roles as future physicians. The other medical schools have 4-year curricula, as do almost all others in N America.

Accreditation of Medical Schools Since 1934 schools in Canada have been regularly accredited by the US body now called the Liaison Committee on Medical Education. With the advent of universal medicare in Canada in 1970, the patterns of medical care and practice in the US and Canada began to diverge, making it necessary for Canada to adopt a system of accreditation more appropriate to the country's needs. Accordingly, in 1979 the Committee on Accreditation of Canadian Medical Schools was formed as an independent body to examine and attest to the quality of educational programs in Canadian medical schools. Schools in Canada are now jointly accredited by both bodies, with the assurance that Canadian schools meet Canadian standards.

Emerging Issues By 1984 medical schools were graduating exactly the number of doctors the Hall Commission had decided that Canada would need by the middle 1980s. Unfortunately the commission's projection of Canada's population growth between 1964 and 1984 was an overestimate, and as a result the physician population is now growing (proportionately) at a faster rate than the rest of the population. Planning for Canada's physician needs is complicated by a number of factors. First, the number of women physicians is rising rapidly, and because they choose different specialties and practice locations from men, their potential influence on the distribution of physicians and the availability of certain skills is important. Second, large numbers of doctors emigrate from and immigrate to Canada. Shifts in the migration of physicians can be quite sudden and are not easily influenced by legislation or regulation. For many years Canada has had a negative "balance of trade" in physician labour power, with an annual net loss equivalent to the output of 2 of its medical schools. Future changes in emigration and immigration can be expected to have a major impact on the supply of physicians in Canada. Third, in the next 30 or 40 years the percentage of Canada's over-65 population will double and Canada will require more physicians trained to meet the health needs of the elderly. Fourth, in 1980, 500 Canadians who had been unable to gain admission to a Canadian medical school were enrolled in schools abroad, many of which do not meet Canadian accreditation standards. These students expect to return and practise in Canada, and this will affect both the size and the quality of the available pool of doctors. Fifth, new technologies and therapeutic procedures may have the effect of reducing health manpower needs in the future.

DOUGLAS WAUGH

Reading: S.E.D. Shortt, ed, *Medicine in Canadian Society* (1981).

Medical Ethics are concerned with moral questions raised by the practice of medicine and, more generally, by health care. Because of the increasing importance of health care to an aging population within a society wealthy enough to afford it, and because of the increased complexity of health care, and the reduced reliance upon tradition and authority in moral matters, debate over issues in medical ethics has grown more intense. Certain issues present particularly difficult ethical dilemmas.

Physician-Patient Relationship How much information is a patient entitled to receive before accepting or refusing treatment? Is a physician or other health provider ever permitted to deceive or withhold information from a patient? To what extent, if any, may a physician's personal moral or social beliefs influence his or her relationship with and advice to a patient? The Hippocratic Oath, which is still administered in many (but not all) medical schools, omits any reference to a moral obligation on the part of physicians to be honest with their patients. Traditional medical ethics were paternalistic; information was given or withheld as doctors thought best. Since the beginning of the 20th century, however, courts in the US, Britain and Canada have ruled that a "mentally competent" adult patient is entitled to all information necessary to give "informed consent" to treatment. Nevertheless, ascertaining the true wishes of a patient may not always be easy, eg, the patient may be seriously ill, drugged, in pain, depressed, and may be less than fully rational and competent. As a result, physicians are not necessarily released from the obligation of using their own judgement to determine, at least in the short run, what is best for the patient.

Reproductive Technology and Medical Interventions Besides the issue of ABORTION, questions have been raised about artificial methods of inducing pregnancy (eg, by donor artificial insemination and *in vitro* fertilization); about gestation, eg, surrogate motherhood; and about various contraceptive techniques and surgical sterilization procedures.

Death and Dying When breathing and heartbeat are temporarily sustained by machine in a patient without brain function, is that patient alive or dead? Should it be permissible, for example, to harvest organs from such an individual for the purpose of organ transplantation? Is a health practitioner permitted to provide life-sustaining treatment to a patient who has forbidden medical treatment? Does the dying patient have the right to be assisted should he or she wish to commit suicide? In these questions the value of "sanctity of life," that every life must be preserved at all costs, is frequently at odds with the value of the "quality of life," according to which an individual has a right to a humane and dignified death. Whether and when to use technology to prolong the life of infants with severe genetic diseases is one of the most difficult decisions health-care practitioners and society must make, and involves again

the conflict between "sanctity" and "quality." Those who advocate what is sometimes called "medical vitalism" support the former and argue that the potential abuse of quality-of-life judgement is enormous; their opponents argue that concern for relief of suffering and a dignified death will help promote a society more sensitive to human life (*see* DEATH AND DYING).

Special Patient Populations Who should decide treatment on behalf of severely handicapped newborns (or any group who cannot speak for themselves), and on what basis should these decisions be made? In some ethnic groups, an extended family (including grandparents) is involved in the rearing of children. Are there therefore special circumstances in which the extended family should be involved in medical decisions regarding newborns?

Economic and Social Policy Do patients have a right to health care regardless of expense? When patients' needs exceed available health-care resources, how should those resources be distributed? Considerations of social welfare have traditionally been used to justify intervention into the physician-patient relationship, eg, physicians have been required to report on patients with gunshot wounds or communicable diseases. The question arises, to what degree should health professionals act in accordance with the best interests of their society?

Research and Experimentation Upon Human Beings When is experimentation upon children justified? Is it ethical to proceed with an experiment that requires the subject of research not to know whether the drug he is taking is a sugar pill or pharmacologically active?

Individuals and Organizations Involved in Medical Ethics Legal and governmental bodies are concerned primarily with the public regulation of health practices. The Law Reform Commission of Canada established the Protection of Life Project in 1976. This group has issued reports and recommendations on topics such as the definition of death, euthanasia and the withholding of treatment, and behaviour control techniques. Provincial law-reform commissions have also issued reports on aspects of ethics and health care, eg, children's consent to medical procedures (Alberta, 1975); artificial insemination (Saskatchewan, 1981); and new forms of human reproduction (Ontario, 1984). Views of legislators on some issues of medical ethics may be expressed in provincial Acts governing the conduct and licensure of the health professions, as well as in special enactments (eg, Manitoba's Act on defining death, and the Human Tissue Gift Acts, governing transplantation, that were adopted by a number of provinces). Cases brought before courts may involve the judges in intricate questions of medical ethics, such as whether physicians are obliged to advise patients against relatively useless surgery (*Zamparo* v *Brisson*, Ontario Court of Appeal, 1981), and whether a physician, when informing a patient of the risks and benefits of a medical procedure, should take into account the patient's economic situation (*Reibl* v *Hughes*, Supreme Court of Canada, 1980).

Organizations of health professionals are involved in establishing codes of ethical behaviour on behalf of their membership. Some have committees charged with enforcing ethical behaviour, or with studying ethical problems that arise in the profession. A code of ethics for physicians established by the Canadian Medical Association (CMA) has been revised on a number of occasions. In 18th-century England, a long, highly detailed code was formulated, but current codes usually consist of a brief set of abstract principles that need to be supplemented by guidelines governing implementation. The codes do not, of course, preclude the occurrence of serious conflicts and ambiguities, and in fact may sometimes help inspire them. Also, while a code may represent the ethical view of the profession, physicians are not necessarily familiar with it. As far back as 1880, an editorial in the *Canada Lancet* complained that most doctors were not familiar with the code, and a 1983 survey of 300 Toronto physicians found that 68% had never read the code and 84% could not say whether references were made in it to abortion or to organ transplantation.

Legislation may require professional associations to establish committees to monitor ethical conduct. Independent committees on ethics have been established by the CMA, the Royal College of Physicians and Surgeons of Canada and the Canadian Pediatric Society. Some lay associations and church groups also issue statements representing members' views on specific issues in medical ethics, eg, the United Church of Canada issued a report on ethics and genetics in 1978.

Courses on medical ethics became widely available in the 1970s. Most Canadian universities and some colleges offer at least one and sometimes several undergraduate courses. Graduate instruction is also available in some Canadian universities, largely within departments of philosophy, theology or religious studies. Because of year-to-year variations, it is difficult to say what proportion of medical schools include ethics within the curriculum. For several decades prior to the 1970s, however, formal ethical instruction included within the medical curriculum was the exception; today it is the rule.

Research into aspects of medical ethics is conducted by individual scholars from many disciplines, including the health professions, the humanities and the social sciences. In addition, research institutes investigating questions of medical ethics have been established in a number of Canadian cities including Toronto (the Cardinal Carter Centre), Montréal (Centre de Bioéthique) and London, Ont (the Westminster Institute). Institutions involved in research have commonly established ethics committees to review the ethics of proposed research programs. These committees are likely to refer to guidelines on the ethics of research established by the Medical Research Council of Canada (1978) and by the Social Sciences and Humanities Research Council of Canada (1979). Increasingly, hospitals and other institutional providers of health care are establishing internal ethics committees to consider their own practices and those of their staff. *See* BIOETHICS.

BENJAMIN FREEDMAN

Reading: T.L. Beauchamp and J.F. Childress, *Principles of Biomedical Ethics* (1979); Law Reform Commission of Canada, *Euthanasia, Aiding Suicide and Cessation of Treatment* (1983), *Criteria for Determination of Death* (1979) and *Medical Treatment and Criminal Law* (1980); W.T. Reich, ed, *The Encyclopedia of Bioethics* (1978).

Medical Jurisprudence, broadly defined, covers the relationship between a patient and a health-care provider such as a doctor, nurse, dentist, physiotherapist, or even an institution such as a HOSPITAL. The law has established standards, it regulates practice and provides a mechanism for patients to claim compensation in the case of an injury. The source of the law may be statutes (provincial or federal) or judge-made law. While the legal principles set out by judges in case law are generally consistent throughout Canada, there are some variations in legislation from province to province.

Medical jurisprudence is concerned with many basic and profound issues, such as a patient's right to consent to health care. Every person, including children who understand the nature and consequences of treatment, has the right to be fully informed of the risks of a procedure and to choose whether to proceed with it or not (*see* MEDICAL ETHICS), even if refusing treatment will result in the death of the patient. In 1980 the Supreme Court of Canada stated that the standard for the disclosure of risks must be what the reasonable patient would want to know and not what health-care professionals customarily choose to explain. Another basic legal principle is the requirement that in carrying out health care, a person or institution must exercise reasonable skill, knowledge and judgement. This standard is derived from the custom or common practice of the profession or group, ie, that a doctor must perform as a reasonable doctor would in the circumstances (*see* MALPRACTICE). If this standard is not met and a patient suffers injuries as a consequence, the health-care provider may be found negligent and have to pay monies to the patient as compensation. Very complex issues arise when the proposed medical treatment is experimental or when it involves organ transplantation, artificial insemination or *in vitro* fertilization. Then, not only must the right of the individuals involved be considered but the values and goals of society as well.

A number of problems have emerged from modern medical practice where the "team" approach to health care is used and where the hospital assumes a major role as a health-care provider. Very often a patient may be cared for by many highly trained doctors and nurses, and frequently there is an overlap in their functions; in many cases that have gone to court it is clear that each member of the team has deferred to the others his or her responsibility in decision making or communication, with the result that the patient has received substandard care. Cases have also arisen concerning whether or not a nurse should carry out a doctor's orders when she believes that they will be harmful to the patient. The law states that if a nurse carries out such an order she may be negligent and, as in the case of a lethal overdose of a drug, might even be charged under the CRIMINAL CODE.

Hospitals have assumed a greater role in providing health care and are increasingly being held accountable to patients. The earliest hospitals were charitable institutions and were shielded from liability by the courts, but modern hospitals are large, complex organizations that as far as the public is concerned constitute the heart of the health-care system. A hospital as an employer is liable when any employee is held to have injured a patient through negligence. However, a hospital also has certain direct responsibilities to a patient, including the duty to select competent and qualified employees and to instruct and supervise them; to provide proper facilities and equipment; and to establish systems necessary to the safe operation of the hospital. Courts have recently noted that the public expects hospitals to provide competent medical treatment. For example, in the emergency department of a hospital a patient may receive medical treatment by a doctor who is provided by the hospital but who is not an employee of the hospital. Whether the hospital should be liable when such treatment is substandard remains to be resolved by the courts.

Law suits by patients against health-care providers are increasing. Resort to the legal process brings difficulties for all parties. In some provinces the patient may have to make a preliminary application to the court for an order allowing him to gain access to his health records. Litigation is slow and costly, and those sued are usually concerned that the allegations made against them may affect their reputations. Even if the patient is successful, money can never compensate for the loss suffered. However, there is at present no alternative to the law suit for resolving a patient's claim for compensation. The alternative of reporting a health-care professional to his or her governing body for discipline, while sometimes effective for that purpose, does not result in compensation to a patient.

ELLEN PICARD

Reading: T.D. Marshall, *The Physician and Canadian Law* (2nd ed, 1979).

Medical Research ranges from fundamental research to applied technology. Fundamental research involves investigation into biological functions; knowledge thus derived may then be applied in clinical research to help understand specific diseases and to develop cures or methods of prevention. Applied technologies result from both fundamental and clinical research in the form of vaccines, drugs, instrumentation, diagnostics, prostheses and other health care products. Physicians, biologists, biochemists, biomedical engineers, chemists, dentists, veterinarians, health economists, nurses, physicians and pharmacists are among the health professionals involved in medical research.

The discovery of INSULIN in 1921 by Frederick BANTING, J.J.R. MACLEOD, Charles BEST and James COLLIP, the most celebrated event in Canadian medical research, spurred development of biomedical research in Canada, and led to the establishment of the Connaught Laboratories and of the Banting Institute at U of T. Since that time, research in Canada has been conducted into areas such as molecular biology, immunology, nutrition and metabolism, reproductive biology, CANCER, behavioural sciences, genetics, developmental biology, DENTISTRY, microbiology, drugs, OCCUPATIONAL DISEASE, health care organization, environmental health hazards, and the biology of human populations. In addition, Canadian researchers are examining the function and diseases of particular organs such as the skin (dermatology), the blood system (hematology), the kidney (nephrology), the eye (ophthalmology), the ear, nose and throat (otolaryngology), the stomach and intestines (gastroenterology), the endocrine glands (endocrinology), the respiratory system (respirology), and connective tissue disorders. The range of accomplishments is impressive. Twenty-eight Canadians have received the Gairdner Award for outstanding achievements in Canadian medical science. Research at the U of T in cardiovascular surgery alone has contributed significantly to the overall treatment of HEART DISEASE. Canadians have been responsible for major developments in heart pacemakers, heart-lung machines to oxygenate blood and correct heart defects, and the first coronary care units. Hans Selye broke new ground in the understanding of STRESS. In the neurosciences Canadians have made major contributions to the knowledge of the central nervous system and its related diseases. The Montreal Neurological Institute (MNI est in 1934), is an important centre for neuroscience research. Its founder, Wilder PENFIELD, not only pioneered the technique of brain-mapping, which is conducive to the better understanding of localized functions of the brain, but also built the MNI into an internationally known training centre. Research at the MNI has led to improved surgical and nursing techniques for the management of spinal lesions, to the development of electroencephalography to treat conditions such as epilepsy, and to a deeper understanding of cognitive and other behavioural changes associated with brain lesions. Noninvasive imaging techniques, in conjunction with a new understanding of neurotransmitters, help researchers understand the way the various parts of the brain and nervous system grow, develop, take on specific tasks, and repair and replenish themselves.

Support for Medical Research

The federal government, provincial governments, voluntary agencies and private foundations, industry and foreign sources all contribute to the support of biomedical research in Canada, including equipment, operating costs, research training and technical assistance.

Federal Funding Agencies The Medical Research Council of Canada was established by Parliament in 1960 to promote, assist, and undertake basic, applied and clinical research in the health sciences and to advise the minister of the Dept of National Health and Welfare on matters of health research. MRC evolved from the Associate Committee of Medical Research, established in 1938 at the National Research Council of Canada. During WWII, the committee divided into a number of subcommittees; after the war, the Division of Medical Research replaced the committee and this subsequently became the MRC.

MRC supports over 50% of direct medical research expenditures in Canada. It provides support, on the basis of scientific excellence as determined by national peer review, for research and for training of health-science researchers in the health-science faculties. These include the departments and laboratories of the 16 medical schools, 10 dental schools and 8 pharmacy schools and their affiliated HOSPITALS and institutes across the country. In 1983-84 the Medical Research Council spent $137 million contributing to medical research across Canada.

Research relating to health-care delivery has been supported at the federal level primarily by the National Health Research and Development Program in the Dept of National Health and Welfare, a program which grew out of the annual Public Health Grants started in 1948. (The MRC was precluded from support of public health research until 1976 when Parliament removed this restriction.) NHRDP provides grants to encourage research that is required by the department to fulfill its mandate to promote, protect, maintain and restore the health of Canadians. Researchers may belong to any of the 4 general health fields of health-care organization, environmental health hazards, lifestyles or the biology of human populations.

Provincial Funding Agencies Provincial agencies in Alberta, BC, Manitoba, Ontario, Québec and Saskatchewan contribute to medical research and training through such organizations as the Alberta Heritage Foundation for Medical Research and le Fonds de la Recherche en Santé du Québec.

Voluntary Funding Agencies Voluntary agencies, which are generally "disease specific," play a major role in medical research. For example, the Canadian Cancer Society supplies 80% of the National Cancer Institute of Canada's granting monies for research into cancer.

Research costs, such as salary support, capital expenses to construct laboratories, and animal care facilities, are generally paid by the institutions where the research is conducted. They receive funds for this purpose through provincial governments and private donations.

Structure of Medical Research

Medical research is highly decentralized in universities and teaching hospitals and their affiliated institutions throughout the provinces. Canada is one of a small minority of countries which does not have significant government laboratories devoted to biomedical research. While this decentralization links research with professional training and health-care delivery, it makes it difficult to define or maintain a national focus for concerted programs, especially as health care and education are provincial responsibilities. However, in 1982 federal and provincial representatives identified several health areas of national concern (cancer, accidents, arthritis and joint disorders, cardiovascular and cerebrovascular diseases, maternal and infant health problems, MENTAL HEALTH and respiratory diseases). The MRC and other funding agencies are providing support for research in these areas. In 1983, the federal Cabinet approved in principle a federal framework for medical research that emphasizes the provision of high-quality training, a balance between basic and applied

Gairdner Foundation International Awards

Date of award	*Canadian recipients*	*Area of achievement*
1959	W.G. Bigelow	hypothermia method of open-heart surgery
	A.C. Burton	cardiovascular physiology
1963	M.L. Barr	insight into cell genetics and discovery of the Barr body
	J. Genest	vascular physiology and hypertension
1964	G.D.W. Murray	cardiac physiology and pathology and cardiac surgery
1965	C.P. Leblond	autoradiography for cellular biology and research on the thyroid gland
1967	D.H. Copp	calcium homeostasis, identification of the hormone calcitonin which alters blood calcium levels
	P.J. Moloney	immunology and diabetes
	J.F. Mustard	the role of platelets in thrombosis and atherosclerosis
	B. Chown	human blood groups and hemolytic disease of the newborn
1969	R.B. Salter	musculoskeletal disorders and orthopedic surgery
	E.A. McCulloch & J.E. Till	spleen-colony technique for leukemia treatment
1971	C.H. Best	insulin
1972	O. Hornykiewicz	Parkinson's disease and physiology of the brain
1973	H.E. Johns	cobalt and high-energy radiotherapy
1974	J.H. Quastel	biochemistry
1975	J.D. Keith	congenital heart disease
	W.T. Mustard	cardiovascular surgery
1976	K.J.R. Wightman*	educator, physician and leader
1977	H.G. Friesen	biochemistry and physiology of hormones which stimulate milk production (lactogenic hormones)
1978	S.O. Freedman & P. Gold	carcinoembryonic antigen
1979	C.R. Scriver	genetic disease
	C. Fortier*	scientist, teacher and scientific adviser
1980	I.B. Fritz	regulation of fatty-acid metabolism
1981	J.H.C. Wang (with W.Y. Cheung)	discovery of calmodulin
	L. Siminovitch*	geneticist, adviser on science policy, leader of Canadian academic community
1984	K. Krnjevic	research on the mechanisms of brain cell communication
	R.L. Noble	discovery of important anticancer drug vinblastine
	D.G. Cameron*	educator, physician and initiator of training programs for both clinicians and clinician-scientists

* Indicates receipt of the Gairdner Foundation Wightman Award, an award for Canadians who have demonstrated outstanding leadership in medicine and medical science

research, and a balance across regions and disciplines (with special attention to areas of national health concern), and the utilization of new knowledge for improved health care. Within this federal strategy, elaborated in the MRC's Five Year Plan, the MRC undertook to continue the development of a strong research base, and to promote research in areas of national concern and in the more efficient transfer of new knowledge to health-care systems.

Issues in Medical Research

Some critics of medical research charge that advances in medical research have led to little improvement in health status. Some blame this on inadequate communication among workers in the health sector and recommend an increase in the number of clinicians conducting research to improve the introduction of new knowledge into health care and increase treatment-oriented research. Others charge that the conservative nature of the peer review system precludes progress of innovative science, and they advocate the participation of a greater variety of health professionals in medical research, eg, nurses and pharmacists, who have received less support in Canada than basic and clinical researchers. The absence of a strong health-care sector industry with a solid commitment to research, or of adequate long-term funding, are other problems that have been identified. There is also ongoing debate about the appropriate balance between curiosity-driven and targeted research, and between research oriented towards costly, technologically sophisticated medical treatments and more broadly based epidemiological and environmental medicine.

Ethics is another important issue in medical research. Although the MRC has helped to establish guidelines (favoured by many because of their flexibility) for safe and ethical practices with respect to human experimentation, research with animal subjects and use of hazardous and infectious substances, these are technically only binding on researchers supported by the MRC. In fact, many groups voluntarily comply with these guidelines. Some critics advocate legislation defining safe and ethical medical research practices on the grounds that laws are more enforceable than guidelines. Canada has no law that protects research volunteers or ensures that they are fully informed of the purpose or possible dangers of the drug or procedure being tested. Through its committee on Ethics of Experimentation the MRC is currently revising its ethical guidelines. Groups such as the Centre for Bio-ethics at the Clinical Research Institute of Montréal and the Westminster Institute for Ethics and Human Values are increasingly asked to advise researchers on ethical issues in medical research.

Future of Medical Research

The health-care system in Canada is changing. Developments such as the increased recognition of the contribution of environmental and behavioural factors to mental and physical health, the growing focus on cost containment and the allocation of scarce resources, the significant rise in the number of women in medicine, the increased need for chronic-disease care in an aging population, the trend towards home care and away from hospital care, and the increase in hospital-based research institutes will all influence the nature and extent of medical research.

Many of the discoveries of medical research, such as those which have recently offered new abilities to manipulate genes, to perform *in vitro* fertilization and embryo experimentation, to transplant organs and to screen for genetic problems, will continue to require excellent research by scientists. However, the growing social and ethical issues raised by medical research will necessitate closer co-operation between scientists and the Canadian public. Scientists can help the public understand the implications of new knowledge, and the public needs to exercise its responsibility in guiding the extent, conduct and application of medical research in Canada.

JUDITH MILLER

Reading: Michael Bliss, *Banting: A Biography* (1984); Donald Jack, *Rogues, Rebels and Geniuses* (1981); S.E.D. Shortt, ed, *Medicine in Canadian Society* (1981).

Medical Research Council is a departmental CROWN CORPORATION established 20 May 1969 to promote research in the health sciences in Canada. It maintains a program of support to research trainees and investigators, and to research programs in Canadian universities, hospitals and related institutions. The council has a number of awards programs designed to provide advanced training at the predoctoral and postdoctoral level. It reports to the federal minister of national health and welfare.

Medicine, Contemporary The years since 1939 have seen great changes in Canadian medicine. In the ARMED FORCES, served, during WWII, by many of Canada's most talented medical practitioners and specialists, medical services were responsible for advances in the management of wounds and shock, for research on infections, motion sickness and high-altitude aviation, and for perfecting methods of preventing blackout during rapid descent of fighter planes. The effectiveness of penicillin against many bacterial infections was established when the drug was provided (largely through the efforts of the Connaught Laboratories in Toronto) to the Canadian armed forces at the time of the invasion of Europe after D-Day.

During the early postwar years the Dept of Veterans Affairs organized medical and HOSPITAL services for veterans. Some of the hospitals were closely associated with university medical schools, with the result that medical teaching and research were carried out in the hospitals and the staffs of the hospitals were in most cases members of the medical faculty. This arrangement, which ensured a high level of medical care for veterans and provided universities with teaching facilities, continued until the 1970s when the Dept of Veterans Affairs' hospitals were converted to general hospitals under the provincial hospital programs.

In the 1940s Saskatchewan and BC developed hospital insurance programs; Saskatchewan also provided medical coverage. In 1957 the federal government began to give assistance to the provinces for programs of hospital services and in 1968 a countrywide medical-care program was developed (*see* HEALTH POLICY). In 1984 the federal government passed new legislation designed to discourage user fees for hospital services and extra billing by physicians.

Diagnostic and Treatment Methods Many advances in diagnosis and DISEASE treatment have occurred since 1945. The development of a large number of antibiotics has provided means of combatting bacterial infections (the successful treatment of tuberculosis is an outstanding example) although the ability of some bacteria to develop resistance to antibiotics is of increasing concern. Many viral diseases are now controlled by the use of vaccines. For example, the last epidemic of poliomyelitis in Canada occurred in the mid-1950s; it is no longer a threat as a result of effective vaccination programs. The introduction of new methods of diagnosis in cardiac disease, such as catheterization of the heart by the introduction of small catheters into the heart chambers and the coronary arteries, has provided the means of precise diagnosis of valvular and coronary artery disease (*see* HEART DISEASE). The use of radioactive isotopes and the recently developed nuclear magnetic resonance method of examination has enabled cardiologists to assess the state of the heart muscle. Surgical procedures involving correction of congenital heart defects, valvular abnormalities and coronary artery disease are being carried out in many centres across Canada. The widespread use of cardiopulmonary resuscitation in hospitals and by paramedical personnel has resulted in recovery in many cases of cardiac arrest. Pacemakers have enabled patients with life-threatening cardiac rhythm problems to survive many years. The development of coronary care units and intensive care units in hospitals has resulted in the much improved management of patients suffering from severe illness or injury.

Canada has made a significant contribution to the field of CANCER diagnosis and early detection with the "Pap" smear tests for uterine cervical cancer. Programs for the early detection of breast cancer by self-examination and mammography have also been developed. Canadian scientists were responsible for the development of the "cobalt bomb" used in radiation treatment of cancer, and for the discovery of the vinca alkaloids, chemotherapeutic agents used in the treatment of many types of cancer. Cancer diagnostic treatment and research centres have been established in many cities in Canada.

The availability of radioactive isotopes (used in the diagnosis of many conditions, including cancer and disease of the lungs) from centres such as Chalk River, has led to the development of the specialty of nuclear medicine. The diagnosis and treatment of certain conditions, eg, thyroid disease, has been greatly improved. The development of dialysis units and kidney transplants for chronic kidney failure have enabled patients to carry on useful lives, in many cases, for several years.

Centres for the treatment of the many types of ARTHRITIS have been established in many Canadian communities, greatly assisted by the Canadian Arthritis Society. These centres provide an integrated program of treatment including medical, physiotherapy and occupational therapies and social service assistance. New medications and developments in surgery involving replacement of joints with plastic or metal materials have improved the outlook of patients suffering from chronic arthritis.

The management of patients with mental illness has changed quite markedly in recent years. Patients suffering from depression and schizophrenia can now be treated with various types of medication, thus avoiding long periods of hospital care. Outpatient community treatment clinics and departments of PSYCHIATRY based in general hospitals have also been established.

Early ambulation after surgical operations has been very effective in preventing postoperative complications such as venous clotting, lung congestion and general muscle weakness. Anaesthetic methods have improved so that extensive surgical procedures can be performed even on elderly patients. Cardiac surgery and neurosurgery have made great advances. Kidney transplants are now common and a few cardiac and lung transplants have been carried out. Surgery of the blood vessels has progressed with the use of artificial replacement materials. The provision of blood transfusions by the Canadian RED CROSS SOCIETY has made possible many of the advances in surgery. Emergency departments of hospitals have been provided with personnel and equipment to handle serious injuries, because trauma continues to be a major cause of disability requiring surgery. Microsurgery has made possible the repair of small blood vessels and operations on the ear to relieve deafness. The LASER beam in OPHTHALMOLOGY is used in the treatment of some retinal diseases.

The understanding and treatment of epilepsy has advanced, and there has been considerable improvement in the outlook of patients with strokes because of extensive study of this common affliction by Canadian neurologists. The

treatment of berry aneurysms of the arteries of the brain by neurosurgeons has been an outstanding Canadian development.

The application of ultrasound to many conditions, eg, liver and gall bladder disease, obstetrics, and cardiac function, has improved diagnosis. New developments in X-ray equipment have greatly increased the precision of diagnosis by this means. The introduction of computerized axial tomography (CAT scanner) revolutionized the diagnosis of intracranial conditions, spinal cord lesions, abdominal masses and other conditions. The application of fiber optics to diagnostic instruments has greatly enhanced the examination of the stomach, duodenum and colon. This modification of equipment has allowed the catheterization of the common bile duct without surgical intervention and in some cases impacted gall stones can now be removed without surgery.

In obstetrics the emphasis has been on careful prenatal investigation, to discover high-risk situations in order to anticipate and prevent complications during delivery. The prenatal programs of preparation of the mother for the birth of the baby have allowed for delivery with a minimum of anaesthesia. Other advances in the management of pregnancy include fetal monitoring during delivery, ultrasound examination of the fetus and placenta, and examination of the intrauterine amniotic fluid for genetic abnormalities in the fetus. Recently, *in vitro* fertilization of the mother's ovum has been carried out in Canada, resulting in successful pregnancies for women who could not otherwise have borne a child. Departments of PEDIATRICS have changed considerably in recent years. Infectious diseases have declined markedly in incidence, isolation hospitals have been closed. Emphasis has been directed toward neo-natal intensive care nurseries, congenital diseases, child neoplastic conditions and adolescent problems.

Diagnostic laboratories have also changed radically with the introduction of automated methods of analysis. For example, the electron microscope has increased the ability of the pathologist to examine the details of cell structure. Immunological abnormalities have been demonstrated in blood serum analysis; genetic abnormalities have been recognized by chromosomal examination. All of this has assisted the physician to diagnose more precisely clinical conditions.

Some medical faculties have established divisions of SPORTS MEDICINE to study and treat the special needs of those engaged in athletic activities.

Emphasis has been paid to the rehabilitation of patients after injuries, following the development of disabling illnesses and after surgical procedures such as amputations. A specialty of rehabilitation medicine has been recognized, and rehabilitation centres have been established in many Canadian communities. Patients with paraplegia, strokes and other neurological and musculoskeletal diseases benefit from these programs, which include physiotherapy, occupational therapy, speech therapy and the use of facilities such as therapeutic pools.

Increased medical attention is being paid as well to the particular problems of the AGING population. A large proportion of medical and hospital care is devoted to the needs of individuals above 65 years of age. Many patients in the older age group become disabled to the extent that they require continuous hospital care. The need for extended care or chronic care hospital facilities has always been greater than the supply. Recently, geriatrics (the study and care of aging individuals) has been recognized as a specialty.

For patients with terminal illnesses, some hospitals have established special hospice facilities that administer to the patients' physical, emotional and spiritual needs.

Medical Education and Qualification Prior to 1964, when the report of the Royal Commission on Health Services (Hall Report) recommended an increase in the number of medical graduates, there were 11 medical faculties in Canada. In the next few years 4 new medical schools were established: McMaster University, Université de Sherbrooke, University of Calgary and Memorial University. This expansion of medical schools was made possible by the establishment by the federal government of the Health Resources Fund, by which $500 million was made available for the provision of facilities for education of health personnel. Programs of postgraduate education leading to family practice and specialty practice have been organized in all of the medical schools in Canada.

The Royal College of Physicians and Surgeons of Canada, est 1929, provided a means whereby a qualification in the specialties could be developed. This qualification, based on a prescribed period of training under supervision, and an examination, is recognized by provincial licensing bodies. Québec provides a separate qualifying procedure. In 1984 the Royal College provided qualification in a total of 41 specialties. The College of Family Physicians of Canada was formed in 1954, recognizing special competence in family or general practice after 2 years of approved postgraduate training and an examination (*see* MEDICINE, GENERAL PRACTICE). By examination and after a year of postgraduate internship, the Medical Council of Canada provides a qualification which is recognized by the provincial licensing bodies as a requirement for licensure to practise medicine. Québec has a separate qualification for the practice of medicine (*see* MEDICAL EDUCATION).

Medical Research in Canada was greatly stimulated by the formation of the Medical Research Council of Canada in 1960. The council established a policy of supporting medical research in universities by grants-in-aid, support for research fellows, research scholars and research associates. In 1960 the budget of the Medical Research Council was $2.3 million; by 1984 it had increased to $153.2 million. Additional funds have been provided through federal health grants for research in PUBLIC HEALTH, MENTAL HEALTH and delivery of health care. Among the many organizations that provide funds for medical research are the National Cancer Institute, the Canadian Cancer Society, the Terry Fox Fund, the Canadian and Provincial Heart associations, the Canadian Arthritis Society, the Canadian Lung Association and the Canadian Kidney Foundation.

Medical researchers in Canada have contributed to the understanding and surgical treatment of congenital heart disease; to knowledge of the development of thrombosis, arteriosclerosis and the function of platelets; to the use of hypothermia in cardiac surgery; to the discovery of calcitonin, a hormone involved in the control of calcium metabolism; to the identification of cells of female individuals by cytological characteristics; to the development of the technique of auto radiography; to advances in the diagnosis, treatment and prevention of haemolytic disease of the newborn; to the discovery of the gastrointestinal hormones, gastric inhibitory peptide (GIP) and motilin; to developments in the understanding and treatment of hypertension, the nature of stress and its effects; to the discovery and significance of carcinoembryonic antigen (CAE) and the discovery and development of the vinca alkaloids and their application in some types of cancer; to the clinical investigation of the nature, causes, treatment and prevention of strokes; and to increased knowledge of renal physiology and of the causation and prevention of kidney stones.

The health professions have become increasingly concerned with prevention of disease and injury, not only as a means of improving the health of their patients, but also to reduce the cost of health care. To this end they have advocated the use of seat belts and participation in suitable FITNESS activities, and supported anti-SMOKING campaigns and information programs concerning diet.

The outstanding advances in many branches of medicine in the past 40 years have led to improvement in the treatment and prevention of illness and injuries, but have also created problems, eg, the rapidly increasing cost of providing all available health care universally. The health professions and the public must also confront ethical problems that have arisen with technical advances (*see* MEDICAL ETHICS).

R.B. KERR

Reading: H.R. Robertson, *Health Care in Canada* (1972); L. Saderstrom, *The Canadian Health System* (1978); S.E.D. Shortt, ed, *Medicine in Canadian Society* (1981).

Medicine, General Practice General practice is the branch of medicine concerned with providing care (known as "primary and continuing care") to patients irrespective of their age, sex or type of problem. In Canada general practice is also known as "family practice" and general practitioners are also known as "family physicians." General practice as a medical discipline is usually referred to as Family Medicine.

A number of features make general practice a distinctive part of the medical profession. General practitioners (GPs) usually enter into a long-term relationship with their patients which enables the physician to treat illness with a full knowledge of a patient's life history, medical history, social and family relationships, and personal values or preferences. GPs see each of their patients on the average 4 times a year. These visits provide excellent opportunities for health education and the early detection of disease. Between 80-90% of illness episodes are managed entirely by the GP.

When specialized help is needed, the GP arranges a consultation with or a referral to the appropriate specialist. The growth of specialization and the technological development of medicine have added greatly to the complexity of medical care; GPs are often instrumental in co-ordinating the patient's care and in explaining the implications of diagnostic investigations to patients and their families.

When GPs live in the communities in which they practise, particularly rural communities, they can gain valuable knowledge of the working and living environments of their patients. Most GPs still visit their patients at home and the great majority of general practitioners in Canada admit and care for their own patients in hospital. Prenatal, postnatal and well-baby care are important parts of this kind of medicine; about 50% of babies born in Canada are delivered by general practitioners.

The Development of General Practice In the 19th and early 20th centuries, virtually all doctors were GPs. Since the 1930s there has been an enormous growth in the number of major medical specialties, and since the 1950s, a great deal of fragmentation into subspecialties. As a result, certain procedures (eg, major surgery) which were formerly the responsibility of GPs have increasingly become the province of full-time specialists. At the same time, many specialists, by limiting their practice to narrower fields, can no longer provide primary care. In some specialties, however (notably paediatrics and obstetrics), there are practitioners who offer primary and continuing care to certain age groups.

The rapid growth of specialization after WWII was followed by a decline in the numbers of GPs, a decline paralleled in other countries and in other professions, where the relationship be-

tween generalists and specialists became an issue. Since that time, however, a number of factors have contributed to a renaissance of general practice, including the founding in 1954 of the College of General Practitioners, renamed in 1967 the College of Family Physicians. The college has provided the intellectual and academic leadership that has enabled GPs to redefine their role in a more complex society. Instead of seeing themselves as "jacks of all trades," GPs are now members of a well-defined medical discipline, based on an integrated knowledge of clinical medicine and human behaviour, with special skills in the prevention and early diagnosis of disease and the complex long-term care of patients. The college has encouraged the emergence of general practice as an academic discipline in the universities and the development of postgraduate training programs in family medicine. The first chair of family medicine was established at University of Western Ontario in 1968; today all 16 medical schools in Canada have academic units of general practice and postgraduate training programs. About 450 trainees graduate from these programs each year. In 1969 the College of Family Physicians held its first certification examination in Family Medicine. There are now some 4900 certificants of the college.

As a result of these developments, Canada's health-care system seems to have attained a balance between generalists and specialists. In 1981 there were 19 232 general practitioners and 19 078 specialists. General practice has become a popular career choice for medical graduates, especially women graduates. Some problems still exist, for example, there are insufficient training positions for all graduates entering general practice and a substantial number are therefore entering practice without a specific preparation for their role; and the role of the GP in the large urban hospital — especially the teaching hospital — is in flux and is not yet clearly defined.

In the future, the growing proportion of old people in the population will make the care of the aged an increasingly important aspect of general practice, and the high cost of hospital care and complexity and fragmentation of medicine will make it essential to have a well-trained and highly skilled body of generalists.

IAN R. MCWHINNEY

Medicine, History of Medicine in Canada arguably began centuries before the French settled the shores of N America, but because the native people passed on their traditions orally, the only written accounts of their practices and beliefs were recorded by the white explorers and settlers. Most aspects of native medicine were integral to a religious system in which disease was ascribed to magical causes and therefore required magical cures, provided generally by a SHAMAN, or medicine man. But native people also treated illness with some highly effective plant remedies (eg, oil of wintergreen, bloodroot, high bush cranberries, *see* PLANTS, NATIVE USES) and physical procedures such as SWEAT LODGES and massages. It was from an Indian that Jacques Cartier learned of a cure (brewed from twigs and bark of white spruce or hemlock) for scurvy. Systems of native medicine began to break down after prolonged contact with European settlers and their imported, often EPIDEMIC diseases (eg, measles, typhoid, typhus, diphtheria and smallpox (*see* NATIVE PEOPLE, HEALTH).

European medicine at the time of settlement was evolving into an identifiably scientific discipline, although theories and knowledge about disease developed very slowly. Most of the first medical practitioners from France were barber surgeons, trained only by a rough and ready apprenticeship, or apothecaries who were theoretically limited to providing remedies ordered by a doctor but usually functioned as semi-trained general practitioners. Many of these men were of questionable character but others, eg, Robert Giffard and Michel SARRAZIN, dedicated their lives to serving the colonists. Giffard, a barber surgeon who arrived in Québec in 1627, was the first physician at the HÔTEL-DIEU, a HOSPITAL (4 rooms, 2 closets) originally founded by a religious order from France (*see* NURSING). The practice of combining the offices of barber and surgeon may have derived from the almost universal custom of bleeding patients as a panacea for virtually every ill. All that was required was a sharp knife and a knowledge of where to locate the major veins. Surgery was limited to operations on the arms, legs and the surface of the body and head. Internal operations usually resulted in the patient's death. The use of drastic measures to induce vomiting and purging were also commonplace.

Sarrazin, who arrived in New France in the second half of the 17th century, was appointed surgeon-major of the French troops in Canada and later official physician of the Hôtel-Dieu. In that capacity he became famous for helping hundreds of colonists recover from typhus. He was also an acclaimed botanist.

Despite the combined hazards of climate, disease, hunger and Indian attack, by 1763, when New France was ceded to the British, Montréal and Québec City were thriving small cities. The medical system imported by the British was similar to that used by the French. Military surgeons continued to dominate the practice and organization of the profession. However, there was a change in that the anglophone doctors took control of the cities, leaving the francophone doctors to serve the poorer areas.

Arriving in what was to become Ontario, LOYALISTS brought army surgeons with them as well, but also civilian physicians. These men usually had great difficulty making a living because the population was small, the fees low and the prestige of the medical profession very shaky. They often held other jobs, such as operating a farm or a store.

The settlers in Upper Canada were afflicted by acute infectious diseases, injuries of all kinds, periodic malnutrition and serious recurrent illnesses such as "fever and ague" (malaria). When they could obtain the services of a physician they often did, but frequently treated themselves with home remedies and botanic cures based on native peoples' prescriptions. Midwives usually assisted at childbirth. The situation was much the same in the other Maritime provinces. Halifax, the largest city in the area, had a substantial medical population, including many military surgeons, and a number of hospitals. The poor could obtain some medical services from dispensaries or the workhouse. Many early Maritime doctors established successful second careers. Abraham GESNER, educated in London, was a doctor, geologist, mineralogist and the discoverer of kerosene. Dr J. Webster was also an historian, Sir Andrew MACPHAIL a writer, Dr Charles TUPPER a politician. Another Maritime doctor, David Parker, who worked in the asylum for the poor in Halifax, was the first physician in Canada to operate with the help of anesthesia.

In the West, most of what was to become the Prairie provinces and BC were controlled by the Hudson's Bay Co, which employed its own doctors. William Fraser TOLMIE, who emigrated to Vancouver as a surgeon and trader for the HBC, and for whom Mt Tolmie in BC is named, was a botanist, geologist and later, a member of the legislature. He may have performed one of the first modern operations on the West Coast when he removed a tumour from the breast of a sailor. Tolmie had brought stethoscopes from Scotland; surgical instruments provided to him on his arrival in BC included "an Amputating, two trephining, two eye instruments, a lithotomy and a cupping case, beside two midwifery forceps, and a multitude of catheters, flexible and silver sound bougies, probangs, tooth forceps." A colleague of Tolmie's, Dr John MCLOUGHLIN, born in Lower Canada, became representative of the HBC in the West.

During the 19th century, immigration to Canada, particularly from Britain and the US, increased dramatically. Among the immigrants were many notable physicians, such as Christopher Widmer (who became known in Upper Canada as the "Father of Surgery") and W.R. Beaumont, a prolific inventor of surgical instruments. Widmer practised at York Hospital (later the Toronto General). The first medical schools in Upper Canada had been established in the 1820s. One of the first, the Talbot Dispensary, was opened by the reformer Dr Charles DUNCOMBE, but closed when its benefactor, Thomas Talbot, withdrew his support, suspecting correctly that Duncombe was using the dispensary as a stepping stone into politics. Indeed, many of Canada's early doctors became actively involved in politics. A second school, which eventually (1870) became the medical department at Victoria University, was founded by the reformer Dr John Rolph. In 1824 the Montreal Medical Institution, later absorbed by the medical faculty of McGill University, was established by Dr W. Caldwell and his associates.

The founding of medical schools in Canada was inspired by various motives, including the desire of doctors (who invariably founded the schools) to teach along lines of which they approved and to ensure a source of income for themselves. They were supported by those who felt that many Canadians who sought education in the US were being inadequately trained and were being exposed to dangerous democratic principles. In the US, many medical schools became commercial operations willing to lower standards to attract students, but in Canada the schools sought affiliation with universities and in an effort to discourage charlatans and to raise the low esteem in which doctors were held by the public, maintained high standards of entry. By the 1850s, students in medical schools in Canada typically attended lectures on "Materia Medica and therapeutics, Anatomy and Physiology, Principles and Practices and Surgery, Midwifery and the Diseases of Women and Children, and Medical Jurisprudence." There was some dissection but little laboratory work (it was not until the mid-1870s, when William OSLER took over the chair at McGill, that microscopes would be used in any extensive way). The dissecting rooms were known as "dead-houses." The one associated with the medical school established in London, Ont, was not untypical. In makeshift quarters (a dining room of an old cottage), the room contained "two tables, a few chairs, a pile of sawdust, a shovel in the corner, old coats and aprons and hooks along the walls. A trapdoor in the floor led to the cellar where 2 large vats, filled with ancient wood alcohol and other things, permeated the whole building with their ordours." New medical students were initiated into dissecting by being forced down to the cellar to retrieve the cadavers. Dr D.C. MacCallum has left a record of the situation at McGill in the mid-19th century, where he prepared the dissections that were to be part of the anatomy professor's lectures the following day. He was compelled to pass several hours at night in the dissecting room, which was "dismal and foul-smelling." He wrote that his only company was "several partially dissected subjects and numerous rats which kept up a lively racket coursing over and below the floor and within the walls of the room." The procuring of cadavers, used for anatomical studies and medical research, was often risky. Some students in Québec paid their medical fees by taking bodies

from the cemetery near Côte des Neiges. Such incidents led finally to amendments in the Act regarding anatomy and thus indirectly aided the development of Canadian medicine.

From the late 1700s, efforts to regulate the medical profession had provoked controversy between universities and boards of examiners over whether a medical degree constituted a licence to practise. The number of charlatans and incompetents practising medicine had proliferated, partly because the public preferred them, having no social or scientific reason to choose regular doctors. In both Upper and Lower Canada licensing bodies had existed since the late 1800s. In Lower Canada a board appointed by the governor had been formed under the authority of a British Act of Parliament to prevent unlicensed persons from practising medicine. Later attempts to define the profession in Lower Canada produced tension between French and English doctors until the College of Physicians and Surgeons of Lower Canada was finally created in 1847. In 1849 the Act creating the corporation was amended to provide automatic membership in the college to those engaged in practice in 1847. In 1839 a group of Toronto physicians, many of them trained in Britain, were incorporated as the College of Physicians and Surgeons of Upper Canada, but its incorporating act was disallowed in 1840. In 1869, under the Ontario Medical Act, a new College of Physicians and Surgeons of Ontario, empowered to examine would-be practitioners and university graduates, was incorporated. In 1867 the CANADIAN MEDICAL ASSOCIATION was formed. Overall, the mid-19th century was a turbulent period in the Canadian medical profession, which was torn by divisions between English and French doctors, and between those trained in Canada and those trained elsewhere.

As the population of British N America increased, so did its susceptibility to epidemics. In 1832, 1834, 1849 and during the 1850s, cholera epidemics ravaged the country. In 1832 the disease spread from Québec City to most of the towns and cities in Upper Canada in only 3 weeks. In 1854 an Italian, Filippo Pacini, had described the cholera vibrio visible through a microscope, but it was not until the germ theory, established by Louis Pasteur, was reluctantly accepted that the cause of cholera was isolated. Robert Koch, a German researcher building on the discoveries of Pasteur, also discovered the germs that caused diphtheria, typhoid and tuberculosis.

During the cholera years in Canada, doctors disagreed over whether the disease was contagious. There was a tendency to see it as a disease of the blood; treatments included bleeding, massive doses of calomel and opium, and cauterizing. As early as 1834, however, William Kelly, a surgeon of the Royal Navy, had suggested there was a relationship between diseases and sanitation, particularly clean water. Local boards of health were established to enforce quarantine and sanitary laws. By the end of the 19th century PUBLIC HEALTH was being promoted through a variety of enactments regarding IMMIGRATION restrictions, protection against the sale of tainted food, and provision of adequate sanitation. Public resistance to these measures was intense, as it was to compulsory vaccination. For example, although a smallpox vaccine was introduced into Canada in the early 1800s by a Nova Scotia doctor, smallpox epidemics ravaged the country until the 1900s, when the value of the vaccination was finally understood.

Two other major discoveries in medicine also occurred in the mid-1800s. The first was the discovery, in the 1840s, of anesthetic, which rendered surgery painless. Two Canadian doctors later made major contributions to developments in anesthesiology. In 1923, W.E. Brown of U of T established the value of ethylene as an anesthetic, and in 1942 Dr Harold Griffith advanced the science of anesthesia by his use of curare (commercially, Intocostrin), a plant extract used by South Americans as an arrow poison. The second discovery, by the Englishman Joseph Lister, derived from Pasteur's work. Lister proved that the recovery rate of patients suffering wounds could be drastically improved if the wounds were disinfected (Lister first used carbolic acid for this purpose). At that time, surgeons at the Toronto General, like surgeons everywhere, operated in frock coats, usually holding their knives, when not in use, in their mouths. Instruments were washed in a cursory fashion or wiped on a towel. Lister's antiseptic treatment was described in Canadian journals within a few months of Lister's experiments and was being used in operating rooms of the Toronto and Montreal General Hospitals by 1869, but most Canadian physicians initially resisted the technique and the attempts by Archibald Malloch, an Ontario surgeon who had worked with Lister in Glasgow, to teach Lister's principles of antisepsis. Thomas RODDICK is credited with being the first doctor to base procedures at the Montreal General on these principles.

By the 1850s Canadian women had begun to demand access to medical schools, but until the 1880s virtually all female physicians practising in Canada (eg, Emily Howard STOWE, Jennie Kidd TROUT) had trained with doctors or in schools outside Canada. In 1883 the Women's Medical College, affiliated with Queen's, and the Woman's Medical College, affiliated with U of T and the University of Trinity College, opened. Both institutions offered only the required course work, not degrees, but after 1895 students of the Ontario Medical College for Women, successor to the Toronto school, could take the exams of the medical school of their choice. Medical training for women was subsequently offered at Dalhousie (1890), University of Western Ontario (1890s) and U Man (1891), but the universities of McGill, Laval and Montréal did not open their doors to women until much later. Early female practitioners, such as Elizabeth Matheson in her work in the NWT and Maude ABBOTT in her work on congenital heart disease, among other accomplishments, made significant contributions to Canadian medicine.

Many Canadian doctors eg, John Schultz, John Sebastian HELMCKEN, Clarence HINCKS, and John RICHARDSON, helped influence the development of their own country not only as physicians but as politicians, inventors, explorers, writers, soldiers and community leaders. Many others, including Robert MCCLURE (whose work was described in W.H. Auden's and Christopher Isherwood's *Journey to War*), Florence Murray, Davidson BLACK and Norman BETHUNE, became known for their work outside of Canada in countries such as China and India. Of the 19th-century doctors who contributed to the prestige of Canadian medicine abroad, the most eminent was William Osler. Educated at the Toronto School of Medicine and at McGill, over time he was professor of medicine at the University of Pennsylvania, was appointed to John Hopkins Hospital and Medical School, and became Regius Professor of Medicine at Oxford. Author, in 1892, of *The Principles and Practice of Medicine* (which indirectly helped inspire the foundation of the Rockefeller Insitute of Medical Research), he contributed to science through his discovery of blood platelets and his investigations into heart disease, malaria and tuberculosis. His emphasis on the study of anatomy and on bedside teaching transformed medical teaching in N America. His colleague, Dr Francis SHEPHERD, introduced new scientific methods of teaching at McGill and, like Osler, emphasized the importance of a grounding in anatomy in understanding medicine.

Tentative advances in medical research in Canada were accelerated by the discovery (1921) of INSULIN by Frederick BANTING, Charles BEST and J.J.R. MACLEOD. Because of their success and the increased interest in medical research, government became involved in financing and more studies and institutes of medical research were established. For example, in 1934, Wilder PENFIELD, funded by the Rockefeller Foundation, founded the Montreal Neurological Institute, which drew together the disciplines of neurosurgery, neuropathology, neurology and related basic sciences and consequently transformed the study of the brain.

As WWII approached, medical practice was

Norman Bethune, shown here during the Spanish Civil War, in which he organized the first mobile blood-transfusion service (*courtesy Public Archives of Canada/ PA-124407*).



changing slowly, influenced by the discovery that a number of serious diseases could be controlled by immunization. Health in general was improving, largely because of better diet and nutrition and more effective public health measures. Hospitals had become safer places for the sick, and surgical procedures were more sophisticated and more likely to achieve satisfactory results. The discovery of sulfa drugs in the 1930s was a harbinger of the discovery of antibiotics. In the early 1950s, a vaccine, which the Connaught Laboratories at U of T had helped develop, defeated the feared disease of polio.

CHARLES ROLAND

Medicine Bundles were the focus of most Plains Indian rituals. A bundle might be a few feathers wrapped in skin or a multitude of objects such as animal skins, roots, or stone pipes inside a rawhide bag. Every article had significance and called for a special song whenever its owner exposed it to light. Songs and a sacred myth belonged to the bundle itself. Fixed rules of inheritance governed the sale of a particular bundle. Formal transfer was a solemn ceremony and the new owner had to learn the significance of all objects in the bundle, details of visions to which they owed their origins, and songs that established their validity. Feasts were given for bundles by both owners and nonowners. *See* NATIVE PEOPLE, RELIGION.

RENÉ R. GADACZ

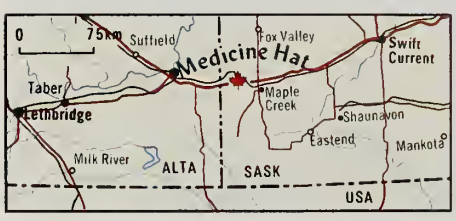
Medicine Hat, Alta, City, pop 40 380 (1981c), inc 1906, is located on the CPR main line and the Trans-Canada Hwy about 300 km E of CALGARY. Nestled in the valley of the S SASKATCHEWAN R, it is a park-studded retreat amidst the surrounding flat and treeless prairies. A council of 8 aldermen and a mayor govern the city.

History According to an Indian legend, a Cree medicine man lost his headdress while fleeing across the S Saskatchewan from a bloody battle against the Blackfoot. His disheartened tribesmen surrendered and were massacred. This is the most likely explanation of Medicine Hat's name. With the arrival of the CPR here in 1883, a tent town sprouted up around the station and slowly a community emerged. The commercial production of natural gas and clay led to the manufacturing of pottery, bricks and tiles. Milling, canning, brewing and some smelting followed. Medicine Hat grew most rapidly during the first decade of the 20th century. By 1911 it had a population of 5600.

Economy Although Medicine Hat is located in an agricultural region of large ranches, wheat farms and some irrigated lands, the abundance of natural gas permitted it to build a small but vigorous industrial sector. In 1921 Medalta Stoneware became the first western Canadian plant to sell a manufactured product E of the Lakehead. Northwest Nitro Chemicals (now Western Co-operative Fertilizers) built a large fertilizer plant in the city in 1955. Five years later Medicine Hat built Brier Industrial Estates, which welcomed as one of its first occupants a Goodyear tire plant. Both the greenhouse and petrochemical industries have profited from local supplies of natural gas.

Cityscape Medicine Hat is an oasis with many parks and sporting facilities. Its college, art gallery, museum, Fire Hall Theatre and Little Symphony Orchestra enhance local cultural life. The Medicine Hat Tigers play in the Western Junior Hockey League.

A.A. DEN OTTER





Sanctuary general, Kommos excavations (*photo by Joseph W. Shaw*).

Medicine Wheels, circles of stones over 6 m in diameter, are ceremonial in origin, though related to TIPI rings used to weight down skirts of tipis. They contain lines of stones radiating from the centre, like spokes on a wheel. Smaller rings or wheels are sometimes walled structures, probably used by SHAMANS seeking supernatural power and knowledge (*see* MANITOU). Artifacts, chips, scrapers, knives and points are sometimes found in association with them. *See also* BRITISH BLOCK CAIRN; NATIVE PEOPLE, RELIGION.

RENÉ R. GADACZ

Mediterranean Archaeology Archaeology derives understanding of past civilizations through excavation and a study of remains. Although Canada did not have its own schools nor Canadian universities their own excavations in the Mediterranean until recently, Canadian scholars have nevertheless long contributed to Egyptian, Greek and Roman archaeological studies; eg, Charles T. Currelly, first director of the ROYAL ONTARIO MUSEUM (ROM), excavated at Abydos [Abdu, Egypt] and Homer A. Thompson spent over 50 years working in the Agora at Athens, Greece. In 1961 the CANADA COUNCIL began to support archaeological research, and in 1969 extended that support to full funding, a policy continued by the SOCIAL SCIENCES AND HUMANITIES RESEARCH COUNCIL OF CANADA. Substantial funding has allowed a burgeoning of exploration organized by Canadian academics.

In Italy, University of Alberta took a lead in both the study and excavation of ancient remains, particularly through a series of research projects, first in the late 1960s at Gravina di Puglia (near Bari) in association with the British School at Rome, then in the early 1970s at Monte Irsi (near Irsina) in collaboration with Marie O. Jentel and Edith M. Wightman. At San Giovanni di Ruoti in the Apennine hills, an excavation was begun in 1977, directed by Alastair M. Small and Robert J. Buck, participants in the earlier projects. The excavations have revealed a large, prosperous, rural villa rebuilt many times between the 1st and 5th centuries AD. The latest phase, dated 460-530 AD, represents a discovery of buildings probably unique in Italy. Because bones, shell and carbonized seeds are well preserved, much information has been recovered about Roman farming practices over 6 centuries. This exemplary project in environmental archaeology will provide evidence for a reappraisal of Roman land use. Another project initiated in 1977 was a surface survey of the lower Liri Valley, S Latium, by Alexander G. McKay and Edith M. Wightman, sponsored by McMaster University. Here too the results will lead to a great increase in data on land use in various periods of Roman history and to a detailed occupational history of the region.

In Greece, the first excavation permit awarded a Canadian team went to Joseph W. Shaw, sponsored by University of Toronto and ROM. In 1976 Shaw began investigations at Kommos on the S coast of Crete under the auspices of the American School of Classical Studies at Athens. Work on this Minoan harbour town, linked by road with Phaistos, has led to remarkable discoveries: well-preserved houses of the second millennium BC and a unique Greek sanctuary in use from early Protogeometric through early Roman times, below which are monumental buildings of late Minoan date. The stratigraphy on the site is excellent and valuable ceramic series have been established. A second Canadian team, led by John M. Fossey, professor at McGill and first director of the Canadian Archaeological Institute at Athens (CAIA), surveyed the site of Khostia in Boeotia in 1979, and the following year returned for a season of exploration of the town and its surrounding territory. Here the main emphasis was on recovering the history of Khostia, not only in classical but also in prehistoric times, with concern for natural resources and climate. In 1982 the current director of CAIA, E. Hector Williams of UBC, obtained a permit to survey Stymphalos in the Peloponnese. This led to the first complete plan of the remains, and the discovery that Stymphalos was established in the 4th century BC with a street plan organized around a regular grid.

Three Canadian teams have been working in Egypt. Donald Redford of U of T, closely involved in reassembling the temples erected by Pharaoh Akhenaten (*c*1375-58 BC) at Karnak from a computerized study of some 40 000 pieces of sculptured reliefs, began excavations in 1975 in E Karnak. Here he identified the foundation of one temple, and ascertained that after its destruction the area was abandoned for 500 years, then reoccupied for domestic and industrial purposes from the 8th to 4th centuries BC, and thereafter abandoned permanently. John S. Holladay, Jr, also of U of T, has been directing since 1979 a multidisciplinary regional study of the transit corridor linking Egypt and Asia, the

Wadi Tumilat region of the eastern Nile Delta, with special emphasis on Tell el-Maskhuta, which appears to have been founded in the 7th century BC and survived until the 2nd AD. One important result has been the construction of a stratigraphically dated body of Egyptian pottery for the period *c*609 BC-*c*135 AD. The third team, led by Anthony J. Mills of ROM, in 1978 began a systematic survey of the Dakhleh Oasis, at over 3000 km^2 the largest in the Egyptian Sahara. By 1983 the field survey was complete, with over 400 sites recorded; and there have been geomorphological studies as well as floral, faunal and palynological sampling. The results should provide a history of the oasis's settlement and its external connections and an understanding of the environmental factors associated with an oasis and of the effects that man and the area have had on each other.

Intense Canadian involvement in the archaeology of Italy, Greece and Egypt has been very recent and a direct consequence of the support offered archaeological research by the Canada Council and SSHRC. This activity and support led to the establishment of CAIA and the Canadian Academic Centre in Italy, both in 1978, and the Canadian Institute in Egypt in 1980, all now united under the aegis of the Canadian Mediterranean Institute. It is to be hoped that with these institutions our links with the Mediterranean past will be strengthened and our indebtedness better acknowledged. *See also* CLASSICS; ARCHAEOLOGY.

C.W.J. ELIOT

Reading: Summary reports on most of the Roman and Greek excavations can be found in *Classical News and Views*, or its successor *Classical Views*, published by the Classical Association of Canada; and on Egyptian projects in *Archaeological Newsletter*, published by ROM.

Medley, John, bishop (b at Chelsea, Eng 19 Dec 1804; d at Fredericton 9 Sept 1892). As the first Anglican bishop of Fredericton, Medley spent 47 years building up the church physically and spiritually. Educated at Wadham Coll, Oxford, and friend of Edmund Pusey, he was active in the English ecclesiological movement, which stressed the improvement of church music and architecture. A known Tractarian, his High Church sympathies were viewed with suspicion by his LOYALIST congregation. Consecrated bishop of Fredericton in 1845, he embarked on a series of annual parish visitations and dedicated himself to building a cathedral at Fredericton and developing a cathedral choir school. The cathedral, designed by architect Frank Wills with furnishing designed by William Butterfield, was consecrated in 1853. Medley supported free pews, free-will offerings and the development of diocesan synods. He was the author of *Hymns for Public Worship in the Diocese of Fredericton* (1855, 1863, 1870).

TERRY THOMPSON

Mégantic, Lac, 26 km^2, elev 395 m, 75 m deep, is located in southern Québec, 6 km from the US border. The lake is the source of the Rivière CHAUDIÈRE; the town of Lac Mégantic is nearby. Discovered in 1646 by Father Drouillette, it was only settled about 1700 by the ABENAKI, who gave it the name *Namesokanjik*, meaning "place of the fish." Bordered to the S and E by the Appalachians, the lake is fed by a network of valleys that drain the surrounding forests. Once used to float timber, it is now popular with fishermen and vacationers. In 1776, during the American Revolution, Col Benedict ARNOLD's troops used Lac Mégantic and the Chaudière to attack Québec City from Boston.

JEAN-MARIE DUBOIS AND PIERRE MAILHOT

Mégantic Hills, part of the Appalachian Region of Québec — a region 800 km long by 60-150 km wide lying S of the St Lawrence R between the American-Canadian border and the Gulf of St Lawrence. The region, formed by the alignment of many mountain chains (the chief ones being the Notre Dame mountains in Gaspé), spreads to the SW into New England, as the White and the Green mountains, and to the NE into Newfoundland. The highest peaks are Jacques Cartier (1268 m) and Albert (1151 m) in Gaspé, and Mégantic (1105 m) in the Eastern Townships. The region's main city is SHERBROOKE in the Eastern Townships (pop 715 000 in total). Colonized primarily by LOYALISTS in the 18th century, it was the principal mining region in Canada in the 19th century, especially for COPPER. It now produces ASBESTOS and lumber as well as fish products in the Gaspé.

JEAN-MARIE DUBOIS

Megantic Outlaw, *see* MORRISON, DONALD.

Megaprojects, The term megaproject was already inappropriate when, in the early 1970s, it was first applied to very large capital projects such as the JAMES BAY PROJECT and the Syncrude tar-sands project in northern Alberta. "Mega" denotes a factor of millions; in fact the proper prefix for Canada's giant ENGINEERING schemes of the 1970s and 1980s would have been "giga" (ie, billions) because their common characteristic was a price tag of billions of dollars. In the energy field alone, construction of major projects costing more than $200 billion was planned in Canada during the 1980s. A single offshore oil-production platform, serving up to 36 undersea wells, carried a 1982 price tag of more than $1.5 billion.

The whole concept of megaprojects was thrown into question when the long list of megaprojects proposed in the 1970s was wiped out by the recession of the early 1980s. Megaprojects can only thrive in an atmosphere of certainty. Ten-year, 20- year, or even 50-year commitments, involving billions of dollars and thousands of man-years, can only be undertaken with assured finances, good product demand, a supportive political environment and fail-safe technology. Without this certainty, megaprojects can easily become white elephants.

Canada is a huge country blessed with a great wealth of natural RESOURCES — the ideal environment for megaprojects. Its history is often told as a sequence of what were, in the context of their times, megaprojects: Ontario's WELLAND CANAL and RIDEAU CANAL; the CANADIAN PACIFIC RAILWAY and CANADIAN NATIONAL RAILWAYS; the war mobilizations; the HYDROELECTRIC systems; the TransCanada and Westcoast natural-gas PIPELINES; the Interprovincial and TransMountain oil pipelines; the TRANS-CANADA HIGHWAY, ALASKA HIGHWAY and Canol pipeline; the ST LAWRENCE SEAWAY; the Canadian deuterium-uranium (CANDU) nuclear reactors; and the Syncrude tar-sands project. All were built for one or more of 3 overriding national purposes: transportation, energy or defence.

In addition to mere size and scope, megaprojects involve a long-term perspective that often verges on crystal-ball gazing. Megaprojects are usually designed for a future that will not begin for 5-10 years and will extend for a further 25-30 years. Moreover, the megaproject usually does not enter the economic system gradually but represents a quantum leap in productive capacity. Hence, there must be a huge, unsatisfied demand to be met when the project begins operation, or the project must meet old demands more cheaply and efficiently. Old suppliers (eg, clipper ships around Cape Horn, imported oil, oil-fired electrical plants) are abruptly displaced by the arrival of a railway, heavy-oil plant or massive hydroelectric development.

The earliest and most persistent critics of major projects are usually accountants. Even proposing a project carries substantial financial risk: the Canadian Arctic Gas consortium spent over $100 million before its MACKENZIE VALLEY PIPELINE was rejected in 1977; the Alsands group spent a similar amount before abandoning the tar-sands venture in 1982. In Canada, where the long-term real return on capital has averaged 7%, investors want a potential profit at least 7% higher than the expected rate of inflation. Hence, investors require assurances from governments about tax rules, prices and regulations that will apply. Governments have a parallel concern that the social benefits of a project exceed its social costs, and that the same benefits (eg, oil supply, transportation, employment) could not be obtained more cheaply by other means. For example, megaprojects are generally built in the hinterland but benefit metropolitan centres — sometimes out of the province or even out of the country (*see* CHURCHILL FALLS). Governments must judge whether the boom-and-bust trauma suffered by remote regions is worth the benefit to the industrial heartland.

The calculations of "opportunity cost" and "benefit/cost" are intimately entwined with the basic economics of the projects themselves. During the 1970s the inflation rate for energy projects was a daunting 1.5 times greater than the general rate. With the recession of the early 1980s came the concern that there might not be a demand for the megaprojects' high-priced production when it eventually came to market. Forecasts of annual energy-demand growth in Canada were reduced from as high as 7% to around 2%, with some predictions of zero or negative growth rates for many years. Consequently, several ELECTRIC-POWER projects were shelved. The collapse of expected energy price increases dimmed enthusiasm for virtually all megaprojects. Long-term national strategy (for energy security, BALANCE OF PAYMENTS, economic infrastructure, defence, etc) can override discouraging economic factors, but such planning demands extraordinarily clear long-range vision, seldom evident among politicians facing election every few years. Federal and provincial elections, such as Manitoba's 1981 campaign, have centered on megaprojects (*see* ENERGY POLICY). Uncertain political support was frequently cited by businessmen as the reason they abandoned tar-sands megaprojects in the early 1980s.

Even after the cancellation in early 1982 of the $13-billion Alsands tar-sands project and the indefinite postponement of Esso Resources Canada Ltd's $12-billion COLD LAKE heavy-oil project, nearly 200 major, energy-related projects, with a total cost of $226 billion, were planned to start in western Canada between 1982 and 1995. Proposals included completion of a world-scale PETROCHEMICAL complex in BC and Alberta, development of major coal mines, tapping and transporting of arctic oil and gas, liquefying BC natural gas for shipment to Japan, upgrading heavy oil, adding new electrical production and transmission capability and increasing railway capacity.

The largest single megaproject underway in 1982 was the $50-billion James Bay hydroelectric development in northern Québec. Other proposed megaprojects in eastern Canada included more CANDU nuclear reactors in NB, Québec and Ontario; developing TIDAL ENERGY projects in the Bay of FUNDY, NS; tapping the oil and gas off NS and Newfoundland; building natural-gas pipelines through Québec and the Maritimes; and producing synthetic fuels from Cape Breton coal (*see* COAL).

All of these technologies attempt to take advantage of "economies of scale," ie, the larger a facility, the lower its unit cost of production. This was the conventional wisdom for generations of engineers and economists, but much of its validity rests on an assumption of financial, economic and political stability. Amid the uncertainties of the early 1980s the tenet was re-examined critically and found wanting for a number of reasons. First, a very large project is vulnerable to malfunction. Thus, it would be

unwise to depend too much on one technology (oil-sands projects or CANDUs) that might be shut down completely by some hidden flaw or hazard. The Syncrude project, for example, was plagued in its first years by fires, freeze-ups, breakdowns and accidents that abruptly halved or even cut off its 125 000-barrel/day output. Second, smaller projects can be built in modules, with a continuing labour force and design improvements as mistakes are found in earlier models; cash flow from the first units can help pay for subsequent ones (substantially reducing the financial risks), and the timing of additional units can be altered to match shifts in price, demand and competition. Third, the regulatory process is simpler and quicker for smaller projects. Fourth, some technologies (eg, *in situ* tarsands extraction, high-pressure oil processing) are not notably cheaper on a huge scale. Other technologies (mining, pipelining, railroading) have obvious economies of scale, but even they were being questioned in the new climate of the 1980s. Some previously ignored concepts, eg, free-running turbines to tap the hydroelectric power of tides and rivers without dams, could revolutionize project engineering in the coming decades. Companies are hedging their bets on megaprojects, eg, "prebuilding" the profitable southern portion of the Alaska Highway gas pipeline and postponing the riskier $40-billion northern portion.

In retrospect, many technologies seem to go through a dinosaur age, an era of eventually untenable gigantism, followed by a focus on smaller, more manageable ventures. The one certainty is that not all the megaprojects on the drawing boards will be built. ROBERT D. BOTT

Megarry, Archibald Roy, publisher (b at Belfast, N Ire 10 Feb 1937). Megarry became publisher and chief executive officer of the Toronto *Globe and Mail* in 1978 and was responsible for establishing its national edition. Megarry moved to TORSTAR CORP, the owners of the *Toronto Star*, in 1974 as vice-president of corporate development. Four years later, he switched to the *Globe and Mail*, where he maintained that paper's reputation for quality while expanding foreign coverage and giving more space to "life-style" coverage. In 1983 he was elected a member of the Club of Rome. J.L. GRANATSTEIN

Meighen, Arthur, lawyer, politician, businessman, prime minister of Canada (b at Anderson, Ont 16 June 1874; d at Toronto 5 Aug 1960). As MP, 1908-26; leader of the Conservative Party 1920-26, 1941-42; PM, 1920-21, 1926; and senator, 1932-41, Meighen was a prominent, controversial public figure for nearly 30 years. He was unequalled as a parliamentary debater, combining great knowledge of public business, a sharply analytical and critical mind, a gift for lucid extemporaneous speech and an aptitude for the adversarial atmosphere.

Shortly after graduating from U of T in 1896, Meighen moved to Manitoba and established a law practice at Portage la Prairie. Five years after entering the House of Commons in 1908 he was appointed solicitor general in Sir Robert Laird BORDEN's ministry and 2 years later added the post of secretary of state. In the 1917 Union government he became minister of the interior and one of the Cabinet's dominant members. He was instrumental in devising and defending a number of disputed measures, among them the Military Service Act, the Wartime Elections Act, and bills nationalizing several private transportation companies and uniting them with others in the CANADIAN NATIONAL RAILWAYS. As acting minister of justice in 1919 he was prominent in ending the WINNIPEG GENERAL STRIKE, thus incurring the bitter enmity of part of the labour movement.

Meighen succeeded Borden as PM in 1920 against the advice of most of his fellow ministers, who believed he was temperamentally unsuited and handicapped by his connection with these contentious policies. His one notable achievement in that office came at an imperial conference, where he argued successfully against the British government's plan to renew the Anglo-Japanese alliance. At home things went from bad to worse in a situation complicated by the rise of a new political force, the PROGRESSIVE PARTY, which attracted much support in the Prairies and rural Ontario. In the general election of Dec 1921 his government was defeated and he became leader of the Opposition to the Liberal administration of Mackenzie KING. During the ensuing 4 years the Conservatives made a strong recovery and in the election of Oct 1925 won a plurality of seats. King was able to retain office with the support of the remaining Progressives until a serious scandal in the Customs Dept was exposed. Faced with a motion of censure that seemed certain to pass, King sought to have Parliament dissolved. When Gov Gen Lord BYNG refused, King resigned and Meighen again took office. But his government was soon defeated in the Commons and in the resulting election, whereupon he retired as party leader and joined a Toronto investment company. In 1932 PM BENNETT appointed him to the Senate, which he reluctantly left after 9 years to resume the Conservative leadership. His attempt to re-enter the House of Commons in a 1942 by-election failed and, disillusioned with politics, he retired once again to devote himself to his business interests. ROGER GRAHAM

Reading: Roger Graham, *Arthur Meighen*, 3 vols (1960-1965); J.L. Granatstein, *The Politics of Survival* (1967).



Arthur Meighen was an unequalled parliamentary debater in his time. The 9th prime minister of Canada, he served only 2 very brief terms 1920-21 and June-Sept 1926 (*courtesy Public Archives of Canada/C-5799*).

Meighen, Maxwell Charles Gordon, financier (b at Portage la Prairie, Man 5 June 1908), son of PM Arthur MEIGHEN. After studying at RMC and U of T and serving in WWII, Meighen took over the group of investment companies founded by his father. Chairman and director, Canadian General Investments Ltd, in 1961 he entered the consortium of financiers, headed by J.A. MCDOUGALD, that owned the huge Argus Corp. As an Argus director he was also a member of the boards of some of the largest Canadian companies, including Domtar, Massey-Ferguson, Dominion Stores and Hollinger Mines. He resigned from Argus in 1978, when it was taken over by Montegu and Conrad BLACK and H.N.R. JACKMAN. JORGE NIOSI

Meisel, John, educator, public servant (b at Vienna, Austria 23 Oct 1923). He is known to academics as a leading student of Canadian politics and to the public as chairman of the CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISION (CRTC). Meisel was educated at schools in Czechoslovakia and, after his family came to Canada, at U of T and London School of Economics. In 1949 he joined the politics dept of Queen's and, after switching research interests from international relations to politics, he published ground-breaking work on the 1957 and 1962 general elections as well as other studies on the Canadian political system. He served on a number of royal commissions in research capacities, and in 1980 the Clark government named him as head of the CRTC. He served there until 1984 (and his return to Queen's) and presided over the introduction of pay-TV into Canada. J.L. GRANATSTEIN

Melfort, Sask, Town, pop 6010 (1981c), inc 1907, is located in central Saskatchewan, 85 km SE of Prince Albert. The first settlers came to this area in 1892 and began a settlement called Stoney Creek about 2 km from the present townsite. In 1902 the settlement was moved to its present location where it was surveyed by the CNR. Mrs Reginald Beatty, the first lady settler in the district, was asked by railroad officials to name the town and chose the name of her family place in Scotland. Melfort is the centre of one of Saskatchewan's richest agricultural areas, the Carrot R valley, a territory that has never known drought or severe crop failure. DON HERPERGER

Melon (*Cucumis melo*), annual, viny PLANT of the Cucurbitaceae family. The most important cultivated groups are cantaloupe (*C. melo* var. *cantalupensis*), muskmelon (*C. melo* var. *reticulatus*), winter melon (*C. melo* var. *inodorus*) and sugar melon (*C. melo* var. *saccharinus*). Watermelon (*Citrullus vulgaris*) belongs to a different genus of the same family. Melons originated in Asia and were found by Christopher Columbus on Isabella I in 1494. Cantaloupe is grown mainly in Europe. What are known as cantaloupes in N America are muskmelons; they have a pleasant flavour and aroma and can be served as an entrée or dessert. Winter melons ripen late and lack the scent and rough rind of the muskmelon. Melons need warm temperatures and a frost-free growing season of at least 120-140 days; these factors limit their cultivation in Canada to southern Ontario, the OKANAGAN VALLEY of BC, southern Alberta, southern Manitoba, and drier parts of the ANNAPOLIS Valley, NS. A hardy variety of muskmelon, Far North, was introduced by Ukrainian settlers in the southern prairies. To hasten their development, muskmelons may be grown in greenhouses or under cover in the field. Irrigation is important during dry spells, especially in the period up to formation of the melon. Melons are susceptible to wilt diseases and mildew, and to cucumber beetles and aphids. HUGUES LEBLANC

Melvill Jones, Geoffrey, physiologist, medical doctor (b at Cambridge, Eng 14 Jan 1923). Melvill Jones is a pioneer in aviation medical research in Canada, specializing in research on the body's vestibular system (balancing organs in the inner ear), and its role in problems of disorientation in flight environments. He has also studied the brain's ability to adapt to conflicting information from several bodily sensory systems, particularly the relationship between vestibular and visual sensory information. Melvill Jones began his aviation-related medical re-

search as an RAF scientific officer, studying problems in high-altitude respiration and escape, long-duration flying fatigue, and pilot disorientation. In 1961, after coming to Canada, he inaugurated McGill's Aviation Medical Research Unit as its director. He has examined physiological adaptation to zero-gravity among Skylab astronauts and collaborated in research on physiological zero-gravity adapation among space-shuttle astronauts. He has received numerous awards and honours. LYDIA DOTTO

Melville, Lake, 3069 km², is a tidal extension of HAMILTON INLET on the rugged E coast of Labrador. Linked to the inlet on the E by a narrows, the lake extends 140 km inland to its 2 western arms, Goose B and Grand Lk. At places the water reaches depths of 300 m. Circled by rocky mountains and hills, the lake receives several major rivers that drain a large part of Labrador, including the CHURCHILL. An airforce base was built at HAPPY VALLEY-GOOSE BAY during WWII; another settlement is North West River, a former trading post. The name refers to Viscount Melville (1742-1811), a prominent British politician. DANIEL FRANCIS

Melville Island, 42 149 km², fourth-largest of the QUEEN ELIZABETH IS, NWT. Its western half is hilly, with elevations reaching 775 m, and sustains small ice fields. The eastern half is a rolling plateau with elevations generally below 300 m. Vegetation is scant, but well-vegetated broad valleys and coastal flatlands support a relatively high muskoxen population. Caribou numbers are low, owing to recent adverse climatic events. The island was discovered 1819 by Lt W.E. PARRY, who named it after Viscount Melville, first lord of the Admiralty. Promising natural-gas and oil deposits were found recently on and around the island. S.C. ZOLTAI

Melville Peninsula, NWT, approximately 400 km long and 100 km wide, joined to the Canadian mainland by Rae Isthmus, is bounded on its W side by Committee Bay and separated from BAFFIN I in the N by Fury and Hecla Str; it faces FOXE BASIN in the E. Uplifted through faulting associated with the Foxe Basin structural depression, it is an erosional remnant of a once widespread sheet of sedimentary rocks that mantled the core of the Canadian SHIELD. It is made up of 2 distinct physiographic regions, with by far the larger part consisting of a dissected plateau that becomes quite mountainous on the W side, rising as high as 900 m. In the NE corner is a narrow, low-relief coastal plain of more recent limestone. The Precambrian material forming the upland is 1600 million years old, metamorphosed and granitized Shield. Most of the rocks have been moderately folded and more intensive folding raised the low mountains in the W. The faults and intrusions associated with the peninsula's general uplift have become the focus of erosion, and steep-walled canyons, 90-175 m deep, have developed. In conjunction with some of the intrusions, formations of iron-ore deposits have been found, assessed as an important addition to Canada's iron-ore inventory. The high concentration of natural uranium in lake sediments and waters of southern Melville Pen has been traced to igneous rocks intruded into the Shield bedrock. DOUG FINLAYSON

Member of Parliament, member of the HOUSE OF COMMONS elected in single-member constituencies. Predominantly from densely populated areas, as a group they have a high level of education and many are lawyers. They are mostly male and most are middle-aged. Most are elected on a party "label" but some may sit as independents. In recent years few have had prior experience, politically, in public office, although many have had local office-holding experience. Their careers are usually short-lived, because of electoral vicissitudes. Policymaking is the domain of Cabinet and the senior public service; MPs as a group have less effect in policy formation, although some MPs claim a strong voice in CAUCUS and in Commons committees. Part of an MP's representative role is responding to the grievances of constituents. There are 282 MPs (1985). ROBERT J. JACKSON

Mémoires de l'Amérique septentrionale, a learned and entertaining natural history of Canada, was the journal kept by Louis-Armand de Lom d'Arce, baron de LAHONTAN, during his travels in New France, 1683-94. Published as vol II of *Nouveaux voyages* (1703), the memoirs duplicate information from vol I, an epistolary travelogue. Lahontan's memoirs describe the geography, native peoples and flora and fauna of the colony, and outline its trade and politics and its importance to Europe. Lahontan's lists and essays, occasionally unreliable, include false accounts of fictitious tribes from the Long R, which he claimed to have discovered; his portrait of the Indian helped to create the image of the "noble savage" popular in 18th-century Europe. The complete *Voyages* went through 13 editions in 14 years, including the author's own English translation (1703; ed R.G. Thwaites, 1905). A facsimile of the 1703 French text was published in Montréal (1974). MICHÈLE LACOMBE

Memorial University of Newfoundland, St John's, fd in 1925 as Memorial University College, a memorial to Newfoundlanders who died in WWI. Memorial received university status in 1949 after Newfoundland joined Canada. In 1961 it moved from its crowded, centrally located campus to 89 ha on the city's northern outskirts. A second campus, the Sir Wilfred Grenfell College, was opened 1975 in Corner Brook on the island's W coast. Memorial has 6 faculties (arts, science, education, medicine, engineering and business administration) and 4 schools (graduate studies, nursing, physical education and athletics, and social work). Because it is the province's only university, Memorial has to meet a wide variety of needs. It has therefore established a number of special divisions, including the Centre for Cold Ocean Resources Engineering, the Extension Service, the Folklore and Language Archive, the Institute for Research in Human Abilities, the Labrador Institute of Northern Studies, the Marine Sciences Research Laboratory, the Maritime History Group, the P.J. Gardiner Institute of Small Business Studies and the Oxen Pond Botanic Park. Memorial is one of the largest universities in eastern Canada, with high academic standards in teaching and research and a wide, multipurpose program. SHANNON RYAN

Enrolment: Memorial University, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
8332	569*	4012	374

* Includes medical interns and residents

Menaud maître-draveur (1937), novel by Félix-Antoine SAVARD, is the last classic example of the didactic Québec *roman du terroir*, "novel of the land," basing its lyrical descriptions of rural life and its appeal to colonize the interior upon the author's firsthand experiences as a pastor in new settlements near La Malbaie. Savard revisits MARIA CHAPDELAINE (1916), incorporating excerpts into his novel and effectively writing a sequel to Hémon's romance. A farmer who prefers logging, Menaud bemoans the exploitation of Québec's resources by unnamed strangers, encouraging his daughter Marie to marry le Luçon rather than le Délié, who would sell his inheritance to "foreigners." Following his son's death in a log jam, Menaud, rendered insane by his quest to confront the enemy, obsessively tracks the elusive le Délié. Savard revised his poetic novel in 1938 (simply adding a glossary), 1944, 1960 and 1964; Alan Sullivan translated the first edition as *Boss of the River* (1947), Richard Howard the 1964 text as *Master of the River* (1976). MICHÈLE LACOMBE

Mennonites, a Protestant religious-cultural group, numbering over 600 000 adult members in 41 countries. Mennonites first arrived in Canada from the US in 1786 and there are now about 190 000 Mennonites in Canada (1981c). They date their separate Christian identity to the ANABAPTIST movement of the early 16th-century Reformation. Baptism (not of infants but of mature voluntary believers) and a communion service, which included foot washing as a symbol of humility and service, were the Anabaptists' only sacraments. The movement soon spread to the northern German states and the Netherlands, where Menno Simons (after whom the Mennonite denomination is named) assumed the leadership in 1536. Through prolific writing, preaching and tireless organizational work he strengthened his people. However, even the peaceful "Mennists" were persecuted and thus were scattered in all directions. The Swiss-South German Mennonites went mostly westward, settling in Alsace and the Palatinate and, by the end of the 17th century, in Pennsylvania. The Dutch-N German went mostly eastward, forming settlements in present-day Poland, and by the end of the 18th century in Russia. The Mennonites' relative isolation and self-sufficiency within closed communities, combined with their conviction that religion was a way of life, produced a unique socio-religious culture. Thus the Mennonites who came to Canada, all of whom spoke Germanic dialects, were perceived as a minority group with both religious and ethnic characteristics.

The first migration into Canada brought about 2000 Swiss Mennonites from Pennsylvania to Upper Canada after the AMERICAN REVOLUTION. They acquired land from private owners in the Niagara Peninsula and in York and Waterloo counties. This group was followed by Amish Mennonites (named after Bishop Jacob Ammon, a conservative leader of the late 17th century). From 1825 to the mid-1870s about 750 settled on crown land in Waterloo County and adjacent areas.

In the 1870s the russification policies of the Russian government caused 18 000 Dutch Mennonites — one-third of the total in Russia — to leave for N America. The promise of land, cultural and educational autonomy, and guaranteed exemption from military services attracted about 7000 of them to southern Manitoba. The opening up of HOMESTEAD lands in the North-West Territories attracted Mennonites from Prussia, Russia and the US between 1890 and WWI. They were joined by many from Manitoba, who established 2 reserves in Saskatchewan, and others from Ontario. Conscription in the US in 1917 brought more Mennonites to the Canadian Prairies. The largest immigration occurred in the 1920s, when 20 000 Mennonites took the opportunity to escape the effects of the Bolshevik Revolution. Most of this group settled on the Prairies. WWII caused over 12 000 Mennonite "displaced persons" to migrate from Russia and Germany. Most of them settled in urban areas, the most rapidly growing urban community being Winnipeg. In recent decades many Mennonites have immigrated from the US, Mexico and Paraguay.

The basic unit of Mennonite institutional life is the congregation. There are nearly 1000 congregations throughout Canada, tied together in about 30 congregational families of 2 types: those representing older and more conservative traditions whose unity is symbolized by a single membership register and a single bishop (eg,



Arrival of the first Mennonites in Winnipeg, Man, 1874 (*courtesy Glenbow Archives*).

Old Order Mennonite Churches); and those representing newer structures called "conferences" (eg, the Conference of Mennonites in Canada, the Canada-Mennonite Brethren Conference and Mennonite Church Region I). Most congregational families are members of provincial, national and continental central committees. The headquarters of the Canadian Mennonite Central Committee is in Winnipeg. An annual budget of more than $10 million is applied to foreign and domestic programs which include development, relief and peace projects (*see* PACIFISM; PEACE MOVEMENT). Prominent Mennonite periodicals include the German-language *Mennonite Rundschau, Der Bote* and *Die Mennonitische Post,* and the English-language *Mennonite Brethren Herald, Mennonite Mirror* and *Mennonite Reporter*. Their total circulation is about 45 000. Mennonite voluntary associations promote music, the arts, folk and heritage festivals, research and writing, welfare institutions, nursing homes, retirement centres, psychiatric units, insurance and tourism.

Mennonites differ in their attitudes toward innovation in religious and cultural life. Some believe that the Kingdom of God comes to the faithful who live an exemplary life in communities. Others insist that it cannot come without penetration of, adaptation to, and involvement in, the world. Among both the Swiss and the Dutch are conservative groups that have successfully perpetuated traditional rural modes of life, unchanging clothing styles, the German language and liturgical forms. The Old Order Amish and Old Order Mennonites have also succeeded in continuing a traditional farming style. Other Mennonites have adjusted and integrated with society. Mennonites are no longer limited to their Swiss and Dutch traditions and ethnic backgrounds. There are many Canadian Mennonites of French, Chinese, Indian and Anglo-Saxon extraction, and about 40% of Mennonite marriages in 1981 were mixed.

As a church, emphasizing separation from the state and social nonconformity, Mennonites have always resisted the influence of state-run public schools. In the early 1980s about 10% of 18 000 Mennonite elementary children were in 50 private schools; slightly more secondary (grades 7-13) students were in 8 private high schools; and about 500 of 3600 post-secondary students were in 4 church colleges. A network of 5 BIBLE SCHOOLS instructs nearly 400 students annually. Students seeking training for the ministry usually go to one of 4 Mennonite seminaries in the US.

Politics have represented a paradox among Mennonites. On the one hand, they had a high doctrine of the state, believed in the coming of the Kingdom of God on Earth, and from time to time lived in semiautonomous communities which functioned like mini-states. On the other hand, Menno Simons had taught the believers to separate church from state and to avoid the magistracy (in his time the source of persecution). Today, most Mennonites vote, and a number have served in municipal, provincial and federal governments.

Except for conservative minorities, Mennonites in Canada are undergoing rapid change; but a strong emphasis on the family and the role of religion, specific programs to keep the young people (youth organizations, camps, choirs, service programs), special schools and a dynamic congregational life minimize the losses to the larger, secular community. FRANK H. EPP

Reading: Frank H. Epp, *Mennonites in Canada,* 2 vols (1974, 1982).

Martin's Old Order Mennonite meeting house, north of Waterloo, Ont (*photo by Hunsberger Photography*).



Menou d'Aulnay, Charles de, sea captain, governor of ACADIA (b in France *c*1604; d at Port-Royal [Annapolis Royal, NS] 1650). Although best known for his disputes with rival Acadian governor Charles de Saint-Étienne de LA TOUR, d'Aulnay was a determined and resilient colonial promoter who grappled over a 15-year period with the intractable problems associated with the colonization of Acadia. Of noble descent, he saw naval service as lieutenant to his cousin Isaac de RAZILLY, and went to Acadia 1632 when Razilly became governor. On Razilly's death in 1635, d'Aulnay assumed his powers and was later formally commissioned to govern Acadia. La Tour claimed similar owers, and their rivalry was only ended by d'Aulnay's military victory on the Saint John R 1645. Military supremacy did not solve for d'Aulnay the problem of how to bring real social and economic stability to the colony. After his accidental death by drowning in 1650, Acadia lapsed again into internal strife. His most lasting achievement was the establishment of the Acadian people at PORT-ROYAL. JOHN G. REID

Reading: A.H. Clark, *Acadia* (1968); John G. Reid, *Acadia, Maine and New Scotland* (1981).

Mens Rea, "guilty mind" (Lat), refers to the mental state that must generally accompany a prohibited act before it can legally be considered a crime. Different offences require different mental states; some require intention, eg, to commit theft; some knowledge, eg, that property possessed is stolen. In the case of some offences (viz, those of "strict" and "absolute liability"), no mens rea requirement exists. LEE PAIKIN

Mental Health, in the early years of the mental-health movement, was often defined as the absence of symptoms of mental illness. Since that time, attempts have been made to relate mental health to a concept of psychological well-being and to certain capacities of individuals, eg, the capacity to perceive reality "objectively," to be flexible in meeting new situations and to understand another's point of view. However, no clear line divides the mentally healthy from the mentally unhealthy, and in addition, the definition of mental health is relative and is dependent on cultural context. The characteristics of a mentally healthy person in one milieu may seem very different from those of a mentally healthy person in another. The World Health Organization's definition of health as "a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity" implies that perfect "health" is an unattainable ideal, and this point of view is also reflected in the concept of mental health, as no person will exhibit all the symptoms of mental health all the time. Freud's definition of health as the capacity "to work and to love" is widely accepted by mental-health specialists as simple and accurate, and does not reflect the legal or moral considerations which often colour attempts to describe mental health.

Hippocrates was one of the first writers to challenge the belief in supernatural causes of mental illness, a belief that had prevailed since

ancient times. Hippocrates claimed that mental disease had a physiological and natural basis. An astute observer, he described in clinical detail a number of mental conditions now known as phobias, mania, depression and paranoia. By the Middle Ages, however, attempts to explain mental illness through rational mechanisms were replaced by theories of demonology and witchcraft. Those who opposed the habit of attributing mental disorders to possession by the devil included Johann Meyers (1515-88), considered the father of PSYCHIATRY, and Paracelsus (1493-1541). Philippe Pinel (1745-1826), director of 2 institutions in Paris for the mentally ill, was one of the first reformers to advocate a humane approach to mental patients. In England the Society of Friends (Quakers) supported the work of reformer William Tuke (1732-1819) who established a country retreat for the mentally ill, who, although treated kindly, were expected to undertake manual labour. In the 19th and 20th centuries the work of Sigmund Freud revolutionized the psychological understanding of individuals and the concepts of mental health.

Mental Health in Canada

In 1714 the HÔTEL-DIEU in Québec provided a ward for women who were mentally ill and later took in about 12 men, but treatment of the mentally ill both in New France and British N America was primarily a family responsibility, and patients who could not be cared for at home were placed in jails and poorhouses under deplorable conditions, eg, overcrowding, poor sanitary conditions, inadequate food and heating, and no intervention or treatment. The mentally ill, often caged or kept in barred rooms, were thought to be morally unfit and were treated essentially as sinners. Asylums for the insane were opened in 1835 in Saint John, NB, and in 1841 in Toronto. The latter, which was begun in an abandoned jail, was transferred to a wing of the Parliament Buildings and finally to headquarters at 999 Queen Street.

Changes in care in Canada and the US were initiated by Dorothea L. Dix (1802-1887), Richard M. BUCKE, Charles K. CLARKE, Clifford W. Beers (1876-1943) and Clarence N. Hincks (1885-1964). Dix, a Massachusetts schoolteacher, wrote, lectured and informed the public and legislators about the deplorable conditions in mental institutions. She was successful in influencing a number of state legislatures either to establish or improve their mental institutions, and because of her efforts a mental hospital was built in St John's in 1885. She also lobbied the Nova Scotia legislature and oversaw the building of a hospital for mental patients in that province. Dr Richard Bucke was appointed superintendent of the Asylum for the Insane in Hamilton in 1876 and a year later of the asylum in London, Ont. He believed mental illness was a "failure of the biological process by which mankind adapts to change." In his attempts to reform the crude and often cruel treatment of mentally ill patients he abandoned the practice of pacifying the inmates with alcohol, ceased to "restrain" the patients, opened an infirmary to treat the patients' physical ills, and inaugurated regular cultural and sports events in which the patients were encouraged to participate.

Dr Charles Clarke was an assistant superintendent at Hamilton asylum in the early 1880s, and later superintendent of the asylum at Kingston, Ont. By 1887 he had changed the asylum from a jail to a hospital and was instructing nurses and attendants in the care of the mentally ill. He ceased to restrain inmates and organized many of them into a musical band as part of their therapy. By 1893 he was advocating that the term "asylum" be dropped and that special hospitals be constructed for the mentally ill.

A Connecticut engineer and founder of the mental-health movement in N America, Clifford Beers had suffered an episode of mental disorder at the age of 18 while a sophomore at Yale University. At one point he was hospitalized in the Hartford Retreat, which had been founded by Dr Eli Todd 71 years earlier. He was also housed in other psychiatric institutions, and was aware of the appalling treatment and physical abuse suffered by patients. On his release, he wrote *A Mind That Found Itself*, in which he described his experiences. In 1908, the year his book was published, he founded the National Committee for Mental Hygiene. Dr Clarence Hincks was born in St Marys, Ont, the only child of a schoolteacher and a Methodist minister. His interest in mental health was partly the result of his own experiences with severe depression. In 1918, with Beers's help, he organized the Canadian National Committee for Mental Hygiene, which later became the Canadian Mental Health Association. Both organizations were influential in promoting mental-health issues in both the US and Canada. After WWI, he toured asylums across Canada, and was shocked by what he found. In 1920, with Beers, he organized the International Committee for Mental Hygiene (which in 1948 became the World Federation for Mental Health, headquartered in London) and helped plan the first International Congress on Mental Hygiene, which was held in Washington in 1930. He was one of the first physicians to recognize the value of prevention and of treating sufferers of mental illness before they were incapacitated. His work led to the development of child-guidance clinics for the early detection and prevention of mental illness. Perhaps because of the psychoanalytic focus on the development of children or because of Hincks's conviction that mental health began in childhood, academic interest in child development began in earnest during this time. Hincks persuaded benefactors to fund the St George's School for Child Study at U of T and the McGill University Nursery School and Child Laboratory in Montréal in 1925. A psychologist, Samuel Laycock (1882-1971), came under the influence of the charismatic Hincks during one of Hincks's visits to the West. He became professor of educational psychology in 1927 at University of Sask and director of education for the Mental Hygiene Committee in 1929.

WWII profoundly affected attitudes towards mental health. The medical examinations of recruits revealed that thousands of apparently healthy adults suffered mental difficulties. This knowledge affected public attitudes towards mental health, and stimulated research into preventive measures and methods of treatment. It has also led to a better understanding of the emotional needs of children and of the role of stress in causing mental disorder. Indeed, it is commonly held today that symptoms of much mental illness are a response to everyday or unusual stresses and are probably transitory.

Treatment of Mental Illness Mental illness is the most pervasive health problem in Canada. Universal medicare in Canada includes coverage for psychiatric illness (as well as any other medical condition), but all mental-health problems are not necessarily psychiatric problems, and there has been a significant increase in demand for care for the full range of behavioural and adjustment problems. Mental illness may be treated by family physicians, psychiatrists, psychologists, social workers and psychiatric nurses, but these professional groups have not met all of the mental-health needs. Specific problems, such as those involving ALCOHOLISM or SMOKING, have led to the development of very large and sophisticated self-help groups, eg, Alcoholics Anonymous, founded in 1935. There are other groups whose aim is the development of healthier life-styles or healthier dietary habits and who offer structured programs and group support to achieve these ends.

In the past 2 decades, research towards evaluating the psychotherapeutic, behavioural and biochemical interventions for mental-health problems has increased. For example, both effectiveness and cost studies of home treatment versus hospital psychiatric treatment have recently been carried out in Montréal. Findings from these studies have allowed a clearer understanding of the usefulness of such interventions and have pointed the way toward innovative approaches. JOHN T. GOODMAN

Mer de l'Ouest ("Western Sea"), originally the goal of EXPLORATION during the French regime, was the stuff of wishful thinking obligingly corroborated by Indians. Initially thought to be an inland sea somewhere W of the Great Lakes, it gradually blended in imagination with the Pacific. The search for the Mer de l'Ouest had



Map by Delisle and Buache, 1752, showing the imaginary Mer de l'Ouest in the lower right (*courtesy Public Archives of Canada/NMC-21056*).

a useful function, since the argument that exploration must be financed by the FUR TRADE served ambitious traders well in their efforts to secure monopoly privileges from the royal authorities. The imaginary Mer de l'Ouest finally came to rest in the region around Lk Winnipeg, where, in the middle of the buffer zone marked off by the Cree and Assiniboine around the English at Hudson Bay, LA VÉRENDRYE, his sons and their successors established a network of trading posts after 1730. THOMAS WIEN

Merasty, Angelique, *see* BIRCH-BARK BITING.

Mercantile Bank of Canada has head offices in Montréal. Citibank, North America, holds a 24% interest in the Mercantile Bank, which operates a general banking business through 13 branches and one representative office. As of Oct 1983, it had annual sales or operating revenue of $476 million, assets of $4.1 billion (ranking 18th among banks and financial institutions in Canada) and 826 employees. The bank is 24% foreign owned.

DEBORAH C. SAWYER

Mercantilism, economic theory that there is a fixed amount of wealth in the world, and that a nation's prosperity depends on its success in accumulating wealth by exporting more than it imports. It was put into effect through commercial policies designed to produce a favourable balance of trade, through colonial policies that developed colonies as exclusive markets and sources of raw materials, and, in England, through NAVIGATION ACTS, which made the shipping and marketing of colonial goods the monopoly of British merchants and shippers. Mercantilism was intended to benefit European powers, but was not wholly disadvantageous to the colonies, providing a protective mantle for early development. However, it left colonial economies dependent on staple production (*see* STAPLE THESIS) and obstructed their industrial development. Though less rigid than the French system, English mercantilism brought no fundamental changes to the colonial economy after the CONQUEST of New France (1760). The system was dismantled with the repeal of the CORN LAWS in 1846 and the Navigation Acts in 1849, and the elimination of duties that had favoured colonial timber. *See* ECONOMICS.

JAMES MARSH



The mercantilist system was highly profitable to merchants, such as these shown in a French port preparing manifested goods for the colonies. The engraving appeared in 1675 in a manual dealing with all aspects of business (*from Jacques Savary, Le parfait négociant, 1675*).

Mercier, Honoré, lawyer, politician, premier of Québec (b at St-Athanase, Qué 15 Oct 1840; d at Montréal 30 Oct 1894). A founder of the PARTI NATIONAL, he was the first Québec political leader to assert that the Québec government was the national government of Quebecers, and is therefore considered a father of Québec nationalism.

A Liberal, he helped found the short-lived Parti national in 1872, in an attempt to win electoral support by dissociating the Liberals from the PARTI ROUGE, and won election to the House of Commons for Rouville. Defeated federally in St-Hyacinthe in 1878, he won the provincial election in that riding the following year. In 1883 he became leader of the provincial Liberal Party, and in 1885 he headed a group of Liberals and dissident conservatives who rejected their parties' respective stands on the Louis RIEL affair. At the head of the revived Parti national, Mercier was the first Québec leader to win large popular support; by keeping alive the feelings aroused by Riel's hanging, he and his party won the election held late in 1886 and he took office as premier 29 Jan 1887. In office he settled the issue of the JESUITS' ESTATES as well as the quarrels that surrounded the creation of a distinct university in Montréal. Mercier's government encouraged railway building and colonization of undeveloped lands, creating a department of agriculture and colonization in 1888, with Curé Antoine LABELLE as deputy minister. Mercier also called the first interprovincial conference of premiers since Confederation and led the movement to force the federal government to recognize the principle of provincial autonomy in administrative and fiscal matters. Implicated in the BAIE DES CHALEURS SCANDAL, Mercier was removed by the lieutenant-governor in Dec 1891. A subsequent investigation could not prove that Mercier was personally involved and he was re-elected in the 1892 provincial elections, but his party was soundly beaten. A man of considerable style and a noted orator, Mercier collected various foreign honours during his premiership. DANIEL LATOUCHE

Mercure, Pierre, composer, producer, bassoonist, administrator (b at Montréal 21 Feb 1927; d accidentally near Avallon, France 29 Jan 1966). Mercure, always seeking a new, multimedia language, learned French music and became an orchestrator with Claude CHAMPAGNE. He studied in Paris, notably with Nadia Boulanger and Darius Milhaud and in 1951, in Tanglewood, Mass, was introduced to dodecaphony by Luigi Dallapiccola. Mercure was the first producer of TV music programs on Radio-Canada. Influenced by Pierre Schaeffer during a second stay in Europe, he turned to ELECTROACOUSTIC MUSIC and, after organizing the Semaine internationale de musique actuelle (1961), returned to Europe to study electronic music. He left a rich legacy of ballet music (especially *Structures métalliques I* and *II* and *Tétrachromie)* and of chamber, electronic, vocal and orchestral music. His *Cantate pour une joie* has been performed several times, including during the Olympic Games in Montréal in 1976. HÉLÈNE PLOUFFE

Mercury (Hg), silvery white metal, also known as quicksilver. It is the only common metal existing as a liquid at ordinary temperatures (melting point: -38.87°C) and is a good conductor of heat and electricity. Mercury and its compounds have been used for centuries, eg, in the making of vermillion, a red paint, and in early treatments for syphilis. Mercury was used to extract gold from rock and sand. Production of caustic soda and chlorine in mercury cells is gradually being replaced because of mercury's toxicity. Because it has a high rate of thermal expansion, it is used extensively in thermometers. Its primary use is in electric switches, mercury-vapour lamps, batteries, catalysts and dental and agricultural compounds. Mercury and many of its compounds are toxic and mercury chloride is used as an insecticide and rat poison. Mercury is recovered primarily by roasting ores containing the MINERAL cinnabar, a red mercury sulphide. Historically, the major producers have been Spain, the US, Italy and Yugoslavia. Virtually all mercury produced in Canada was obtained from the Pinchi Lk deposit in north-central BC, which closed in 1976.

Mercury is a cumulative poison and becomes increasingly concentrated in the food cycle of aquatic life and may reach dangerous levels in fish. Highly toxic levels can cause irreversible damage to the nervous system and the brain. The phrase "mad as a hatter" refers to the occupational disease resulting from contact with the mercury used in the early manufacture of felt hats. Mercury poisoning has occurred among native people dependent on fish and much of the freshwater fishery in Canada has been destroyed by mercury pollutants such as industrial wastes and agricultural insecticides. J.J. HOGAN

Meredith, John, painter (b at Fergus, Ont 24 July 1933), brother of William RONALD. John Meredith Smith (known professionally since 1951 as John Meredith), studied at the Ontario College of Art 1950-53, and had his first solo exhibition in 1958. Meredith's work is informed by a belief in the human presence as the ultimate subject of art; it is based on knowledge gained through experience rather than theory, on instinctive understanding. In early works (1958-62), abstract vertical stripes, dark and tonal in colour, take on first vegetal and then human connotations, projecting a pervasive sense of primordial mystery. Paintings from the period 1962-66 generally present large-scale images and brilliant colour, often used to optical and psychological effect. Coloured-ink sketches then became the basis for paintings; his work at the same time became increasingly complex, concentrated and obsessive. These exceptional paintings of the later 1960s achieve a forceful presence, not through scale alone but also through an insistent, overall interaction of colour, related and recurring motifs and linear patterning. Works of the early 1970s frequently evoked the Orient through their titles and subtle asymmetries, but by the 1980s his paintings became simplified, looser and more open.

Reading: M.L. Fleming, *John Meredith: Fifteen Years* (1974); I.M. Thom, *John Meredith: Drawings* (1980).

Meridian, First or Principal, is the line of longitude forming the main backbone of the Dominion Lands Survey System — a plan devised in 1869 for the subdivision of the territory about to be purchased by the federal government from the HBC into a rectangular system of square townships numbered northerly from the FORTY-NINTH PARALLEL and E and W of a given meridian. The Principal Meridian, sometimes referred to as the Winnipeg Meridian, ran northward from a point on the 49th parallel 10 miles (16 km) W of Pembina, where astronomical observations had been made to determine the exact position of the parallel in that location. The point was selected to avoid the settled cultivated areas taken up along the Red R prior to the survey. It has a longitude of 97°27'28" W. The other initial meridians are spaced at intervals of about 4° of longitude and are numbered westerly and easterly from the Principal Meridian. N.L. NICHOLSON

Merlin, *see* FALCON.

Merrickville, Ont, Village, pop 984 (1981c), located on the Rideau R, 55 km SW of Ottawa. It was founded by the LOYALIST William Merrick, a millwright, to utilize the local falls for gristmills and sawmills, and became a major lock point on the RIDEAU CANAL. It remains one of the best preserved 19th-century Ontario villages, with over 100 designated historic build-

ings, including one of 4 blockhouses (1826-32) built to defend the canal, the Merrick sawmill and tavern, and the house in which Col BY lived. Harry F. McLean, railway contractor and eccentric philanthropist, was a longtime resident. The local economy is based on 2 foundries, a pottery, 2 rehabilitation institutions and tourism. K.L. MORRISON

Merritt, BC, City, pop 6500 (1983e; 6100, 1981c), inc 1911, is located in the Nicola Valley of south-central BC, at the junction of the Coldwater and Nicola rivers, about 12 km S of Nicola Lk and 100 km by road S of Kamloops. The Thompson and Okanagan tribes of the Interior SALISH first inhabited the area. Fur trader Alexander Ross visited the region in the winter of 1813. The great fur brigades, with hundreds of horses carrying packs of fur between Ft Kamloops to the N and Ft Langley on the lower Fraser R, used routes through the valley 1848-60. Settlement began and cattle ranches were established in the 1860s. Coal, discovered in the 1860s, was being mined here in the early 1900s. The town of Forksdale was renamed Merritt in 1907 after William H. Merritt, promoter of the failed Nicola, Kamloops and Similkameen Ry. Merritt became a mining boom town and prospered until the Great Depression, when it went into receivership. The province ran community operations until 1952. The growth of the lumber industry and the opening of large COPPER mines in the region in the 1950s and 1960s made Merritt the commercial centre of the Nicola Valley. The region around Merritt is famous for its fishing lakes and the rolling hills of the cattle country. Nearby Douglas Lk Ranch is the largest in Canada at 220 000 ha and over 15 000 head of cattle. JOHN R. STEWART

Merritt, William Hamilton, soldier, businessman, politician (b at Bedford, NY 3 July 1793; d at Cornwall, Canada W 5 July 1862). "A Projector," as he styled himself, he epitomized what John Beverley ROBINSON called the defining characteristic of American society, the "anticipating spirit." Merritt considered enterprise and commercial activity as the quintessential aspect of the American and English character. He believed that Providence had "ordained that Nature should do her part & leave it to the engenuity [sic] of Man so to improve." Confident that the "mind is never satisfied" and certain that industry rather than idleness conferred "the greatest peace of mind," Merritt proposed and undertook policies and projects to transform Upper Canada into a great commercial emporium. Although he was an assemblyman in pre- and post-union Upper Canada and president of the Executive Council in the second Baldwin-La Fontaine administration, politics were secondary, at best complementary, to his policies on public works, transportation and trade. He is best remembered for the WELLAND CANAL (chartered 1824). ROBERT L. FRASER

Messer, Don, and the Islanders For close to 40 years the sounds of "old-time" music meant Don Messer and the Islanders. Donald Charles Frederick Messer (b at Tweedside, NB 9 May 1909; d at Halifax 26 Mar 1973) started playing the fiddle at age 5, learning basic skills and traditional melodies from family and friends. By age 7, he was performing at local dances and social events. In 1929 he began his radio career with a show on CFBO, Saint John. In Sept, 1939, he moved to Charlottetown where he formed "The Islanders" for station CFCY. The personnel of the Islanders changed many times but there were several constants: bass player, Julius "Duke" Nielsen; clarinetist and announcer, Ray Simmons; drummer, Warren MacRae; and pianist, Waldo Munro. The singers were Marg Osburne, who joined in 1947, and Charlie Chamberlain, with Don since 1934.

In 1959, "Don Messer's Jubilee" started a 10-year run on CBC TV. Its cancellation (1969) met with great protest and the show was syndicated from CHCH TV in Hamilton until Messer's death. Don Messer's TV and radio shows, his extensive personal appearances across the country, combined with more than 30 LPs, brought traditional fiddle and dance music into homes across Canada. His shows provided important exposure for younger artists including Stompin' Tom CONNORS, Fred McKenna, Vic Mullen, Graham Townsend and Catherine McKinnon. Several collections of his music have been published. His papers and music are now kept in the NS Public Archives, and one of his fiddles is on display in the Country Music Hall of Fame in Nashville. RICHARD GREEN

Metallurgy is the art, SCIENCE and TECHNOLOGY of making metals and alloys into forms suitable for practical use. Some metals are found in their "native" or free elemental form (eg, GOLD, SILVER, COPPER), and a limited number can be produced from seawater, notably magnesium. However, most metals are extracted from naturally occurring MINERAL compounds found at or near the earth's surface (*see* MINING). In Canada most nonferrous metals (eg, copper, ZINC, NICKEL, LEAD) are produced from sulphide ores. The steps in extracting metals from their ores are mineral processing, which processes mined ore into concentrates and tailings (wastes); chemical extraction, which separates concentrates into metals and slag and leach residues; and refining, which produces refined metal and by-products.

Mineral Processing

Mineral processing, also referred to as ore dressing, mineral dressing or milling, involves the chemical and physical treatment of the ore to upgrade the valuable mineral component, before the metal-extraction stage. This processing eliminates as much of the waste portion as possible. Two principal steps are involved: comminution and separation.

Comminution is liberation of the desired mineral (eg, nickel sulphide, copper sulphide) from the waste (gangue) by crushing and grinding. The ore is crushed, generally in the dry state, by jaw crushers and cone crushers. After crushing, the particle size of ore is about 2-20 mm. The crushed ore is then ground in ball mills and rod mills to particle sizes less than 75 μm. Grinding is usually carried out in water to minimize dust. The degree of grinding depends on the size and distribution of the valuable mineral in the ore.

Separation of the desired mineral from the gangue produces an enriched portion (concentrate) and a discard portion (tailings). Separation is performed by taking advantage of differences in the physical and chemical properties of the minerals. Property differences that are used for this purpose include density, radioactivity, magnetism, electrical conductivity and surface reactivity.

The most commonly used property, surface reactivity, has proven to be very selective, particularly for sulphide ores. The separation process based on this property is called flotation. In flotation, air is bubbled through the pulp (a mixture of finely ground ore and water) in a tank which is agitated vigorously to break the air into fine bubbles. The valuable mineral is picked up by the bubble and floated to the surface to form a stable froth, which is skimmed off. The gangue particles are not affected and remain in the pulp to form the tailings.

The principle of flotation is based on surface tension forces. For an air bubble to stick to a particular mineral surface, the mineral must be hydrophobic (water repellent). To make the mineral particles hydrophobic, small amounts of organic chemicals called collectors are added to form a monomolecular (ie, one molecule thick) layer on the surface. Typical examples of collectors are sodium oleate and xanthates. To ensure stability of the bubble, frothers (ie, heteropolar, surface-active organic chemicals such as pine oil and cresol) are added. Flotation is very selective and can be used to concentrate very low-grade ores.

The concentrates produced through mineral processing are drastically reduced in bulk and weight compared to the original ore. For example, 100 kg of copper ore containing as little as 1% metal in the form of a sulphide can be upgraded to 4 kg of concentrate containing 25% copper, a reduction of 96% in the weight of the initial ore.

Chemical Extraction

Unlike metal oxides, metal sulphides cannot be directly reduced to the metallic state. Additional complications are introduced by the invariable presence of iron sulphides in the nonferrous sulphide concentrates. Extraction processes are often referred to as pyrometallurgical (high-temperature processes, eg, smelting, roasting, distilling, etc, involving furnaces) or hydrometallurgical (aqueous-solvent processes, usually operating near room temperature). Most metal-extraction processes involve both high temperatures and aqueous solution treatments. There are a number of paths which can be followed to produce metals from sulphide concentrates.

Copper In the case of copper, the principal mineral in the concentrate is chalcopyrite ($CuFeS_2$). The traditional process for producing copper from this concentrate involved roasting, smelting, converting and refining. Roasting is the heating of the sulphide concentrates in air to temperatures of about 600-700°C to oxidize partially the iron sulphides to iron oxides and sulphur dioxide gas. The solid products of the roaster together with a flux (silica) are then melted in a furnace (smelting) to separate and remove the oxide components as slag and the enriched copper-iron sulphides as matte. The liquid matte is transferred to a converter where the remaining iron and sulphur are removed by air blown through the matte (converting). The iron is oxidized, then slagged with the addition of silica; the sulphur forms sulphur dioxide gas.

The resulting product is "blister" copper of more than 98% purity. The impurities are present in the concentrate and remain in the copper during processing. Some of these impurities (eg, zinc, tin, iron and sulphur) may be removed by a fire-refining step, in which air is blown into the molten copper to oxidize selectively the impurities to form a slag or oxide gas. The slag is then skimmed off and the copper is covered with charcoal to prevent further oxidation. At this stage the copper contains approximately 1% oxygen. Traditionally, most of this oxygen was removed by inserting and agitating a freshly cut tree trunk below the copper surface (poling). Today, natural gas is usually used to reduce the oxygen content to about 0.13%. This grade of copper, referred to as "tough pitch" copper, is sold to manufacturers. Sometimes precious metals are present in the copper in very small amounts. These cannot be removed by fire refining and the copper must undergo an additional refining process, electrolytic refining.

In electrolytic refining, fire-refined copper is cast in the form of a large block, which acts as an anode. The block is placed into a copper sulphate solution (an electrolyte, ie, solution in which electrical current is carried by ions) together with a thin sheet of high-purity copper, which serves as the cathode. Direct current is passed through the anode, electrolyte and cathode, resulting in the transfer of copper from the anode to the electrolyte as copper ions and the migration of these ions to the cathode surface, where pure copper is deposited. The precious metals do not dissolve but drop to the bottom of the refining cell. They are referred to as anode

slime. The slimes are collected periodically for the recovery of gold, silver and PLATINUM group metals. The refined cathode copper is melted and cast into shapes for industrial use. There are 3 copper refineries in Canada: at Montréal (NORANDA MINES LTD), one of the largest in the world; Copper Cliff, Ont (International Nickel Company of Canada); and Timmins, Ont (Kidd Creek Mines Ltd).

In the late 1940s, INCO developed a new technology, "flash smelting," to smelt copper concentrates at Copper Cliff. By using pure oxygen, INCO technicians were able spontaneously to ignite the sulphide concentrates, thus combining the roasting and smelting steps. This process requires no fuel for smelting and also permits the efficient collection of sulphur dioxide gas for liquefaction. INCO was the first company to use pure oxygen in metal extraction and to produce liquid sulphur dioxide from sulphide concentrates.

In the late 1960s, Noranda developed a continuous copper-making process using a single furnace (the Noranda Reactor). This reactor is a horizontal cylinder in which roasting, smelting and converting operations are combined. The concentrates and flux are fed in at one end and the surface of the bath is kept turbulent by oxygen-enriched air (23.5% O_2) blown through tuyeres (nozzles) located at the side of the reactor. The matte or copper produced is tapped from one side and the slag from the end of the vessel. The slag contains substantial amounts of copper and is treated by a mineral-processing operation in which it is crushed as it cools slowly. The copper-containing components are floated to produce a 40% copper slag concentrate for recycling to the reactor. This process has been in operation at Noranda, Qué, since 1973.

Nickel In Canada, 2 main methods are used to produce nickel: one is a leaching process; the other is based on roasting, smelting and converting processes similar to those used in copper production. In the leaching process, developed by Sherritt Gordon Ltd and used at Fort Saskatchewan, Alta, the sulphide concentrate is mixed with ammonia leaching solution and oxygen (compressed air at 689-758 kPa) and heated to 80°C. The nickel, copper and COBALT present in the concentrate form soluble ammonia complexes. The solution containing the dissolved metals is separated from the residue. The copper is precipitated out from the solution as copper sulphide by increasing the acidity of the solution and by use of hydrogen sulphide. Metallic nickel is then produced in powdered form by reducing the solution with hydrogen gas at 3445 kPa and 200°C. The nickel-free solution is then treated with hydrogen sulphide to recover cobalt as cobalt sulphide. Finally, the metal-free solution is evaporated to form ammonium sulphate, which is sold as fertilizer.

Three variations of the roasting, smelting and converting route are practised in Canadian plants. At INCO's operation in Thompson, Man, the nickel sulphide concentrate is roasted, smelted and converted to remove iron and part of the sulphur (as in the copper process). The product, nickel sulphide (Ni_3S_2), is cast into anodes and dissolved electrolytically, using a sulphate chloride electrolyte, to produce pure cathode nickel. The anode residues are treated for the recovery of elemental sulphur and precious metals. This is a unique process patented by INCO.

Since the nickel concentrate produced at INCO's Sudbury plant also contains some copper, the product after roasting, smelting and converting contains both nickel sulphide (Ni_3S_2) and copper sulphide (Cu_2S). By slowly cooling a molten mixture of these 2 sulphides in an insulated mold over a period of 3 days, it is possible to produce large crystals of nickel sulphides, copper sulphides and a small amount of copper-nickel alloy containing most of the platinum metals. The nickel sulphide is separated from this mixture by grinding and flotation. The metallic alloy fraction is removed magnetically and treated for recovery of nickel and precious metals.

The remaining nickel sulphide is then oxidized to form nickel oxide by a roasting operation at approximately 1050°C. The nickel oxide is then reduced either with coke (a dense substance distilled from coal) in a reverberatory-type furnace or with hydrogen in a fluid-bed roasting furnace to produce metallic nickel. The nickel is further refined electrolytically at a plant at Port Colborne, Ont. An alternative high-pressure carbonyl process has been developed by INCO and has been in operation since 1973 at their Sudbury plant. In this process, carbon monoxide gas is passed over nickel at a pressure of 6895 kPa and a temperature of 170°C. A nickel carbonyl gas is formed which is purified by distillation. The purified nickel carbonyl is then decomposed at 200°C to form high-purity nickel pellets or powder and carbon monoxide gas which is recycled.

Falconbridge Nickel Mines at Falconbridge, Ont, process their nickel-copper sulphide concentrates by roasting, smelting and converting steps. The product from the converting operation, a copper-nickel sulphide matte, is shipped to Norway for recovery of metal. The sulphur dioxide gas from the roasters is used to produce sulphuric acid.

A number of nonferrous metals are produced from oxide minerals. Two examples are given.

Magnesium is produced in Canada by Chromasco near Renfrew, Ont. The process, invented and developed in Canada during WWII by L.M. PIDGEON, is referred to as the Pidgeon Process. Calcined dolomite (MgO.CaO) is mixed with ferrosilicon and then placed in a tubular stainless steel retort which is evacuated to approximately 0.003 kPa. One end of the retort is heated to about 1180°C; the other is cooled. The magnesium vapour that forms condenses in the water-cooled end as a dense, coherent deposit. The magnesium crystals so formed are removed, melted and cast into ingots.

Uranium In Canada URANIUM is extracted from various minerals such as pitchblende, uraninite and brannerite. The ore containing these minerals is crushed, ground and treated with sulphuric acid, under either atmospheric or high pressure conditions, to dissolve the uranium. The solution containing the uranium is separated from the solid residue and purified by ion exchange or solvent extraction techniques. The uranium is then precipitated out from the solution as an ammonium or magnesium diuranate. This material is filtered, dried and shipped to the refinery in Blind River, Ont, where it undergoes further purification to produce nuclear-grade compounds such as uranium oxide (UO_2) and uranium fluoride (UF_6).

Environmental Considerations

Canadian metallurgical plants are generally located in sparsely inhabited areas near the mines. As a result, ecological problems were not given much consideration until recently. In general there were no facilities to capture or fix the sulphur dioxide gases; all gases were vented through stacks to the atmosphere. However, with the greatly increased knowledge of the influence of poisonous gases on the environment and in the face of increasing public apprehension, the control of pollutants from metallurgical plants is of utmost concern to modern industry (*see* AIR POLLUTION). The principal pollutants from nonferrous operations in Canada are particulate materials and the sulphur dioxide gas which is responsible for ACID RAIN. The control of solid particulate matter has been brought about by elaborate gas-cleaning equipment such as venturi scrubbers, cyclones, filter bags and electrostatic precipitators. The control of smelter gases is much more difficult. Approximately 98% of the sulphur which enters the plant in the form of sulphides leaves as sulphur dioxide gas. This emission, through the formation of acids and other compounds in the atmosphere, can cause serious damage to human health, vegetation and property. In order to protect the environment it is necessary to capture the sulphur dioxide and convert it to a marketable product or to an inert solid waste which can be safely stored. The most common conversion treatment is to produce sulphuric acid. However, depending on the economics and concentration of the sulphur dioxide gas, other products include elemental sulphur, liquid sulphur dioxide, ammonium sulphate and gypsum. In Canada sulphuric acid and liquid sulphur dioxide are produced by nonferrous smelters. *See* IRON AND STEEL INDUSTRY; MINERAL RESOURCES.

J.M. TOGURI

Reading: J. Neely, *Practical Metallurgy and Materials of Industry* (1979); A. Street and W. Alexander, *Metals in the Service of Man* (1979).

Metcalf, John, author (b at Carlisle, Eng 1938). Metcalf received a BA from U of Bristol and lived in Eng until 1961 when he immigrated to Canada. He has published 3 collections of short stories, *New Canadian Writing* (1969), *The Lady Who Sold Furniture* (1970) and *The Teeth of My Father* (1975); 2 novellas, *Girl in Gingham* (1978); 2 novels, *Going Down Slow* (1972) and *General Ludd* (1980). He has also edited numerous anthologies of short stories and has written one book of literary criticism, *Kicking Against the Pricks* (1982). A witty satirist, Metcalf is a master of the short story and relentless in his jibes against the Canadian literary establishment. SHARON DRACHE

Metcalfe, Charles Theophilus Metcalfe, Baron, governor general of British N America 1843-45 (b at Calcutta, India 30 Jan 1785; d at Malshanger, Hampshire, Eng 5 Sept 1846). He was educated at Eton and in 1801 joined the Indian Civil Service, where he earned a reputation as a talented and judicious administrator. He succeeded to his father's baronetcy in 1822, and later was appointed provisional governor general of India. Between 1838 and 1842 he served as governor of Jamaica.

Metcalfe arrived in Canada early in 1843 to replace Sir Charles BAGOT, with instructions to make no concessions towards RESPONSIBLE GOVERNMENT, the principle on which was founded Bagot's existing Reform ministry headed by Louis-Hippolyte LAFONTAINE. In Nov 1843 he provoked his ministers' resignation by making appointments without their advice. For some 9 months he carried on the government with the aid of a single minister, Dominick Daly. In Aug 1844 he formed a Conservative administration headed by William Henry DRAPER, and was sustained at the polls by a small majority in Nov 1844.

Afflicted with cancer of the face, Metcalfe laboured under the most difficult personal circumstances, yet he devoted long office hours to official business. He moved the capital to Montréal, negotiated pardons for the rebels of 1837-38 who had been deported to Australia, consolidated Lord SYDENHAM's work in the civil service and gave generous financial support to many cultural and philanthropic causes. In Nov 1845 the progress of his disease giving him no other choice, he resigned his office and left for England. As a reward for his service, he had been created Baron Metcalfe of Fern Hill early in 1845, but his titles became extinct when he died.

JACQUES MONET, SJ

Meteor, Meteorite, Impact Crater The solar system contains many small objects travelling in individual orbits about the SUN. When such a particle collides with Earth, interaction with the

upper atmosphere produces a flash of light called a meteor, which typically endures for less than one second near heights of 90 km. Large particles produce spectacular meteors and, in rare cases, part of the object survives to reach Earth's surface and is then called a meteorite. Huge meteorites are not slowed much by the atmosphere and their violent collisions with Earth blast out "impact" or "meteorite" craters.

The vast majority of meteors are fragments of COMETS. When a comet is heated during passage near the sun, particles separate from the nucleus and the more stony material withstands the effect of solar heating and continues in its own orbit, which resembles the comet's orbit. Over thousands of years, the particles disperse around the entire orbit and into a stream of appreciable width. When Earth crosses such a stream, a meteor shower can be seen, and one observer can typically see 5-50 meteors per hour, all meeting Earth from the same direction and with constant velocity. A shower may last only hours or many days and is likely to occur every year. With time, streams disperse so that the meteors blend into a general background of sporadic meteors. Meteors enter the atmosphere at speeds of 11-72 km per second.

RADAR and spectroscopic meteor observations have been Canadian research specialties. A radar beam reflects from the column of electrified gas produced by a meteor's passage; the method is sensitive for very small particles. A meteor's spectrum can be recorded photographically or by television techniques, and spectrum analysis (ie, SPECTROSCOPY) reveals which atoms are abundant in the particle and hence, indirectly, something of the chemical composition of comets.

Except for lunar samples, meteorites provide our only chance to study material from space by laboratory techniques. Most meteorites are "stones," with a thin, black fusion crust; about 5% are "irons," composed of a nickel-iron alloy; a smaller number are "stony-irons." Analysis of meteorites yields vital clues about the early history of the solar system because some have had relatively simple chemical and thermal histories. It is not clear whether any large chunks of cometary material are strong enough to survive impact with Earth's atmosphere. Most, possibly all, meteorites appear to be derived from asteroids by mutual collisions. Their orbits appear to have been modified by Jupiter's gravitational field in tens of millions of years to permit collision with Earth. About 3000 different meteorites are known, of which nearly 50 have been found in Canada. Observations with a network of cameras in western Canada indicate that a meteorite of at least 100 g falls somewhere in Canada daily, but very few are ever recovered.

Canadian Meteorite Craters

Name	*Latitude*	*Longitude*	*Diameter (km)*
Nouveau Québec, Qué	61°17′	73°40′	3
Brent, Ont	46°05′	78°29′	4
Manicouagan, Qué	51°23′	68°42′	75
Clearwater LkWest, Qué	56°13′	74°30′	37
Clearwater Lk East, Qué	56°05′	74°07′	25
Holleford, Ont	44°28′	76°38′	3
Deep Bay, Sask	56°24′	102°59′	11
Carswell, Sask	58°27′	109°30′	38
Lac Couture, Qué	60°08′	75°18′	13
West Hawk Lk, Man	49°46′	95°11′	4
Pilot, NWT	60°17′	111°01′	8
Nicholson Lk, NWT	62°40′	102°41′	14
Steen R, Alta	59°30′	117°38′	24
Sudbury, Ont	46°36′	81°11′	95
Charlevoix, Qué	47°32′	70°18′	52
Mistasin Lk, Lab	55°53′	63°18′	28
Lk St Martin, Man	51°47′	98°33′	42
Wanapitei Lk, Ont	46°44′	80°44′	11
Gow Lk, Sask	56°27′	104°29′	5
Lac La Moinerie, Qué	57°26′	66°36′	11
Haughton Dome, NWT	75°22′	89°40′	28
Slate Is, Ont	48°40′	87°00′	26
Ile Rouleau, Qué	50°41′	73°53′	4

Impact craters are formed by the expanding shock wave when a giant meteorite, weighing hundreds to millions of tonnes, strikes the ground at high velocity. The MOON and several other planets and satellites retain impact craters for very long periods, but on Earth EROSION usually removes the surface evidence in a few million years. Subsurface ROCK, however, is permanently damaged by the shock wave and can be used to identify very ancient craters. A major program to study impact craters was begun during the 1950s by C.S. BEALS, the Dominion Astronomer. Two dozen features in Canada, ranging from 3 to 95 km in diameter, have been confirmed as impact craters in this pioneer study, of which the Nouveau Québec Crater is the most recent. IAN HALLIDAY

Reading: D.W. Sears, *The Nature and Origin of Meteorites* (1978).

Meteorology is the SCIENCE that studies the atmosphere and atmospheric phenomena, using data about temperature, humidity, CLOUD, WIND, etc. Its ultimate aim is to explain the structure and functioning of the atmosphere using the basic laws of PHYSICS. The major theoretical divisions are physical and dynamic meteorology (very closely related and often coupled under the title atmospheric physics) and synoptic meteorology. CLIMATOLOGY is the branch of meteorology most concerned with WEATHER, CLIMATE and CLIMATE CHANGE.

Physical Meteorology

Physical meteorology links meteorology and physics in studies of 3 core topics: electromagnetic radiation, meteorological thermodynamics and cloud physics. Related topics include stratospheric physics, atmospheric electricity, optics and ACOUSTICS.

Radiation Solar radiation is received by Earth mostly as visible and near-infrared light. About 30-35% is lost to space by reflection from clouds and the Earth's surface. Most, however, is absorbed by the Earth's surface and re-emitted as infrared radiation, which is absorbed by water, carbon dioxide (CO_2) and pollutants in the air. In the long term, the solar radiation received by Earth and its atmosphere at any point is balanced by infrared radiation emitted to space. Temporary imbalances, eg, the summer surplus and winter deficit in incoming solar radiation in Canada, result in large seasonal temperature changes, except where moderated by oceans. Radiative exchange processes are of central importance in computer models for long-range WEATHER FORECASTS and climate change. Radiation is used extensively in REMOTE SENSING of weather elements from satellites, aircraft and surface instruments.

Meteorological Thermodynamics assumes that air is a mixture of dry air and water vapour, each characterized by temperature, pressure and density, interrelated in an equation of state. Temperature variations cause pressure changes that drive the winds. Local cooling causes condensation and the release of latent heat. Complex interactions among the state variables, clouds, winds and radiation are studied with the aid of the laws of thermodynamics and computer simulation.

Cloud Physics is the study of cloud and precipitation particles and the physical processes that take place in natural and artificial clouds. Water vapour condenses on tiny hygroscopic particles called condensation nuclei to form cloud and FOG droplets. At temperatures far below freezing, water vapour condenses on soil particles and other freezing nuclei to form ice crystal clouds. In favourable circumstances, droplets and crystals grow into raindrops and snowflakes, or even hailstones, by collision and coalescence and by transfer of water vapour from droplets to crystals in a mixed cloud (*see* ICE). Scientific experiments on modification of clouds, fog and precipitation for purposes of rainfall enhancement, HAIL suppression, visibility improvement and forest-fire suppression have been conducted in Canada with mixed results since about 1950 (*see* RAINMAKING).

The stratosphere (upper atmosphere) imposes thermodynamic constraints on air motions in the weather layer (troposphere) below, and acts as a reservoir for gases and fine particles that influence radiation streams. LIGHTNING, ionization and the air-earth current are elements of atmospheric electricity. Electrical processes are thought to be important in the physics of clouds and precipitation. Atmospheric optics and acoustics embrace studies of transmission, reflection, refraction and diffraction of light or sound. The results are applied to such phenomena as RAINBOWS, mirages, scintillation, wind sounds and echoes, and to the use of light and sound in remote sensing as in laser or acoustic RADAR, cloud photography and the sonic anemometer-thermometer. K.D. HAGE

Dynamic Meteorology

Dynamic meteorology is the science of atmospheric motions. Because the Earth's atmosphere is a complex physical system subjected to a number of external influences, such as heating and cooling by the LAND and OCEAN masses, a wealth of phenomena involving air motion are observed. The largest is the belt of westerlies, ie, winds blowing from W to E, circling the Earth in the middle latitudes. These westerlies are normally disturbed and forced to wander northward and southward in a snakelike fashion. The core of this meandering current, the jet stream, normally located 10-12 km above sea level, can have winds of over 300 km/h. The wavy structure of the jet stream is caused by the deflecting effect of large mountains such as the Rockies, by heating or cooling by the underlying surface and by travelling vortices measuring as much as a few thousand kilometres in diameter. These vortices can be viewed as clockwise or counterclockwise circulations superimposed on the main westerlies and causing the latter to be deflected around them. Some of the larger vortices can remain nearly stationary for periods of several days; smaller, weaker vortices are swept downstream by the jet current. There is, therefore, an intricate interplay between the jet stream and the vortices, each affecting the other in ways that depend on their relative strengths and configurations.

Near the Earth's surface the circulation is dominated by the vortices because the jet stream becomes feeble at low altitudes. These are the systems seen on sea-level weather maps on which are drawn isobars — lines connecting points of identical pressure. In the Northern Hemisphere, clockwise vortices have a high central pressure (anticyclones), while counterclockwise vortices have a low central pressure (cyclones); in the Southern Hemisphere the opposite circulations around "highs" and "lows" are observed. Lows are normally associated with areas of cloud and, often, precipitation; highs are usually accompanied by clear skies. Far less frequent but much more violent is the hurricane, or typhoon, one of the most intense and feared storms. Ranging in size from about 100-1000 km, they are normally found only in the tropics and subtropics. On a still smaller scale is the THUNDERSTORM, with a typical dimension of 5-10 km, and the destructive TORNADO, typically having a diameter of a few hundred metres and winds estimated at up to 500 km/h.

Dynamic meteorology uses the laws of hydrodynamics and thermodynamics to investigate various types of atmospheric circulations. The former describe how various forces, eg, gravity acting on a parcel of air, will affect its velocity;

the latter provide information on the temperature change that results when a certain amount of heat is added or extracted from the air. The procedure may be most easily visualized if the atmosphere is subdivided into a large number of imaginary volumes (cubes or similar shapes). If all forces acting on the volume and the velocity of the air are known, it is possible to compute the displacement of the air over a period of time. Similarly, if at a given instant the temperature inside a given volume is known and the amount of heat entering or leaving it can be determined, it is possible to compute what the temperature inside the volume will be some short time later. This is fundamentally the method used to produce weather forecasts by electronic computers. Calculations are most accurate when volumes are small; hence, forecasts for large regions, such as a continent or hemisphere, are feasible only on powerful computers. JACQUES DEROME

Synoptic Meteorology

Synoptic meteorology is the analysis of meteorological data, obtained more or less simultaneously from a large geographical area, in order to present a comprehensive and nearly instantaneous picture of the state of the atmosphere. Frequently, data will be obtained over an extended period so that the development of meteorological systems may also be studied. Synoptic meteorology is very closely related to physical and dynamic meteorology and to general climatology, and may be considered a synthesis of these disciplines. Phenomena of interest to the synoptic meteorologist occur on many spatial and temporal scales. Major hemispheric circulation patterns (including jet streams) in the middle and upper troposphere (lower atmosphere) typically span 10 000 kilometres or more and may persist for weeks or months. These major circulation patterns tend to control and interact with smaller-scale phenomena, eg, cyclones and anticyclones.

Cyclones are vortices having a relatively low central pressure. At the Earth's surface, the air tends to spiral inward toward the centre of the cyclone where it is forced to rise. Since the rising air will be cooled by adiabatic expansion (ie, expansion that occurs without the addition of heat) at a rate of about 1°C per 100 m, some of the water vapour will condense to form cloud droplets. If there is sufficient moisture and if the air ascends high enough, precipitation will occur. Anticyclones have a relatively high central pressure. Near the Earth's surface, the air generally spirals outward from the centre. Near the centre of an anticyclone, the air is generally subsiding; consequently, clouds tend to dissipate and fair weather is frequently observed.

Cyclones and anticyclones occur in middle latitudes and are one of the principal means by which heat and moisture are redistributed throughout the atmosphere. Solar heating in equatorial regions and cooling in polar regions will create strong horizontal thermal gradients. These gradients represent sources of potential energy which, under suitable conditions, may become available for conversion into kinetic energy. It is now generally accepted that cyclones form in order to accomplish this energy conversion. During the period of development (cyclogenesis), a cyclonic wind field will be initiated (increase in cyclonic kinetic energy). This will occur at the expense of the thermal gradient (decrease in potential energy). At the same time, the kinetic energy is also being destroyed by friction and other dissipative processes in the atmosphere.

Synoptic meteorology is used in weather forecasting to follow the development and evolution of cyclones and anticyclones, as well as a myriad of associated structures such as air masses and fronts (boundaries between dissimilar air masses). In this task the meteorologist is assisted by mathematical models of the atmosphere which are run on digital computers. This interaction between the synoptic meteorologist and computers is the essence of modern weather prediction. M.E. TRUEMAN

Reading: L.J. Batten, *Fundamentals of Meteorology* (1979); H.J. Spiegel and A. Gruber, *From Weather Vanes to Satellites* (1983).

Methodism, originally a movement within the Church of England in Britain, led by John Wesley (1703-91), who encouraged personal holiness and a disciplined (hence "methodical") Christian life. It was distinctive in its Arminianism, the belief that individuals are free to accept or reject God's grace, and that it is possible to attain "perfection" (the overcoming of a will to sin) in this life. The movement was first represented in what is now Canada by one of Wesley's followers, Laurence Coughlan, who began to preach in Newfoundland in 1765. Yorkshire settlers around Chignecto, NS, in the 1770s were the first sizable group of Methodists in the Maritimes. William BLACK, of the next generation, became the greatest Methodist preacher and organizer in the Atlantic colonies. Following the arrival of LOYALIST Methodists after the American Revolution he worked with the American Methodist Episcopal Church, but before long he began to recruit preachers from England and in 1800 Methodists in the Maritimes joined the English Wesleyan Conference. Subsequent immigration strengthened ties with England, making Maritime Methodism dependent on English policies, deferential to dominant Anglican elites, and conservative. Not until 1855 did Maritime Methodists gain partial autonomy, in the new Conference of Eastern British America.

Methodism exercised its strongest influence in Upper Canada. Methodists were among the Loyalist founders and many more among "late loyalists" who flocked into UC before the WAR OF 1812. With them came Methodist Episcopal "saddle bag preachers" whose zeal and adaptability made them highly effective in frontier conditions. After the war, UC Methodists laboured increasingly under suspicion of being "pro-American" and in 1828 they sought a remedy by severing their American connections. In 1833 they negotiated a union with the more conservative English Methodists who had first entered the colony in 1817. The resulting Wesleyan Methodist Church fell apart in 1840 but was renewed in 1847. Methodists who rejected the union formed a continuing Methodist Episcopal Church in 1834 and attempted to maintain close ties with their American counterparts. Continued English immigration brought more evangelical groups to UC: Primitive Methodists (1829), Bible Christian Church (1831) and New Connexion Methodists (1837).

Under Egerton RYERSON, founding editor of the *Christian Guardian,* Methodists became involved in UC politics as a result of their determination to deny the C of E's claim to be the colony's established church (*see* ANGLICANISM). Support for religious and civil equality did not lead to political radicalism and Ryerson's early sympathy for William Lyon Mackenzie and the Reform Party soon waned. In both the REBELLIONS OF 1837 and the 1844 election, when loyalty was an issue, Ryerson and most Methodists followed a moderate path. Its concern for community life made the Methodist Church the most "Canadian" of denominations and encouraged Methodists to view their church as a nation-building force. Inspired partly by the forces leading to CONFEDERATION, the Wesleyan Methodist Church, the Conference of Eastern British America, and the New Connexion Church united in 1874, and in 1884 the Methodist Episcopal Church and the smaller Methodist bodies were added to form the Methodist Church. The Free Methodists, who entered from the US in 1876, were few and have remained separate. The new Methodist Church was governed by a national quadrennial conference and annual area conferences, with the participation of laymen (but not women) at all levels. It continued earlier missions among Canadian Indians in several regions and conducted substantial overseas work in Japan (1873) and West China (1892).

Methodist commitment to education was expressed in Upper Canada Academy (1836), Cobourg, UC (Victoria College after 1841); MOUNT ALLISON Academy (1843), Sackville, NB, (a university after 1858); and Wesley College (1877), Winnipeg, which joined with the Presbyterian Manitoba College to form United College (1938). Secondary schools included Belleville Seminary (1857), later Albert College (1866); Stanstead Wesleyan College, Qué (1873); Alma College, St Thomas, Ont (1877); and Mount Royal College, Calgary (1910).

With the settlement of western Canada the Methodist Church endeavoured to hold the allegiance of Canadians migrating westward and of British settlers, and to promote the assimilation to Protestant Canadian culture of the thousands of non-Anglo-Saxons who poured into the West before WWI. This endeavour was closely associated with the SOCIAL GOSPEL. Many Methodists saw increased state intervention in economic and social life as essential in establishing the Kingdom of God on Earth. The Methodist Church and most members were vociferously patriotic during WWI, a struggle they believed would purge the nation and prepare the way for a new social order. At the end of the war several church bodies adopted Christian socialist platforms, but subsequent rejection of such policies testified to the church's dominant conservatism. When the Methodists entered the new UNITED CHURCH OF CANADA in 1925, they carried both radical and conservative traditions with them. At that time the church had 2061 ministers, 418 352 members, and many adherents. MARGARET E. PRANG

Reading: M. Bliss, "The Methodist Church and World War I," *Canadian Historical Review* XLIX, 3 (1968); G. S. French, *Parsons and Politics* (1962); J.W. Grant, "Canada," in N.B. Harmon, ed, *Encyclopedia of World Methodism* (1974).

Interior of the gallery of the Methodist Meeting House in Hay Bay, Ont, built in 1792 (*photo © 1984 Hartill Art Associates*).



Methye Portage, *see* PORTAGE LA LOCHE.

Métis, one of several historically variable terms (*michif, bois brûlé, chicot,* halfbreed, country-born, mixed blood) used in Canada and some parts of the northern US to describe people of mixed N American Indian-European descent.

It is important to define specific meanings for the term as used in this discussion, while cautioning that writers, past and present, have not achieved consensus on the matter. Written with a small m, *métis* is an old French word meaning "mixed," and it is used here in a general sense for people of dual Indian-white ancestry. Capitalized, *Métis* is not a generic term for all persons of this biracial descent but refers to a distinctive so-



Métis traders, *c*1872-75 (*courtesy Public Archives of Canada /PA-4164*).

ciocultural heritage, a means of ethnic self-identification, and sometimes a political and legal category, more or less narrowly defined. (Alberta's Métis Betterment Act of 1938, eg, defined Métis as persons "of mixed white and INDIAN blood having not less than one-quarter Indian blood," not including those people already defined under Canada's INDIAN ACT as treaty or nontreaty Indians.) This complexity arises from the fact that biological race mixture (Fr, *métissage*) by itself does not determine a person's social, ethnic or political identity. Many N American whites have some Indian ancestry, and rates of European genetic admixture among status-Indian groups in eastern and central Canada range in some instances from 20 to over 40%. Biologically, métissage has gone on since earliest European contact, but over time and in different areas people of that ancestry have grown up and lived out their lives in a vast variety of circumstances, leading them and their descendants to be categorized and to classify themselves by many different criteria.

On Canada's Atlantic seaboard, Métis families and communities were identifiable in the 1600s, although not classified according to race. Early and often casual unions between European fishermen and native women from Acadia to Labrador produced uncounted progeny who matured as Indians among their maternal relatives. Those among the MALISEET were known as "Malouidit" because so many of their fathers came from St Malo on the Brittany coast of France. In Acadia, many French took Indian wives, and some communities became largely Métis. The *capitaines des sauvages* who served the French governors as interpreters, intermediaries and distributors of annual presents to the Indians were commonly of mixed parentage.

Some such offspring were born of formal church marriages, as Acadian families such as the Denys and d'Entremonts forged both kinship and trading ties with the MICMAC. During the 17th century French officials supported such marriages in hopes of better converting the Indians and building up the population of NEW FRANCE. "Our young men will marry your daughters and we shall be one people," Samuel de CHAMPLAIN reportedly told his Indian allies; and subsequent administrators continued to encourage those mixed unions which were church sanctified.

Problems arose, however. Both the Indians and the French traders who sojourned among them had a distressing tolerance for unions unblessed by Christian rite, and many Frenchmen took up "savage" ways themselves. As New France began its second century, policy shifted against intermarriage — reflecting, too, the increased availability of white wives within the colony, both FILLES DU ROI and native-born. The ideal of "one people" (French, incorporating Indian and Métis) faded. Countless families, both French and Indian, had become genetically mixed, but Indian communities, as such, were not assimilated. Nor did biological *métissage* in eastern Canada yield a biracial population that persisted as socio-culturally or politically distinct. Indeed, despite their numbers, people of mixed descent are difficult to identify in early records of New France; they either remained among their mothers' kin as Indians or were baptized with French names, and in almost all instances went on record solely as French.

The official discouraging of mixed unions in New France was probably one among many factors that fostered the growth of the first distinguishably Métis communities, around and beyond the Great Lakes from the 1690s on. Many men who evidently preferred the freedom and opportunities of life in the Indian country to the regulation of church and state in the home colony found livelihoods at the trading and military posts that were carrying French influence into the interior of the continent. Their native families, whom they might or might not legitimize in the missionaries' terms, had formed nuclei of settlement at several dozen localities by the time the British conquered Canada in 1763. Numerous American and Canadian towns and cities (eg, Detroit and Michilimackinac in Michigan; Sault Ste Marie in Ontario; Chicago and Peoria in Illinois; Milwaukee, Green Bay and Prairie du Chien in Wisconsin) had their origins in these informal biracial communities. The sizes of these populations are sporadically reported. As of 1700, the Jesuit missionary Etienne de Carheil was deploring the lewdness and apostasy of the hundred or more VOYAGEURS and COUREURS DE BOIS residing with native women around Michilimackinac.

Carheil and other outsider-critics to the contrary, these communities achieved a moral and social order of their own. French Catholicism remained a part of their heritage, even if attenuated by isolation. Indian constraints also set moral limits. Unions with Indian women involved commitments to and reciprocities with Indian kin and neighbours, and earned their own descriptive term, marriage *à la façon du pays*, "according to the custom of the country." Fathers often lived out their lives with these families, whether formally employed at the forts or subsisting as *gens libres*, freemen who supplied the posts or served intermittently as guides, interpreters or voyageurs. Game, fish, wild rice and maple sugar furnished sustenance, supplemented by the small-scale slash-and-burn or "burnt-stump" agriculture that may have caused Great Lakes Métis to be labelled *bois brûlés* or *chicots*.

While these communities were growing during the 1700s, a biracial population of a rather different character was becoming noticeable to the north of the Great Lakes watershed. RUPERT'S LAND, the region draining into Hudson Bay, was granted by Charles II of England in 1670 for the exclusive trade of the HUDSON'S BAY COMPANY. After the Treaty of Utrecht in 1713 granted Hudson Bay to the British, HBC posts there became permanent residential enclaves among the predominantly CREE Indians, who, as "Homeguard" traders and provisioners, were basic to the company's survival and success. As around the Great Lakes, white women were absent; and Indians eager to consolidate trade and friendship offered wives to the Europeans in "the custom of the country." HBC employees, however, violated strict company rules if they accepted. The HBC directors in London, strongly aware of the costs and problems of maintaining posts so remote from their home base in so northerly an environment, sought rigid controls on the numbers of post dependants. Needs to maintain security at the forts and to minimize expenses and sources of friction with the Indians reinforced company concerns to maintain servants' celibacy and chastity and, in turn, the employees' efforts to keep transgressions off the record. By the 1740s, however, when officer James Isham reported that traders' native offspring around the posts had become "pretty Numerious," the HBC London Committee had to acknowledge the limits of its control. By 1810 the company had given some attention to both the responsibilities and the rewards of educating and training these progeny into "a colony of very useful hands."

These early Hudson's Bay offspring did not become classed as a separate ethnic/racial entity in these years. Even if the company could not suppress country marriages, it could and did suppress the growth of dependent post communities and free traders by removing from the bay all British servants who retired or were dismissed and by encouraging Indians to disperse to their hunting grounds each winter. A very few HBC officers' native sons gained permission to travel to Britain; most offspring were assimilated among the Cree Homeguard, and a few became company servants, sometimes classed by 1800 as "Natives of Hudson's Bay" or even as "English."

The HBC data to 1810 show that biological mixing in itself was insufficient to occasion Métis "ethnogenesis" — the rise to recognition and self-consciousness of a new racial-political-cultural group. These HBC offspring lacked the distinct community and economic base upon which to build a separate identity. Through much of the 18th century, company rules gave their trader-fathers good reason to be circumspect about their existence. HBC word usage also muted their distinctiveness. It was in New France, and in British Canada after 1763, that Métis, *bois-brûlé*, and later, halfbreed, came into use; HBC men lacked such terms until they picked them up from the Canadians in the early 1800s. If language is any guide to thought, perhaps HBC writers also lacked (although they later learned) the increasingly judgemental racial/blood consciousness shown by some of their Canadian FUR-TRADE counterparts by the early 19th century.

Events of the late 1700s and early 1800s brought great changes for both British and Canadian fur-trade offspring. Around the Great

Lakes, Britain's 1763 conquest of New France may have heightened a Métis sense of separateness as the new regime intruded. The leadership of the Montréal fur trade became British, in fact mainly Highland Scottish, as the NORTH WEST COMPANY gained strength in the 1780s; francophones whose experience and skills continued to be basic to the trade were relegated to lower ranks. In 1794 JAY'S TREATY fixed the US-Canadian boundary around the Great Lakes. In following decades, US white settlers and governments displaced and disorganized numerous Métis communities around the lower lakes, leading many to migrate northwest towards Minnesota and Manitoba.

It was in Manitoba that the Métis became conspicuous in Canadian history. By 1810 they had established roles as buffalo hunters and provisioners to the NWC. As NWC supply lines lengthened to ATHABASCA and beyond, the Red R heartland was central to the Montréal traders. Accordingly, when in 1811 Thomas Douglas, fifth earl of SELKIRK, reached an agreement with the HBC to found the colony of ASSINIBOIA with a band of Scottish settlers, the NOR'WESTERS and their native-born employees and associates saw it as a direct threat to their trade, livelihood and territorial interests.

Events of the next decade are well known: the Pemmican War, the SEVEN OAKS killing of Gov Robert SEMPLE and several colonists in 1816, the often violent conflicts between the HBC and NWC, and the final merger in 1821. Less recognized is the fact that each company's RED RIVER COLONY involvement was intensified in part by the presence of its own native-born constituency. The growing numbers of "Hudson's Bay natives" were a factor in the HBC decision to support the colony. Servants with "country" wives and families lobbied for the founding of a community where they could retire and have lands, livelihoods, schools and other amenities. The HBC itself hoped to reduce costs by relocating dependent post populations in a place where they could become self-supporting under company governance.

The Nor'Westers and their Métis associates had a more complex relationship. The NWC claimed less control over its Métis and freemen, many of whose biracial connections long predated its arrival in the Northwest. In the conflict, this fact served the NWC well, for no matter what support it actually gave to Cuthbert GRANT, Jr, and his Métis cohorts, it could and did argue that these men were defending an identity and interest of their own. Nor'Wester William MCGILLIVRAY admitted in a letter of 14 Mar 1818 that Grant and the others were linked to the NWC by occupation and kinship. "Yet," he emphasized, "they one and all look upon themselves as members of an independent tribe of natives, entitled to a property in the soil, to a flag of their own, and to protection from the British government." Further, it was well proved "that the half-breeds under the denominations of bois-brûlés and metifs [alternate form of Métis] have formed a separate and distinct tribe of Indians for a considerable time back."

From 1821 to 1870 Red River's overwhelmingly mixed-descent population continued to reflect its dual origins: Montréal, the Great Lakes and Prairies, and the NWC; and Britain, the Orkney Is (a major HBC recruiting ground) and Rupert's Land. The extent to which these subgroups were allied is debated. Some argue for their solidarity on the basis of their numerous intermarriages, business ties, and shared involvements in the BUFFALO HUNT, the HBC transport brigades, and Louis RIEL's provisional government of 1869-70. A contrary view emphasizes the split between the Roman Catholic Francophones and the Protestant anglophone "country-born," as they were sometimes known. The debate reflects in part the complexity of the evidence and the fact that many individuals, such as members of the Alexander ROSS family, suffered personal ambivalence about their Indian heritage and about Métis political activism.

Whatever their internal ties and tensions, the rapidly growing population of "halfbreeds" in the Northwest was, by the 1830s, increasingly seen as a racial aggregate as racial interpretations of human behaviour gained ground. As such, they were often stereotyped and disparaged, as by HBC Gov George SIMPSON in his characterizations of the company's "halfbreed" clerks and postmasters from the mid-1820s to 1832. Simpson showed biases that were common among other Europeans (clergy, colonists) arriving in Red River and the fur-trade country and among numerous scientific and popular writers of the period; attributes of race or "blood" were linked with cultural and behavioural traits to produce deterministic judgements that science later proved untenable. Such views, applied to biracial groups, covered a wide range; such hybrids were everything from "faulty stock" or a "spurious breed" to "the natural link between civilization and barbarism," as Alexis de Tocqueville put it in the 1830s. Daniel Wilson, writing of the Red River halfbreeds in 1876, moved beyond such interpretations. Racial traits, he suggested, did not set limits to adaptiveness or potentials. Besides demonstrating "a remarkable aptitude for self-government" in their organization of the buffalo hunt, the Red River Métis showed "capacity for all the higher duties of a settled, industrious community."

Events from the mid-1800s onwards offered few outlets for the qualities that Wilson perceived. The 1840s and 1850s saw Métis challenges to the HBC trade and administrative monopoly in Red River: the trial and freeing of trader Pierre-Guillaume Sayer in 1849, and the anti-HBC lobbying efforts in London by Rupert's Lander Alexander Kennedy ISBISTER. Other events soon overshadowed the HBC question: the intensifying eastern interest in developing the West (heightened by Henry Y. HIND's glowing report of its agricultural potential), Confederation and the 1870 transfer of Rupert's Land to the Canadian government. The consequent efforts of government surveyors to map Red River without regard for local residents' holdings touched off Louis Riel's establishment of a provisional government and the RED RIVER REBELLION of 1869-70. The Canadian bargaining with Riel led to passage of the MANITOBA ACT, securing the admittance of a small portion of the present province to Canada with provincial status and, most important for the Métis, stating that 1 400 000 acres (566 580 ha) would be allotted for the children of the halfbreeds.

The promised land base was lost in the next decade, however. The settlers and troops who arrived in the new province from 1870 on were hostile to the Métis, many of whom were "beaten and outraged by a small but noisy section" of the newcomers, according to a report by the new governor, Adams Archibald. Métis landholders were harassed, while new laws and amendments to the Manitoba Act undermined Métis power to fend off speculators and new settlers. Of the approximately 10 000 persons of mixed descent in Manitoba in 1870, two-thirds or more are estimated to have departed in the next several years. While some went N and some S to the US, most headed W to the Catholic mission settlements around Ft Edmonton (Lac Ste Anne, St Albert, Lac la Biche) and to the S Saskatchewan R, where they founded or joined such settlements as St Laurent, Batoche and DUCK LAKE.

As they grew, several of the latter communities sought to secure clear land titles from the Canadian government. Lt Gov Alexander MORRIS thought in 1880 that the claimants' case was clear: "They will, of course, be recognized as possessors of the soil and confirmed by the Government in their holdings." He urged that Métis still depending on the buffalo hunt have land assigned to them as that resource failed. The government, however, ignored Métis concerns while at the same time negotiating the major Indian treaties and pre-empting land for RAILWAYS. In deep frustration, the Saskatchewan Métis took up arms under Louis Riel and Gabriel DUMONT in the NORTH-WEST REBELLION of 1885.

Métis defeat at BATOCHE and the execution of Riel set off a second dispersal, particularly to Alberta, and a renewed weakening of their political influence and cohesiveness. Sir John A. MACDONALD in 1885 viewed them as without distinct standing: "If they are Indians, they go with the tribe; if they are half-breeds they are whites." Where Métis individuals did receive land allowances (or money equivalents), they usually were granted them in paper scrip — transferable certificates which unscrupulous speculators often pressured them to sell cheaply on the spot (*see* INDIAN TREATIES). The "scrip hunters" who followed the Treaty No 8 Half-Breed Commission in 1900 as it made its awards to Métis in the Dene settlements bought up many $240 scrip certificates for cash amounts of $70 to $130.

From 1885 into the mid-1900s, poverty, demoralization and the opprobrium commonly attached to being "halfbreed" led many people of Indian descent to deny or suppress that part of their heritage if they could. In 1896 Father Albert LACOMBE, concerned for Métis interests, founded St Paul des Métis NE of Edmonton, on land furnished by the government. For financial and other reasons, the colony failed as a formal entity by 1908, and settlers from Québec began to dominate the area. Here, as elsewhere, the Métis who remained found themselves on the lower socioeconomic levels.

Some other developments after 1900 were more positive, however. In 1909 the Union nationale métisse St-Joseph de Manitoba, founded by former associates of Riel and others, began to retrieve from Métis documents and memories their own history of the events of 1869-70 and 1885, resulting in A.H. de Tremaudan's *History of the Métis Nation in Western Canada* (1929). The 1920s and 1930s saw the rise of new leaders — notably James Patrick (Jim) BRADY and Malcolm NORRIS — who, as prairie socialist activists, built a new political and organizational base to defend their people's interests. Many Métis and ex-treaty Indians had been squatters on crown lands in N-central Alberta. Threatened by a federal plan to place these lands under provincial jurisdiction, Joseph Dion and others organized petitions and delegations to the Alberta government to seek land title for the squatters. After Brady and Norris joined the movement in 1932, the first of several provincially based organizations was founded — the Métis Assn of Alberta, open to all persons of Indian ancestry. Its efforts led to the province's appointment of the Ewing Commission to "make enquiry into the condition of the Half-breed population of Alberta" in 1934-36. Despite reverses, the association eventually secured land for MÉTIS SETTLEMENTS and passage of the Métis Betterment Act in 1938. In the same year the Saskatchewan Métis Society (later the Assn of Metis and Non-Status Indians of Saskatchewan) was founded.

Since the mid-1960s Métis political activity has intensified with the founding of numerous other organizations, eg, the Manitoba Métis Federation, the Ontario Métis and Non-Status Indian Assn, and the Louis Riel Métis Assn of BC. Confronting such issues as the federal government's White Paper of 1969 and the Constitution of 1982, Métis have repeatedly faced questions about whether to pursue their concerns jointly with status or non-status Indians or through their own channels. From 1970 to 1983

the NATIVE COUNCIL OF CANADA represented Métis interests on the national level. For the 1983 First Ministers Conference, however, the 2 NCC seats were both allocated to nonstatus Indian delegates; and the Métis National Council was formed to secure distinct Métis representation there and elsewhere. JENNIFER S.H. BROWN

Reading: Alberta Federation of Métis Settlement Associations, *Métisism: A Canadian Identity* (1982); R.E. Bieder, "Scientific Attitudes towards Indian Mixed-bloods in Early Nineteenth Century America," *Journal of Ethnic Studies* 8, 2 (1980); Jennifer S.H. Brown, *Strangers in Blood: Fur Trade Company Families in Indian Country* (1980); M. Campbell, *Halfbreed* (1973); *Canadian Journal of Native Studies* 3, 1 (1983); M. Dobbin, *The One-and-a-half Men: The Story of Jim Brady and Malcolm Norris* (1981); J.W. Friesen and T. Lusty, *The Métis of Canada: An Annotated Bibliography* (1980); R. Fumoleau, *As Long as This Land Shall Last: A History of Treaty 8 and Treaty 11, 1870-1939* (1974); M. Giraud, *Le Métis canadien* (1945); J.H. Lagasse et al, *The People of Indian Ancestry in Manitoba,* 3 vols (1959); A.S. Lussier and D.B. Sealey, eds, *The Other Natives: The Métis* (1978); D.F.K. Madill, *Select Annotated Bibliography on Metis History and Claims* (1983); A. Morris, *The Treaties of Canada with the Indians* (1880); F. Pannekoek, "The Rev. Griffiths Owen Corbett and the Red River Civil War of 1869-70," *Canadian Historical Review* 57, 2 (1978); E. Pelletier, *A Social History of the Manitoba Métis* (rev ed, 1977); J. Peterson, "Prelude to Red River: A Social Portrait of the Great Lakes Métis," *Ethnohistory* 25, 1 (1978); J. Peterson and Jennifer S.H. Brown, eds, *New Peoples: Being and Becoming Métis in North America* (1984); D. Redbird, *We Are Métis: A Métis View of the Development of a Native Canadian People* (1980); J. Sawchuk, *The Métis of Manitoba: Reformulation of an Ethnic Identity* (1978); D.N. Sprague and R.P. Frye, *The Genealogy of the First Métis Nation: The Development and Dispersal of the Red River Settlement 1820-1900* (1983).

Métis Settlements Located across the northern part of Alberta, the Métis settlements of Paddle Prairie, Big Prairie, Gift Lake, East Prairie, Caslan, Kikino, Elizabeth and Fishing Lake form the only MÉTIS land base in Canada. They comprise 501 810.18 ha, much of it covered by forest, pasture and farmland. The present population is about 4000.

Métis settlers are the descendants of European fur traders and Indian women who emerged as a distinct group on the Prairies towards the early part of the 19th century. Following the NORTHWEST REBELLION of 1885, many Métis moved to the N and W. After a period of political agitation among landless Métis in Alberta during the Depression, the provincial government passed the Métis Betterment Act in 1938. Lands were set aside for Métis Settlement Associations, although 4 of the settlements (Touchwood, Marlboro, Cold Lake and Wolf Lake) were later rescinded by order of the Alberta government . A distinct Métis culture combining Indian and Euro-Canadian values and modes of expression is practised in the Métis settlements. For example, jigging, a favourite form of dance, mixes the reels of Scotland and France with the chicken dance of the Cree. A distinct Métis language combining Cree, French and English words is still spoken alongside English. Most of the residents in Métis settlements are Catholic, although they still retain Indian spiritual beliefs and customs. Education in most of the settlements is provided by the Northland School Division of the Alberta government. In recent years the settlements have emphasized the need to make their children's schools more responsive to the cultural values and history of the Métis.

Employment in the settlements is generated by commercial fishing, logging, farming, ranching and energy projects. During the past decade Métis settlers have emphasized the economic development of their land. They have established a plan for the development of a mixed economy that will combine traditional economic activities (farming, ranching, lumbering, hunting, fishing, trapping) and new industrial and commercial ventures. Among the new enterprises are a garment factory at Caslan and a buffalo ranch at Kikino.

The local government structure is a Settlement Association that holds the land and resources for its residents. Each association has a council of 5, elected by the membership. The council, along with the provincial government, has decision-making powers on matters affecting the settlements. In 1975 the Alberta Federation of Métis Settlement Associations was established to be the political voice of the settlements and to litigate their rights in court. The Métis Betterment Act established a trust fund in which all resource revenues were to be deposited. With the discovery of rich oil and gas deposits on the settlements in the 1960s, a dispute arose over the ownership of subsurface resources. The settlers, citing the Act, asserted their rights to the revenues, but the provincial government, to date, has refused to accede to Métis demands.

ALBERTA FEDERATION OF MÉTIS SETTLEMENT ASSOCIATIONS

Metlakatla Pass Sites Metlakatla Pass, or Venn Passage, located 4 km W of PRINCE RUPERT on the northern BC coast, is a narrow, protected channel, 5 km long, separating Digby I from Tsimpsean Pen. The area is noted for its density of archaeological sites: archaeologists have discovered 40 sites along its shores — 27 are shell middens which represent the remains of ancient Indian villages; 13 are petroglyph or rock art sites, which consist of low-relief carvings on boulders or rock outcrops (*see* PICTOGRAPHS AND PETROGLYPHS). The people who occupied the area at the time of European contact were the Coast TSIMSHIAN. Traditionally, all 9 tribes of Coast Tsimshian had permanent winter villages in the Metlakatla Pass area. Excavations conducted at several of these village sites since 1966 suggest that Metlakatla Pass has been occupied for approximately 5000 years. *See also* ARCHAEOLOGY; PREHISTORY. DAVID J.W. ARCHER

Metric Commission Canada, est 1971 by the Metric Commission Order, comprises a chairman and up to 20 part-time commissioners whose mandate it is to advise the minister of industry, trade and commerce on metric conversion and assist in the development of metric conversion plans. It also has responsibility for disseminating information on METRIC CONVERSION to the public. The commission and its operations have been controversial, especially in the eyes of those groups who oppose "metrication."

Metric Conversion is the process of making metric units, eg, metre (m), litre (L), kilogram (kg), degree Celsius (°C), the common units of measurement in Canada. Although the metric system was legalized in Canada in 1871, the British imperial system of units, based on yards, pounds, gallons, etc, continued to predominate. In the 1960s, with rapidly advancing technology and expanding worldwide trade, the need for an international measurement system became increasingly apparent. Britain decided to convert to the metric system and the US was studying a similar move. A number of Canadian associations representing diverse interests, including consumers, educators and professionals, made representations to the government favouring the metric system. In Jan 1970 the White Paper on Metric Conversion in Canada set out Canadian government policy. It stated that a single, coherent measurement system based on metric units should be used for all measurement purposes, including legislation. In line with this policy, the Weights and Measures Act was amended by Parliament in 1971 to recognize the Système International d'Unités (SI), the latest evolution of the metric system, for use in Canada. Also in 1971, Parliament passed the Consumer Packaging and Labelling Act, requiring that metric units be shown on labels of most consumer products.

To implement metric conversion the government established in 1971 a Preparatory Commission, later called Metric Commission Canada. The commission's role was to ensure a planned and co-ordinated conversion in all sectors of the Canadian economy, to disseminate information on metric conversion and to advise the government on necessary actions. Beginning in 1973 the commission organized over 100 sector committees, with members from national associations and major organizations representing business and industry, consumers, labour, health, education and government. Each sector committee was responsible for preparing a sector conversion plan and monitoring its implementation. Twelve commission steering committees, the federal government's Inter-departmental Committee for Metric Conversion and the Inter-governmental Metric Conversion Committee, made up of provincial government representatives, played co-ordinating roles. The commission as a whole approved sector conversion plans developed through consensus. Thus, Canada's metric conversion relied on the voluntary efforts of numerous committees and subcommittees, with some 3000 participants from the private and public sectors contributing their expertise.

Metric conversion was launched as a 4-phase program with guideline dates endorsed by the federal government. The Investigation Phase was essentially completed in 1975. The Planning Phase, during which sector committees drafted the plan of activities, was largely completed in 1980. The Scheduling Phase, to co-ordinate the timing of plans, neared its end by 1981. The Implementation Phase gained significance from 1975, with forecasts for overall completion extending into the 1980s.

The process of replacing imperial units with SI units in all kinds of documents, measuring devices, manufacturing processes, products and packages involved a countless variety of tasks. The technical basis for the change to SI units was established by 2 national standards of Canada, the *International System of Units (SI)* and the *Canadian Metric Practice Guide,* first published in 1973 by the Canadian Standards Association and approved by the Standards Council of Canada. After choosing appropriate SI units, practical approaches to implementation were debated by sector committees, with each sector determining policies and strategies to suit its interests. Soft conversion (arithmetical conversion of pre-existing measurement values) versus hard conversion (round, rational values in metric units, possibly requiring physical change in product size) was a major issue. Dual dimensioning, the use of both imperial and metric measurements, was another area of controversy. Dependence on the US for many parts and products was a constraint for many sectors. The dedicated efforts of Canadian industry allowed conversion to proceed with few major problems, although implementation took 2-5 years longer than planned. Among the leaders in metric conversion were such major sectors as the automotive industry, petroleum, forestry, wood, pulp and paper, grain handling, feed and seed, chemicals, electric power, mining, steelmaking and construction.

Metric Commission Canada recognized that the general public should become familiar with metric units early in the program. Education and public-awareness programs were important considerations to ensure public understanding and acceptance of the change to metric units. With the co-operation of all provinces, schools prepared to teach mainly the metric system. A series of metric conversion events exposed the general public to simple metric units in everyday life; extensive information campaigns accompanied each change. The first such event was the announcement of temperature in degrees Celsius in weather forecasts beginning

1 Apr 1975. From Sept 1975 rainfall and snowfall were quoted in millimetres and centimetres, respectively. The next significant change (Sept 1977) was the introduction of road signs showing distances in kilometres and speed limits in kilometres per hour. Concurrent with this change, cars with speedometers and odometers graduated in metric units were produced. In Jan 1979 service stations started pricing and dispensing gasoline and diesel fuel in litres. In Dec 1980 (the cutoff date for using imperial length units) fabrics and home furnishings were required to be advertised and sold only by the metre and centimetre. Conversion of weighing scales in retail food stores created political controversies. After 3 pilot areas (Kamloops, Peterborough and Sherbrooke) completed scale conversion in the summer of 1979, national conversion was postponed by the government of the day, resuming in Jan 1982. Cutoff dates were established for different areas, extending up to Dec 1983. After that, store-weighed food items could be priced and advertised only by kilogram or 100 gram quantities and sold only in metric units. Conversion involved some 35 000 retail food stores across Canada. Steadily over the years, metric units became normal for most products and services. However, metric units did not receive much support in real estate or in sports (except track and field and swimming).

Metric conversion proceeded voluntarily in many sectors, but federal and provincial legislative action was required in some. Regulations on the use of metric units for WEIGHTS AND MEASURES in retail trade were established and enforced by the government (based on industry recommendations) for the protection of consumers and retailers against unfair practices and confusion in comparing products. Even so, the government did not escape criticism for imposing mandatory use of metric units to the exclusion of old units. Opponents of metric conversion pointed to the costs at a time of inflation and economic weakness, the danger of being out of step with the US and the invasion of a foreign language of measurements upon a Canadian heritage bound to imperial measurements. In various parts of the country opponents challenged metrication through the courts.

The new Conservative government reaffirmed the commitment to metric but revoked the required use of metric alone in some cases, eg, gasoline and diesel fuels and home furnishings. Defendants of metric measurements have cited many benefits besides export trade and international standardization. SI is simple because of its decimal nature and the absence of a multiplicity of units with conversion factors. The universality of SI symbols (regardless of language) and the convenience of having a single unit for a physical quantity makes communications clearer. Upgrading of many technical standards and rationalization of product sizes and containers are side benefits. All these will lead to long-term cost savings, despite initial conversion expenses. In the final analysis, pressures of technology and the marketplace make metric conversion inevitable. N. GANAPATHY

Metropolitan Government is a form of urban REGIONAL GOVERNMENT used in metropolitan centres with a population over 100 000. The modern concept of metropolitan government originated in the US in the early 20th century as an attempt to devise institutions that could cope with urban growth.

The classic dilemma for municipalities in a metropolitan centre is that area-wide concerns are not met by a policymaking apparatus of similar scope. There are 3 basic problems. Policy co-ordination among local units of government is difficult in land-use and transportation planning and decisions made in one locality will frequently have detrimental consequences for its neighbours. Policy inequities result because each municipality provides services based upon its own tax base (*see* MUNICIPAL FINANCE); only those suburbs with extensive industry can provide high-level services with low residential taxation and normally the core city is hard-pressed on both counts. Policy accountability is fragmented because the numerous municipalities grapple with individual problems but no one unit of government is responsible for the well-being of the metropolitan region. The idea of federation was central to proposed reforms. Municipalities would unite to provide specific common services by delegating that authority to a new level of metropolitan government but would otherwise remain autonomous. The first steps to metropolitan governance were usually intermunicipal co-operative agencies (often known as special-purpose districts) created to provide water transit or sewerage facilities.

The creation of Metropolitan Toronto in 1954 was an important breakthrough for N American metropolitan government reform. Acting on the recommendation of the Ontario Municipal Board, the province federated the city of Toronto and its 12 suburbs as a metropolitan corporation. Although the municipalities retained their separate existences and a portion of their councillors also served as metro councillors, the metropolitan corporation assumed a wide range of functions that have increased over the years. In 1967, in a comprehensive reorganization, the number of local municipalities was decreased to 6. Metro Toronto served as the model for the regional governments of Ottawa-Carleton (1969), Hamilton-Wentworth (1974) and the metropolitan corporation of Greater Winnipeg (1961-1971). But, in Winnipeg, the metro council was directly elected and its responsibilities fewer. Both the Montréal and Vancouver regions have metropolitan governments although they undertake fewer functions than that in Toronto, and Vancouver is technically based upon a system of special-purpose districts. Winnipeg (since 1971) and Calgary each have one local government coterminous with the metropolitan area.

The basic problem with metropolitan government in Canada has been that it is a political compromise. Few governmental responsibilities were transferred entirely to the new level. For example, metropolitan governments would sell water wholesale to municipalities who were responsible for local deliveries; build freeways, although municipalities controlled local roads and parking; issue area-wide plans, but leave municipalities the power to issue building permits. Tension has resulted because 2 levels of government are in competition with each other. The conflict in Winnipeg became so severe the provincial government was forced to abandon the metropolitan approach in favour of unitary government. JAMES LIGHTBODY

Reading: D.J.H. Higgins, *Urban Canada and its Government* (1977).

Metropolitan-Hinterland Thesis, a theory of historic relations between a large, powerful urban community (metropolis) and the surrounding territory (hinterland), which the metropolis dominates through mainly economic means. Formulated by economic historian N.S.B. Gras in the 1920s, it has since the 1950s been widely applied and extended in Canadian history to illuminate the growth of urban power, REGIONALISM and generally the interplay of central and territorial forces. Gras conceived 4 stages in the rise of a major city to metropolitan dominance: it first harnessed the commercial life of a wide adjacent territory, then centered its industrial activities, built up its transport network and finally provided financial services to, and so more controls over, the hinterland. Later, it appeared that these were better regarded as key attributes of economic metropolitanism than as stages operating in straight sequence. The concept was also widened to include noneconomic aspects such as the political power wielded by metropolitan centres, especially as seats of governments, or the social, cultural and informational holds they may acquire. In any case, metropolitan-hinterland relations remain reciprocal, producing complementariness as well as confrontation in complex patterns that may involve whole sets of urban centres, as well as overlapping, changing hinterlands.

J.M.S. CARELESS

Reading: J.M.S. Careless, "Metropolis and Region," *Urban History Review* 3, 78 (1979).

Meulles, Jacques de, chevalier, INTENDANT of New France 1682-86 (d at Orléans, France May 1703). De Meulles, despite explicit instructions, was embroiled in confrontation with Governor LA BARRE throughout his term. In 1684, when the minister, Seignelay, neglected to send cash to pay the troops who were sent to control the increasingly threatening Iroquois nations, de Meulles used playing cards as money, promising redemption the following year. This expedient of using PLAYING-CARD MONEY was frequently resorted to thereafter and was a forerunner of modern paper money. In 1685 the new governor, DENONVILLE, accused de Meulles of greed and illegal trafficking, thereby causing his recall to France. FRANCE BEAUREGARD

Mewburn, Sydney Chilton, lawyer, soldier, politician (b at Hamilton, Canada W 4 Dec 1863; d there 11 Aug 1956). Called to the Ontario Bar in 1885, he became commander of the 13th Royal Regiment of Hamilton in 1910. During WWI, Mewburn rose rapidly as a military administrator and had reached the rank of majgen by 1917. He supported PM Sir Robert BORDEN in the CONSCRIPTION crisis of that year and, after being elected Unionist member for East Hamilton, he became minister of militia and defence in Borden's government. He resigned in 1920, after demobilization had been completed, but continued to sit as member for East Hamilton until 1925. DAVID EVANS

Mézy, Augustin de Saffray de, chevalier (d at Québec C 6 May 1665). De Mézy was chosen first governor of New France under direct royal rule 1663-65. The colonial administration was reorganized on his arrival and the Conseil Souverain established. The question of new appointments to the council led to public quarrels between the governor and Bishop LAVAL, whose civil powers overlapped with those of Mézy. Bishop and governor also fell out over procedures for the election of a *syndic* to represent the people of Québec. The colonial minister ordered an investigation into Mézy's rather violent and arbitrary rule, but the governor died before it could be carried out. ALLAN GREER

Mi-Carême Mid-Lent, in French Canadian tradition, is the time when people dress up in disguise and go from house to house asking for treats, singing and dancing in the MUMMING tradition. An interesting variation is found in parts of ACADIA, where the Mi-Carême becomes a kind of St Nicholas figure: a person disguised as an old woman mummer distributes treats to good children. Mi-Carêmes are also used as frightening figures, and as bringers of children (in place of storks or cabbages). NANCY SCHMITZ

Michaux, André, botanist, explorer (b near Versailles, Fr 8 Mar 1746; d on Madagascar 11 Oct 1803?). He compiled the first N American flora which includes many plants collected in Lower Canada in 1792. Michaux learned about practical horticulture in France before embarking on a series of botanizing expeditions in Europe, Persia (1782-85) and the US (1785-96). After meeting Peter POND in June 1792 he visited

Montréal and Québec before proceeding by canoe up the Saguenay R through unexplored territory to Lac MISTASSINI. Michaux kept a diary and collected numerous new plants (his herbarium is in the Muséum nationale d'histoire naturelle, Paris). According to contemporary records, Michaux was a quiet, independent and simple man, more at ease with the natives than with his fellow Frenchmen. He wrote *Historie des chênes de l'Amérique* (1801) and *Flora boreali-americana*, 2 vols (1803), both edited by his son, François-André. JUDITH F.M. HOENIGER

Michener, Daniel Roland, politician, governor general of Canada 1967-74 (b at Lacombe, Alta 19 Apr 1900). Educated at U of A (1920), Michener attended Oxford as a Rhodes scholar, where he became friends with L.B. PEARSON. Michener practised law in Toronto from 1924, was an Ontario MPP, 1945-48, and a Cabinet minister 1946-48. Describing himself as "a small 'l' liberal and a capital 'C' Conservative," he was MP for Toronto St Paul's 1953-62. Speaker of the House 1957-62, he was civilized and witty but clashed frequently with PM John DIEFENBAKER. After Michener suffered defeat in the 1962 election PM Pearson appointed him high commissioner to India 1964-67, and governor general in 1967. Michener and his accomplished wife, Norah, democratized the office (curtailing the curtsey, for example), and were among the busiest and most creative of vice-regal couples. Among the Michener innovations were frequent state visits abroad, periodic meetings with provincial lieutenant-governors, and the establishment of an Honours Secretariat (the Order of Canada having been instituted in 1967) at Rideau Hall. NORMAN HILLMER

Michikamau Lake, 2031 km², elev 460 m, max length 102 km, max width 49 km, is located in southwestern LABRADOR near the Québec border. Today the lake is part of the 6527 km² SMALLWOOD RESERVOIR system. DAVID EVANS

Micmac The origin of the name *Micmac*, which identifies both a people and their language, is unclear, though it may derive from *nikmaq* ("my kin-friends") used by the 17th-century French as a greeting for the tribe. Alternative names for the Micmac, which can be found in historical sources, include Gaspesians, Souriquois, Acadians and Tarrantines. At the time of European contact, Micmac-speaking peoples occupied the coastal areas of the Gaspé and the Maritime provinces E of the SAINT JOHN R drainage. They continue to occupy this area as well as settlements in Newfoundland and New England, especially Boston. The number of registered Micmac is about 10 000, with another 5000 (approximately) nonstatus persons of Micmac heritage (*see* INDIAN). Estimates of aboriginal population range from 3000 to 35 000, with 20 000 being a reasonable figure.

Micmac is among the Wabanaki cluster of Eastern Algonquian languages, which include the various ABENAKI dialects and the Penobscot and MALISEET-Passamaquoddy languages. Maritime PREHISTORY extends 11 000 years into the past, but the date of arrival of Algonquian speakers into the area remains uncertain (*see* NATIVE PEOPLE, LANGUAGES).

Aboriginal Micmac settlements were characterized by individual or joint households scattered about a bay or along a river. Communities were related by alliance and kinship. Leadership, based on prestige rather than power, was largely concerned with effective management of the fishing and hunting economy. Painting, music and oratory were encouraged. The Micmac were among the first peoples to be affected by European activities in the New World and underwent early depopulation and socioculturaldisruption. They attempted to profit from the FUR TRADE by serving as intermediaries between



Ornate Micmac coat presented to Capt O'Halloran at a Micmac tribal council held at Burn Church Point, NB, 1841 (*courtesy National Museums of Canada/National Museum of Man/S77-1834*).

Europeans and groups farther W. As their trade advantages disappeared, they tried to exploit a military alliance with the French (*see* IROQUOIS WARS).

After British suzerainty was established, the Micmac were subjected to conscious attempts by government to alter their life-style. Most moves to establish them as agriculturalists failed because of badly conceived programs and encroachments upon reserved lands. Their employment as labourers effected irreversible change: crafts, coopering, the porpoise fishery, and road, rail and lumber work integrated the Micmac into the 19th- and 20th-century economy, but left them socially isolated. A forced relocation scheme in the 1950s posed the greatest threat to them as a distinctive people. The Micmac have been able to salvage some of their traditional culture in political decision making, religion and language. The rate of unemployment for reserve communities is extremely high in a region with high unemployment, but there are a number of successful musicians, artists, writers and business and professional persons among the Micmac. *See also* NATIVE PEOPLE, EASTERN WOODLANDS and general articles under NATIVE PEOPLE. HAROLD FRANKLIN MCGEE, JR

Reading: A.G. Bailey, *The Conflict of European and Eastern Algonkian Cultures, 1504-1700* (2nd ed, 1969); Harold Franklin McGee, Jr, ed, *The Native Peoples of Atlantic Canada* (1984); B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

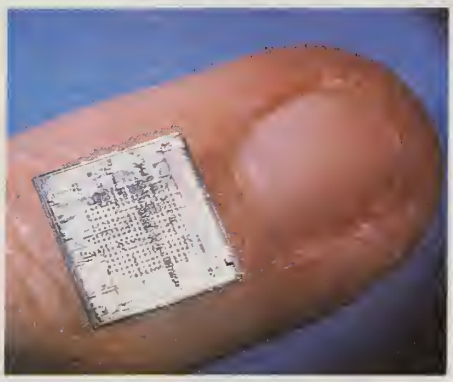
Microblade Technology, defined by arctic archaeologists as part of the Arctic Small Tool and Northwest Microblade traditions, was in its earliest phase coterminous with late Paleoindian complexes traced ultimately to NE Asia. The technology reached western Alaska by 9000 BC, central Alaska by 8500 BC, eastern Alaska and the West Coast by 7000 BC, the southern Yukon and the northern interior of BC before 4000 BC, and western Mackenzie District by 2500 BC. The basic and distinctive Arctic Small Tool tradition is typified by delicately flaked end- and side-blades, scrapers, burins and burin spalls, in addition to microblade technology. The large range of cutting, carving, and scraping implements were produced by specialized manufacturing techniques probably derived from non-Eskimo cultures of northeastern Asia and northwestern N America. *See also* PREHISTORY. RENÉ R. GADACZ

Microchips and Transistors Microchips or microelectronic chips (also called semiconductors or integrated circuits) are essential components of all computerized systems. They form the basis of a $20-billion, worldwide industry. The breathtaking pace of technological change in microchips (every year or 2 their capacity doubles while prices are halved) permits them to be used not only in sophisticated electronic systems but in many consumer products (eg, personal computers, calculators, video games, cars, sewing machines, video-cassette recorders and microwave ovens). The revolution in consumer electronics of the 1970s and 1980s largely results from microchip advances. If comparable progress had been made in automobiles, a Rolls Royce would cost $10 and could be driven around the world on 5 L of gas.

Microchips are silicon wafers on which intricate patterns of transistors are laid down. Transistors function as switches which control electric signals passing through the chip. In the past 2 decades, researchers have packed increasing numbers of transistors onto wafers about the size of a thumbnail. Chips containing tens of thousands of transistors are called large-scale integration (LSI) chips, while those with hundreds of thousands to a million transistors are called very large-scale integration (VLSI) chips. By the early 1980s, chips with more than 250 000 transistors were on the market, and a million-transistor chip is expected before the end of the decade. This complexity has been compared to a street network: if the simpler chips of the 1960s have the complexity of the street layout of a small town, VLSI chips have the complexity of a street network of big-city density covering the N American continent.

Technologies based on VLSI chips are faster and more reliable, smaller and more portable, cheaper and more energy efficient than those just a generation older. It has been estimated that a product with 10 standard chips will cost 20-30 times more to produce than one using a VLSI chip. Developments in VLSI chips are blurring the traditional distinction between computer hardware (ie, physical components) and computer software (instructions that tell the system what to do) because often the instructions are put right into the VLSI chips. This integration reinforces the growing importance of custom and semicustom chips designed to perform specialized functions. Standard or "off-the-shelf," general-purpose chips dominated in the 1970s and 1980s, but it is expected that by the end of the decade the worldwide market for custom chips will reach $25 billion, more than half the semiconductor market. Semicustom chips are projected to show greatest growth, 62% annually between 1983 and 1986. They are made by combining a number of "cells" in novel ways to create chips that can do special tasks, or by using partially prefabricated chips tailored in the late stages of fabrication for special functions. Semicustom chips are cheaper and less complicated to design and make than are full custom chips. New technologies (eg, computer-aided design, automated assembly lines and ion-beam write-on-wafer devices) are expected to reduce greatly the cost of producing specialized chips.

Chip production is divided into 2 phases: design and fabrication. The first is the most expensive and time-consuming: designing a chip with 60 000 to 70 000 transistors can take dozens of man-years and millions of dollars. Computer-aided design (CAD) systems will automate much of this work, but it seems unlikely that human designers will be totally displaced (*see* ROBOTICS). Fabrication involves laying down the intricate patterns of transistors and their connections, often on several layers of silicon. At present, 40 or more processing steps are needed, but new technologies for "writing" circuit patterns onto the wafers may cut this number in half.



Microchip, the "brain cell" of modern-day computers (*courtesy Canapress*).

A handful of Canadian companies, notably Northern Telecom Ltd of Mississauga and Mitel Corp of Ottawa, have in-house "foundries" (fabrication facilities) to make specialized chips for use in their own products. Recently, Northern and Mitel have made these facilities available to outside users, but there has been no open fabrication plant available to the Canadian ELECTRONICS INDUSTRY since the failure in 1975 of Microsystems International Ltd, which tried to compete in manufacturing general-purpose chips. Most Canadian companies now import chips and are growing concerned that access to the most advanced chips will be severely curtailed or even cut off. In 1983, after a 2-year recession, the semiconductor industry was bracing itself for another worldwide explosion in demand. Canadian companies were already facing long delays (up to 40 weeks) for some chips and others were virtually unavailable. Another problem was that the US, the major source of chips, began restricting the outward flow of microchip technology because it feared a loss of its technological edge and was preparing for a battle with Japan for world dominance in semiconductors.

In 1982 the SCIENCE COUNCIL OF CANADA reported that, unless Canada develops its own custom-chip manufacturing capability, "the electronics industry will forever be dependent on foreign sources . . . and the diffusion of the silicon chip throughout Canadian industry will be in the form of imported products." In 1983 an ALBERTA RESEARCH COUNCIL report stated that Canada's industry will continue to stagnate without advanced chips. This report recommended that Alberta build a microchip-design and -fabrication facility as part of the province's industrial diversification into HIGH TECHNOLOGY. In 1983 the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL, a federal agency that supports university research, initiated a 5-year, $17.5-million program to establish a nationwide network of CAD stations that will permit universities to do advanced microchip design and testing. The council is also studying setting up one or 2 national microchip-research centres. LYDIA DOTTO

Middle Power During and after WWII Canadians became increasingly aware that although they should not aspire to the privileges and responsibilities of a great power, they and other countries of comparable consequence could not settle for the role of small powers. In the various conferences in which the UNITED NATIONS was designed, Canada, Australia and medium-sized countries of Europe and Latin America curbed the intentions of the greater powers to dominate all aspects of the UN. In the early postwar years there was a need for middle powers, less directly involved in world economics and politics, to fulfil intermediary UN roles, particularly in conflicts arising from the disengagement of colonial powers in the Middle East, S Asia, and Africa. The Scandinavian countries, Canada, Brazil, Yugoslavia, and others proved useful in seeking compromises and formulas for agreement, as well as in staffing the PEACEKEEPING operations required when truces were established. The term "middle" thereby developed a mediatory connotation as well. Recently, as the 2 superpowers emerged in a special classification, there has been a tendency to refer to Britain, France, Germany and Japan as middle powers. JOHN W. HOLMES

Middleton, Sir Frederick Dobson, soldier (b at Belfast, Ire 2 Nov 1825; d at London, Eng 25 Jan 1898). Middleton was educated at Sandhurst and commissioned in the 58th Regiment in 1842. His early service was in Australia, Norfolk I and New Zealand, and he distinguished himself during suppression of the Indian Mutiny. After stationing in England, Gibraltar and Malta, he came to Canada in 1868 with the 29th Regiment and remained as an instructor with the Canadian Militia and then was commandant 1874-84 of Sandhurst. In July 1884 he was appointed commander of the Canadian Militia, and to him fell the task of organizing and leading the expedition during the NORTH-WEST REBELLION of 1885. The organization was accomplished with speed and efficiency, but after an initial brush with the rebels at Fish Creek, Middleton became cautious and his tactics at the decisive battle of Batoche were ponderous. Nevertheless the campaign was successfully concluded and a grateful Canadian Parliament voted Middleton a monetary award, while the British government made him a KCMG and promoted him lieutenant-general. He retired in 1890, but his plans to take over the presidency of a Canadian insurance company were spoiled by a minor scandal involving the misappropriation of furs during the North-West Rebellion. In 1896 he was appointed keeper of the crown jewels, Tower of London. R.C. MACLEOD

Reading: Desmond Morton, *The Last War Drum* (1972).

Midewiwin, or Grand Medicine Society, a closed ritual society of doctors (shamans, medicine men) among the Upper Great Lakes Algonquian (OJIBWA and Lk Winnipeg Salteaux). The organization recognized 4 or more grades of membership; even the lowest required a long period of instruction and payment of fees. Each grade was marked for the individual by changes in facial painting and the use of a particular MEDICINE BUNDLE. The Midewiwin developed during the early 18th century as a response to European influence, and associated ceremonies and dances involved the use of trance. Initiates were repositories of tribal traditions that were integrated into myth and legend. *See also* NATIVE PEOPLE, RELIGION. RENÉ R. GADACZ

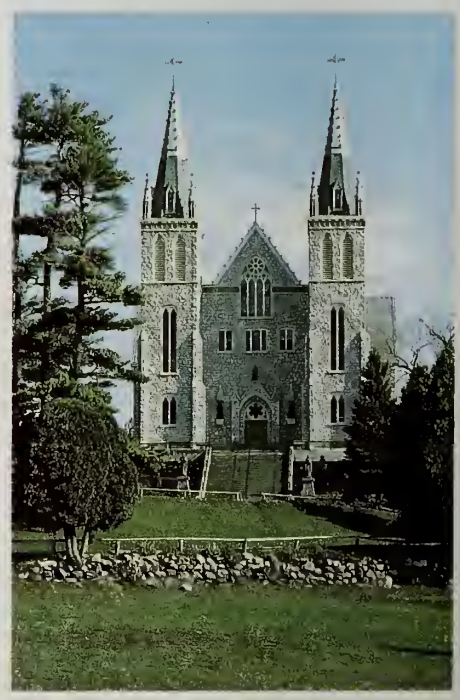
Midge, name given to several groups of small, slender-bodied FLIES. In Canada, nonbiting midges (chironomids), biting midges (ceratopogonids) and gall midges (cecidomyiids) are most important. About 500 species of chironomids are known in Canada; many more await discovery. They reach the northern limit of land, forming an increasingly large component of insect fauna in northern latitudes. Larval stages are mostly aquatic and may form much of diet of fish. Minute ceratopogonids (no-see-ums) can be a scourge in midsummer and seem undeterred by repellents. They are transmitters of bluetongue virus of cattle and sheep, and of protozoan bird diseases. In Canada, 180 species are reported; not all are pestilential. Their predatory larvae inhabit mud or moist soil. Cecidomyiids are known as gall midges, although not all larvae form plant galls. The notorious Hessian fly, larvae of which bore into wheat stems, is a cecidomyiid. Some larvae are fungus feeders, including some serious pests of commercial mushrooms. Others are predatory. Canadian cecidomyiid fauna has been little investigated, with 100 species recorded of a fauna estimated to exceed 1000. G.C.D. GRIFFITHS

Midland, Ont, Town, pop 12 132 (1981c), inc as a village 1878 and as a town 1887, is located on Midland Bay, an inlet of GEORGIAN BAY. It is about 145 km by road N of TORONTO. The area was part of HURONIA before the arrival of Europeans and STE MARIE AMONG THE HURONS (some 2 km outside present-day Midland) was the first European settlement to be established inland from the St Lawrence Valley. Founded by Jesuit missionaries in 1639, Ste-Marie was a base for missionary work among the HURON until it was abandoned in 1648-49. The present reconstruction as well as the nearby Jesuit Martyrs' Shrine and Wye Marsh Wildlife Interpretive Centre attract hundreds of thousands of visitors every year. Midland also serves as a "waterway" to the popular Thirty Thousand Islands of Georgian Bay.

Modern development of the town began with the arrival of the Midland Railway from Port Hope via Beaverton in 1871. The railway stimulated the logging industry and the town developed extensive harbour facilities and grain elevators. Today, light manufacturing includes world-famous Leica cameras, television picture tubes and automobile parts. PATRICK D. GRUBER

Midnight Sun In the Arctic in the summer, the sun shines all night long. Robert W. SERVICE had this in mind when he used the phrase in his ballad "The Cremation of Sam McGee" (1907). The expression "land of the midnight sun" has often been used to refer to Canada's arctic region and, more loosely, to the Yukon and the Northwest Territories. JOHN ROBERT COLOMBO

Mignault, Pierre-Basile, legal author, judge (b at Worchester, Mass 30 Sept 1854; d at Montreal 15 Oct 1945). Educated in Montreal, where he completed brilliant law studies at McGill (1878) and later taught civil law (1914-18), Mignault was a prolific writer on various topics in Quebec law. He is now chiefly remembered for his monumental treatise *Le droit civil canadien* (9 vols, 1885-1916) which is still cited as an authority in Quebec courts. He sat as a judge of the Supreme Court of Canada (1918-29). Many of



The Martyrs' Shrine, Midland, Ont, commemorates the martyred Jesuit missionaries of the 17th century (*courtesy Canapress*).

his judgements, written in French and English, are considered authoritative statements on the CIVIL LAW in Canada. JOHN E.C. BRIERLEY

Migration is defined restrictively as a regular movement between alternate sites, one of which is usually a breeding location. More broadly, it can involve any significant movement of ANIMALS (or even plant seeds). Canadians think of migration primarily as the movement of BIRDS: southward in fall, northward in spring. Such movements may be short, as with horned LARKS which nest in the Prairie provinces and winter just S of the border, returning as early as February. Most migrating passerine (perching) birds and SHOREBIRDS go farther, many to Central and S America. The long-distance champion, the arctic TERN, nests at Churchill, Man, and winters in the Antarctic. North-south movements may follow broad fronts or well-defined flyways as with WATERFOWL. Routes may be identical in both directions or differ, as with the lesser golden PLOVER, which flies S along the Atlantic coast from the Canadian Arctic to Argentina in the fall, but returns N through the Canadian prairies. Similar migrations, southward in fall and northward in spring, are shown by monarch BUTTERFLIES, DRAGONFLIES and some BATS. Some species, however, migrate S in spring, N in fall, eg, Heermann's GULLS which after breeding move from Mexico and southern California to coastal Vancouver I, and various Southern Hemisphere SEABIRDS going to the Atlantic and Pacific coasts. Some birds move altitudinally, usually downslope in winter, up in summer. In contrast, spruce and blue GROUSE move downslope in spring, up in fall.

Barren-ground CARIBOU in northern Canada and Alaska move in a generally circular pattern, wintering near the Peel and Porcupine rivers and calving along the Beaufort Sea. Movements of aquatic animals necessarily follow the configurations of water bodies. SALMON and EEL spawn in fresh water yet spend much of their lives in oceans. Other seasonal movements include those of freshwater FISHES between lakes and rivers and those of SEALS, WHALES and TURTLES in oceanic waters. FROGS, SALAMANDERS and GARTER SNAKES show more localized annual movements. Garter snakes winter and mate in interlake Manitoba and summer in nearby marshy areas.

Many such regular movements involve individuals returning annually to the same breeding area, wintering site or migratory stopover. Species that breed or feed in less stable habitats may alter the precise sites of their activity from year to year, but still migrate regularly. Other migrations are less regular, eg, species such as crossbills and snowy OWLS, which feed on fluctuating food supplies, show "irruptive" or "invasion" types of migration. Some species, such as Clark's nutcracker, undergo much less regular eruptions from their usual range. Other variations are exemplified by partial migrants, such as blue jays and black-capped CHICKADEES, in which only some populations migrate; and by monarch butterflies in which one generation moves south, the next north.

Migratory movements were first documented as a result of observations of diurnally moving flocks, especially along coasts and mountain passes where concentrations occur, or at sites like POINT PELEE where night migrants concentrate during the day. Being restricted in time and place, such observations supply limited data. Movements of many species, such as night-migrating birds, underwater animals and wind-blown spiders, are not readily observed. Early observers recognized migratory movements of large birds, but explained the mysterious disappearance of small birds by assuming they hibernated in the mud, rode on the backs of large birds or changed into other species (not entirely foolish, as many species change plumage). Banding or other forms of marking helped in defining migration routes of bats, birds, fishes and dragonflies and, in some cases, in finding the winter range (eg, for chimney swifts, monarch butterflies). Banding has also revealed unexpected patterns of movement, such as the northward movement of Florida-nesting bald EAGLES and the "leap-frog" pattern of some species, eg, the American ROBIN, in which northern-nesting populations winter farther S than do southern-nesting ones. RADAR tracking and transmitters on birds, large mammals and even tiny fishes are helping to define such movements even more precisely. An early observer, seeing birds flying at night silhouetted against the moon, thought they must migrate there. A commentator, thinking that was too far, suggested that PASSENGER PIGEONS moved to an undiscovered satellite between Earth and the moon. Moon-watching has since proved a useful technique in documenting movements.

Factors governing timing, routes taken and reasons for migratory movements are among the great mysteries of science. Experiments performed by William ROWAN in Alberta showed that the effects of photoperiod on physiological processes triggered migration in many birds. Light also governs the daily vertical movements undertaken by some PLANKTON. Weather, although not important in triggering broad timing, is undoubtedly an evolutionary factor and influences precise timing, exact routes and sometimes even reverse movements in birds. Wind is a major influence in movements of some INVERTEBRATES and plant seeds that depend on passive dispersal (*see* POLLINATION). The superb navigational skills of many birds, turtles and fishes seem to be determined by a complex array of factors, including landmarks, celestial patterns, sun's position, magnetic forces and (in fish) chemoreception. The relative importance of each factor remains controversial.

Evolutionary pressures for migration are also controversial. The reasons why migrations occur away from harsh temperatures, dry seasons and scarce food are obvious; return movements from attractive habitats are probably based on longer-term factors, eg, reducing competition for food or other resources, past patterns of GLACIATION, continental drift and deep-routed traditions. Much remains to be learned about this complex subject. MARTIN K. MCNICHOLL

Reading: R. Baker, ed, *The Mystery of Migration* (1981).

Mikita, Stan, hockey player (b at Sokolce, Czech 20 May 1940). Born Stanislaus Gvoth, he took the name of his uncle after moving to St Catharines as a boy. He played junior hockey for St Catharines and joined Chicago Black Hawks 1959-60. A smooth-skating centre and superb playmaker, he won the ART ROSS TROPHY (leading scorer) in 1964, 1965, 1967 and 1968. He received the HART TROPHY (most valuable player) in 1967 and 1968, and after an early career marred with penalties, received the LADY BYNG TROPHY (most gentlemanly player) in 1967 and 1968. He was first all-star centre from 1961-62 to 1963-64 and from 1965-66 to 1967-68. He played his entire career with Chicago, retiring after the 1979-80 season. His 1467 career points in regular season play rank him (in 1984) third all-time among NHL scorers, his 926 assists are second only to Gordie HOWE and his 541 goals ranked him fifth. His 59 goals, 91 assists and 150 points in playoffs ranked third among NHL players.

JAMES MARSH

Military and Staff Colleges The 3 Canadian Military Colleges (formerly Canadian Services Colleges) educate and train officers and officer cadets for ARMED FORCES careers. ROYAL MILITARY COLLEGE opened 1 June 1876 at Kingston, Ont. Royal Naval College of Canada, authorized by the 1910 NAVAL SERVICE ACT, opened at Halifax, NS in 1911; as a result of the 1917 HALIFAX EXPLOSION it moved to RMC, then in 1918 to the former British dockyard at Esquimalt, BC. It closed June 1922, and for 20 years naval cadets attended Royal Naval College, Dartmouth, Eng. As a result of wartime expansion the new Royal Canadian Naval College, Royal Roads, opened near Esquimalt in 1942. It accepted Air Force officer cadets in 1947 and then, along with RMC, became a tri-service military college in 1948. In 1952 Collège militaire royale (CMR) was established at St-Jean, Qué, primarily for French-speaking officer cadets. Today, both CMR and RMC offer courses in French, and all 3 colleges offer university degrees: RMC since 1959, CMR since 1971 (with UNIVERSITÉ DE SHERBROOKE) and Royal Roads since 1975. In 1984 RMC had 710 cadet students, CMR 548, and Royal Roads 229; all had female students.

After commissioning, an officer's professional development and education may include courses at staff schools and colleges. The Canadian Forces Staff School, Toronto (which opened 1960 as RCAF Staff School, a part of Air Force College), prepares junior officers for basic administrative and planning staff duties. The Canadian Land Forces Command and Staff College, Kingston (opened as a Canadian Army Staff College during WWII), offers a tactics-oriented course for operational command and staff duties. The Canadian Forces Command and Staff College, Toronto (opened as the RCAF Staff College in 1943), prepares air, land, and naval officers for command and staff positions as lieutenant-colonels. National Defence College, Kingston, est 1947, provides senior officers and civil servants with the opportunity to study broad questions of national policy and international affairs. STEPHEN HARRIS

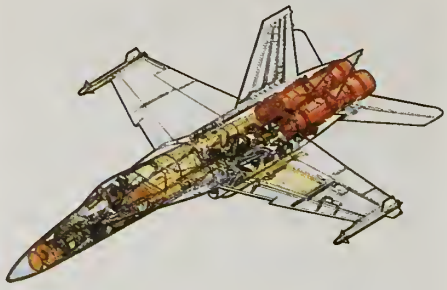
Military Aviation and Aircraft Military aviation began with WWI. When the war started each major belligerent possessed a few primitive aircraft; before it ended large fleets of fighters, general-purpose machines, torpedo carriers, large flying boats, heavy bombers and cigar-shaped dirigibles were in use. Despite some pre-war urging from aviation pioneers J.A.D. MCCURDY and F.W. BALDWIN, Canada had no air service when it went to war; nevertheless, about 22 000 Canadians flew with British squadrons overseas in WWI. At home Canadian Aeroplanes, Ltd (Toronto) produced 1200 training planes for the Royal Air Force and 30 Felixstowe flying boats for the US. No other combat aircraft were built in Canada until 1938. In 1919 Britain gave Canada about 100 aircraft: an assortment of trainers, fighters, bombers and flying boats. Another 12 flying boats were received from the US. These were the first planes flown by the Canadian Air Force, an interim force (1920-23) preceding the Royal Canadian Air Force (1924). In creating the RCAF, the government adopted the view that military aviation could be justified only if it served peaceful purposes. Consequently, most early flying by the RCAF consisted of such activities as topographical surveys, forest and fishery patrols, and anti-smuggling operations. In 1934, when war again threatened, the RCAF had 166 aircraft, only 28 of which were military types. In a belated attempt to rearm, the government found that the only military aircraft available were obsolete planes about to be discarded by the British. Out of necessity some of these were purchased, and others were manufactured in Canada even though they were outdated. On the eve of war, apart from 19 Hawker Hurricanes obtained from the UK in 1939, Canada's operational aircraft consisted of outmoded biplanes.

Canadian AVIATION industry burgeoned during WWII, producing about 15 000 military planes — two-thirds of which were trainers

for the BRITISH COMMONWEALTH AIR TRAINING PLAN. The others were operational types of British or American design: Bristol Bolingbrokes, Consolidated Cansos, Curtiss Helldivers, Handley Page Hampdens, de Havilland Mosquitoes, Avro Lancasters and Hurricanes. However, only the Bolingbrokes and Cansos were directly available to the RCAF. The Helldivers went to the American Navy and the others to the Royal Air Force, the result of a British-American agreement to pool Allied aircraft. Although this was perhaps unavoidable and was strategically advantageous, it caused considerable concern to the RCAF, which had to bargain with its allies for front-line aircraft for home defence. The 48 Canadian squadrons operating overseas were equipped with aircraft supplied by the British Air Ministry. Understandably, after the war the RCAF resolved to keep Canada in the forefront of military aviation with the capability to produce its own fighter aircraft. RCAF squadrons were involved in the DIEPPE raid, NORMANDY, the BATTLE OF THE ATLANTIC and bomber raids over Germany. During the war, the RCAF became the third-largest air force of the Western Allies.

Since 1948 Canadian military aviation has had several distinct roles: to deter aggression, to assist UN PEACEKEEPING operations and to support ground and naval forces in defence exercises, and to assist in search and rescue missions. Owing to Canada's commitment to NATO to keep Western defences on par with the military strength of the Warsaw Pact nations, over half the 650 Canadian aircraft fleet is composed of fighters; the rest are transports, ocean reconnaissance and naval planes and helicopters. In 1948, compelled by East-West tension to upgrade its air defences at home, Canada equipped 6 squadrons with its first operational jet fighter, the British-made Vampire. For the defence of Europe the RCAF contributed 12 squadrons of F-86 Sabres, the only Allied aircraft equal to the Soviet MiG-15. The RCAF Sabres, and also those flown by the air forces of Great Britain, Greece, Turkey and Italy, were manufactured under licence by CANADAIR LTD of Montréal. Two Sabre versions, V and VI, powered by the Canadian-designed and manufactured Orenda engine gave outstanding performance. The AVRO CF-100 CANUCK, a long-range, all-weather plane equipped with 2 Orenda engines, was the first military aircraft wholly designed and built in Canada. It made its appearance in 1953, replacing the Vampires in N American defence; in addition 4 CF-100 squadrons were assigned to Europe to meet the need for all-weather fighters. In the 1950s Canadian and American air-defence organizations were integrated under the NORAD Agreement and the completion of a continental radar defence network. Previously, the Canadians and Americans had foreseen the requirement for an aircraft of advanced design that could effectively exploit the advantages of this system. The RCAF was depending on the AVRO ARROW, but owing to prohibitive costs of development and political considerations the Arrow was abandoned in the experimental stage. The cancellation was considered a disaster for the military aviation industry in Canada and practically ensured that future aircraft would have to be purchased abroad.

In the next decade, 3 American fighters were procured: CF-104 Starfighters (1961) and CF-5 Freedom Fighters (1968) for deployment in Europe and CF-101 Voodoos as replacements for the CF-100s in 1961. The CF-104s and CF-5s were manufactured under licence by Canadair. Both types reflected the tremendous impact of modern technology. The CF-104s, for example, then the fastest combat planes in the world, had computerized navigation and firing-control systems that required only monitoring by the pilot. However, the single-engined aircraft had a dismal record, suffering numerous crashes.



The CF-18 twin-engined fighter, which was chosen in 1982 to become Canada's standard fighter of the 1980s, is a highly advanced and extremely costly weapon (*courtesy McDonnell Douglas Corporation*).

The next major purchase, beginning in 1982, was the McDonnell Douglas CF-18, a twin-engined versatile fighter with a maximum speed of Mach 1.8 (almost twice the speed of sound). Armed with air-to-air or air-to-ground guided missiles, it will replace the other 3 fighters. The aircraft reflects the impact of technology to a greater degree than its predecessors. Standard instrumentation is replaced by cathode-ray tubes and an eye-level printout of all functions enables the pilot to monitor aircraft performance without moving his head. Described as a flying computer, the CF-18 has been surrounded by controversy because of escalating costs and questions over the advisability of extreme reliance on advanced technology. FRED HATCH

Military Engineers, soldiers specially trained to apply engineering science and technology to war. Their tasks include building roads, bridges, railways, airfields, field fortifications, and anti-tank and other obstacles; laying and removing demolition charges and mines; and spearheading amphibious assaults by preparing invasion beaches for subsequent landings. Volunteer companies served in the militia from 1859, and in 1903 the Canadian Engineers Corps was added to the Permanent Force. The "sappers," who were renamed the Corps of Royal Canadian Engineers in 1936, served overseas in both world wars where, in addition to normal duties, they provided mining and tunnelling companies at the front, in Britain, and at Gibraltar. In peacetime Canada's army engineers have conducted land surveys, built bases and other defence installations, and contributed to northern development through the construction of dams, bridges, roads, and airfields. STEPHEN HARRIS

Military Recruiting, the practice of persuading people to serve in the ARMED FORCES. Although military service is compulsory in some countries, the Canadian tradition has been to maintain volunteer forces (for exceptions, *see* CONSCRIPTION; IMPRESSMENT). This places considerable pressure on recruiting officers to find sufficient numbers of suitable, willing candidates. When unemployment is widespread, the simple prospect of having a job may persuade young men and women to enlist. In wartime strong appeals are made to patriotism, honour and the citizen's duty to serve. In peacetime recruiters may challenge the young adult's love of adventure, but more recently they have emphasized that the trades training and education available in the armed forces are applicable to civilian employment once an individual's military career is over. In 1984, about 500 recruiting officers and civilians in 37 locations visited hundreds of high schools and colleges across the country to attract the personnel required to keep the Canadian Forces up to their established strength of approximately 82 000 officers and men. STEPHEN HARRIS

Military Service Act, 29 Aug 1917, invoked to reinforce the CANADIAN EXPEDITIONARY FORCE in France. The war was going badly, casualties were enormous, and Canada's contribution in manpower compared unfavourably with that of other countries. Voluntary enlistment had been uneven, and the military believed they could not maintain the Canadian Corps at full strength without CONSCRIPTION. Encouraged by English Canadians and the British, PM Sir Robert BORDEN introduced the Military Service Act. Riots broke out in Québec. The Act was unevenly administered, and there were numerous evasions and many exemptions. By the end of the war only 24 132 conscripts had reached the front. The act's military value has been questioned, but its political consequences are clear. It led to Borden's Union government and drove most of his French Canadian supporters into opposition, as they were seriously alienated by this attempt to enforce their participation in an imperial war. RICHARD A. PRESTON

Militia Acts provided manpower for defence. Until the 1850s such acts in Upper and Lower Canada, NS, and NB usually imposed compulsory service on males between 16 and 50 or 60, with annual or more frequent enrolment musters. This institution, the Sedentary Militia, was unorganized and untrained. The acts also authorized service battalions for transport duties, etc, or for operations. This Active Militia was composed of volunteers, supplemented if necessary by the ballot (selection by lot). In 1846 an Active Militia 3000 strong was provided for in the PROVINCE OF CANADA. In 1855 much of Canada's British garrison left for the Crimea, and patriotic excitement enabled approval of legislation for an Active Militia of 5000 to be equipped, trained and paid. In 1856 additional Active Militia companies without pay were authorized.

Fearing invasion during the AMERICAN CIVIL WAR, John A. Macdonald introduced a bill (1862) to provide an Active Militia of 50 000, to be selected by ballot if necessary, and to be equipped and paid for 28 days' training. The bill's defeat brought about the fall of his government. In 1863 PM John Sandfield Macdonald provided that the Sedentary Militia would be retained and service battalions could be called out for 6 days' drill a year; 35 000 volunteers would be equipped but not paid. George Cartier's Militia Act of 1868 retained the theory of conscription, but recognized voluntary training as the backbone of the Dominion's militia system: 40 000 infantry, organized in companies in military districts, formed an Active Militia. The Militia Act of 1883 added permanent staffs for militia schools, the nucleus of a permanent force.

In 1904, after a series of confrontations between British general officers commanding the Canadian Militia and the minister of Militia and Defence, a Militia Act set up the Militia Council of civilians and military officials, including a chief of the General Staff. The bill doubled the Permanent Force to 4000 to provide a garrison to replace the British at Halifax. The 1922 National Defence Act brought the Militia, the Naval Service, and the Canadian Air Force together under the Dept of NATIONAL DEFENCE. *See* ARMED FORCES. RICHARD A. PRESTON

Milk River, located in the extreme SE corner of Alberta, is the only river in Canada to flow into the Gulf of Mexico drainage basin. It has its source in Montana, flows N into Canada and then S to join the Missouri R near Fort Peck, Montana. In Alberta the river cuts a spectacular canyon, 150 m deep and over 1.5 km wide in places, straddling the Canada-US boundary. The river flows through the Canadian Dry Belt where precipitation is as low as 200 mm and temperatures of 38°C are not uncommon. The

rare geomorphological process of "piping" along the canyon walls has created a unique landscape of disappearing streams, dry valleys, "sinkholes," blind valleys, waterfalls, natural bridges and caves. JAMES MARSH

Milkweed is the common name for perennial, herbaceous PLANTS of genus *Asclepias*, family Asclepiadaceae (from Gk physician Aesculapius). One hundred species occur worldwide; 13 are native to Canada. Except for butterfly weed (*A. tuberosa*), all Canadian species have milky juice with toxic properties. Leaves are simple; flowers grow in large clusters. Seed pods are generally large, often containing hundreds of seeds, each with a silky parachute. In nature, several species (eg, butterfly weed) are highly regarded "showy" plants. Six species are listed as Canadian WEEDS, the most important of these being common milkweed (*A. syriaca*), found from Manitoba to the Maritimes and abundant in southern Ontario and Québec. It spreads by creeping underground rootstocks and by seeds. In Ontario, it was grown for fibre and latex rubber during WWII; other economic uses have been suggested. It is a source of nectar for monarch and other butterflies. Indians valued its medicinal properties, and used the fibre for rope and weaving. *See* PLANTS, NATIVE USES. PAUL B. CAVERS

Millar, Charles Vance, lawyer (b at Aylmer, Ont 1853; d at Toronto 31 Oct 1926). An able lawyer, sportsman and practical joker, he is best known as creator of the Stork Derby. By his will Millar, a bachelor, left the bulk of his estate to the mother who, in the 10 years following his death, gave birth in Toronto to the largest number of children. The ensuing contest inspired worldwide interest and much litigation before the validity of the bequest was upheld by the Supreme Court of Canada and the money distributed among 4 winning mothers. The question of whether Millar intended his will to take effect or merely to amuse his lawyer friends remains in doubt. MARK M. ORKIN

Millard, Charles Hibbert, labour leader (b at St Thomas, Ont 25 Aug 1896; d at Toronto 24 Nov 1978). Originally a carpenter by trade, Millard helped organize United Auto Workers Local 222, which he led in the historic 1937 OSHAWA STRIKE. From 1938 to 1939 he was Canadian UAW director. Between 1940 and 1943 he was on the executive of the Canadian Committee for Industrial Organization (CIO), the Canadian Congress of Labour (CCL), the United Steelworkers of America, and the Packinghouse Workers' Organizing Committee. Millard helped negotiate the merger of the 2 labour congresses and was elected VP of the CANADIAN LABOUR CONGRESS at its founding convention (1956). In 1956 he also became director of organization for the Confederation of Free Trade Unions in Brussels. A staunch CCF supporter, he was elected to the Ontario legislature twice (1943, 1948). He also ran unsuccessfully for Parliament several times. In 1961, he supported labour's participation in formation of the NEW DEMOCRATIC PARTY. LAUREL SEFTON MACDOWELL

Millenarianism (from the Lat *mille*, "thousand" and *annus*, "year"). Its religious significance comes from Revelation 20:1-6, where John predicts that Satan will be bound for 1000 years. In Christian theology, millenarianism refers to the expectation of the Kingdom of God on Earth, in which the returning Christ will rule men for 1000 years before the Last Judgement puts an end to history altogether. Although part of the inheritance of all Christian groups, this doctrine has been pushed into the background by most of the larger churches. In contrast, it is vital to many smaller sects active in Canada such as the MORMONS, JEHOVAH'S WITNESSES and SEVENTH-DAY ADVENTISTS. Historically, expectation of millennial deliverance has become particularly intense at times of great social stress, such as the Crusades or Black Death in medieval Europe or the Protestant Reformation. It is in such a context that one should place Louis RIEL, who preached a message of millennial salvation to the Métis of Canada as their society was being overwhelmed by white immigration.

Originally a Judeo-Christian concept, millenarianism is now applied by anthropologists and sociologists to parallel phenomena in non-Christian settings, eg, the Ghost Dance of 1890, when many Plains Indian tribes anticipated the destruction of the white man, accompanied by rejuvenation of the earth and the return of the buffalo in unprecedented numbers. Among thousands of such movements are the "cargo cults" of Melanesia, the Black Muslims of the US, the Rastafarians of Jamaica (now also in Canada), and the followers of the People's Temple who committed mass suicide in Guyana in 1978. THOMAS FLANAGAN

Miller, Frank, politician, premier of Ontario (b at Toronto 14 May 1927). He graduated from McGill University in chemical engineering in 1949 and worked for Rubberset Company Ltd in Gravenhurst, Ont, and Alcan in Arvida, Qué. He was a General Motors dealer in Bracebridge, Ont, and operator of several resorts in the Muskoka area. He was councillor in Bracebridge 1967-70 and was elected Conservative MPP for Muskoka in 1971, 1975, 1977 and 1981. As minister of health 1974-77, his move to close some small-town hospitals created public controversy, but he became increasingly adept at defusing confrontation. He was minister of natural resources 1977-78, minister of treasury and economics 1978-83 and minister of industry and trade 1983-85. Considered the most conservative of those who sought to replace William DAVIS, he made a commitment to maintain the social service network built up in Ontario during the previous 41 years of Conservative government. He won the leadership on the third ballot in January 1985 and became premier in February. JAMES MARSH

Miller, Frank Robert, air chief marshal (b at Kamloops, BC 30 Apr 1908). Miller joined the RCAF in 1931 and commanded training schools in WWII before proceeding overseas in 1944 as a station commander. He rose to vice-chief of the air staff 1951-54, but left the air force to serve as deputy minister of national defence 1955-60. He became chairman, Chiefs of Staff, 1960-64, and chief of the defence staff 1964-66. As Canada's first COS, he presided over the integration of the 3 service headquarters and the command organization of the Canadian Armed Forces. Quiet, gracious and possessing a diplomatic nature influenced by his engineer's training, Miller is the only man ever to hold both the top permanent civil and military positions in the Dept of National Defence. NORMAN HILLMER

Miller, George Martell, architect (b at Port Hope 1855; d at Toronto 17 Apr 1933). Designer of many fine neoclassical structures in Toronto, he came to the city in the early 1880s, taught at the Mechanic's Institute and began to practise architecture in 1885. Among his buildings are the Lillian Massey Building at U of T, the old Havergal College on Jarvis St, and the Toronto General Trust Building. He was also architect for the Canadian General Electric Building, Peterborough, Ont; the Ontario Ladies College and the House of Industry, Whitby, Ont; and the MacDonald Building, Ontario Agricultural Coll, Guelph. ANDREA KRISTOF

Miller, John Henry, actor-manager (b at London, Eng 1 Feb 1859; d at New York 9 Apr 1926). Henry Miller was 14 when his parents brought him to Toronto and in 1876 he made his stage debut at the Grand Opera House, with Mrs Morrison's resident Toronto stock company in *Amy Robsart*, the dramatization of Walter Scott's *Kenilworth*. He achieved recognition with Daniel Frohman's Lyceum Theatre in New York, and toured opposite such Canadian stars as Clara MORRIS and Margaret ANGLIN. Miller evolved into a meticulous director and went into management at New York's Princess Theatre in 1905; building his own Henry Miller Theatre in 1916. DAVID GARDNER

Miller, William Lash, educator, chemist (b at Galt, Ont 10 Sept 1866; d at Toronto 1 Sept 1940). When he died Miller was described as the greatest chemist Canada had produced; he was certainly the most colourful. A graduate in CHEMISTRY from U of T (1887), Miller then earned 2 PhDs in Germany, joining the teaching staff at Toronto in 1891, where he served for 46 years. Possessed of extraordinary clarity of thought and a forceful personality, Miller was an inspiring yet terrifying teacher. His greatest scientific strength lay in his mastery of the chemical thermodynamics of Willard Gibbs, learned from Ostwald at Leipzig. His greatest weakness (also learned from Ostwald) was his refusal to use or teach the atomic and molecular theories that formed the mainstream of 20th-century chemical thinking. Toronto became an important centre of chemical research, and a roster of Miller's pupils includes a remarkable number of important chemists. W.A.E. MCBRYDE

Miller and Cockriell Case (1977) J.H. Miller and V.J.R. Cockriell, charged with the murder of a policeman, argued the incompatibility of the penalty imposed by law with the Canadian Bill Rights of 1960. The Supreme Court ruled that the death penalty for the murder of a policeman or prison guard is not "cruel and unusual punishment" in the sense that the expression is used in the Bill of Rights. Since 14 July 1976, CAPITAL PUNISHMENT has been abolished in Canada although a narrow provision for it still applies to those in military service. In *McCann et al* v *The Queen et al* (1976) federal court judges found that solitary confinement under particular conditions could be considered cruel and unusual punishment. GÉRALD-A. BEAUDOIN

Millet, general term applied originally to any small-seeded CEREAL or forage GRASS used for food or as animal feed. Most are restricted to the tropics or subtropics; they are rare in Canada. The most important exception is proso millet (*Panicum miliaceum*), an annual grown for birdseed in Ontario; has also been used as livestock feed in most provinces. In the USSR, it is a major source of grain and flour. In the 1970s, a brown-to black-seeded form of proso millet invaded Ontario and Québec. This WEED, resistant to triazine herbicides, has become a serious problem in corn and bean fields. Ripe seeds scatter readily and are distributed primarily by farm machinery. Seeds are strongly dormant and survive for years in the soil. The seed hull remains attached to the root system through the life cycle. If roots can be excavated, this feature allows positive identification. PAUL B. CAVERS

Millidge, Thomas Edward, vessel owner and builder (b probably at Saint John 18 Dec 1814; d there 5 Aug 1894). He was the principal 19th-century registrant of newly built tonnage at Saint John Port of Registry. His mother, Sarah Simonds, and his cousins, the Gilberts, linked him to 2 of the leading families of the town. Although Millidge began acquiring vessels during the 1830s, the bulk of his tonnage was registered in the 1850s. While carrying on a lumbering business, he served as president of the Bank of New Brunswick (to 1858) and also invested in railways and ferries. By the 1860s Millidge was operating the family shipyard on the Kennebecasis R. From that point, his commercial pursuits tapered off. At his death he had no heir to carry on the family business. GERRY PANTING

Millipede (class Diplopoda), terrestrial, usually elongate arthropod, with a small head and short antennae. Typically, the body is very hard and subcylindrical, but often with platelike expansions making the animal appear flattened. Body comprises 11-100 or more similar segments which, except for the first 3-4, consist of fused pairs of true segments. The first and last true segments and the anal plate lack appendages. The second, third and, usually, fourth segments each bear one pair of legs; other segments, 2 pairs. Some appendages, in functional adults, are modified for reproduction. Despite the name millipede ("thousand-footed"), the number of legs is less than 400, generally less than 200. Newly hatched millipedes have 3-4 pairs of legs; the number increases following successive molts. About 10 000 species are known worldwide, mostly from tropical regions. More than 60 species are known to occur in Canada. About 10% of these, particularly in the East, have been introduced from Europe. Tropical millipedes sometimes grow to 30 cm; in Canada largest species barely attain 8 cm; many common species are less than 1 cm long and 1 mm in diameter. In western Canada, fossils of marine, millipede-like arthropods, not directly ancestral to any living group, are known from the mid-Cambrian (530 million years ago). Cylindrical millipedes usually burrow in soil; "flat backs" occupy matted, rotting vegetation. A few spend periods on the surface, mainly at night. Millipedes are important in soil formation in some deciduous and tropical forests. Virtually all feed on decayed matter or fresh vegetation. One or 2 species have been considered to be crop pests but, usually, damage done follows other injury to plants. An alarmed millipede typically coils itself into a spiral; some flat-backs are incapable of coiling; very short, exotic species may roll into a ball. Millipedes often protect themselves by noxious body secretions. Those of large, tropical species may cause skin and eye inflammation. Canadian species are harmless.

D.K. McEwan Kevan

Millman, Peter MacKenzie, astronomer (b at Toronto 10 Aug 1906). Educated at U of T and Harvard, Millman was an astronomer at U of T 1933-41 and served in the RCAF during WWII. After 9 years at the Dominion Observatory, Ottawa, he transferred to the NATIONAL RESEARCH COUNCIL in 1955 as head of upper-atmosphere research. Millman's own speciality was the spectroscopic study of meteors, for which he was awarded the J. Lawrence Smith Medal of the US National Academy of Sciences. He traced meteors by radar and in the 1950s was chairman of the Canadian government's interdepartmental committee on unidentified flying objects. Millman was an officer of the Int Astronomical Union and presided over its committee on planetary-system nomenclature 1973-82.

Donald J.C. Phillipson

Milne, David Brown, artist, writer (b near Paisley, Ont 8 Jan 1882; d at Bancroft, Ont 26 Dec 1953). Milne's initial recognition was in the US and he did not enjoy in Canada the attention that his contemporaries in the GROUP OF SEVEN received. Succeeding generations of artists, however, have generally given him (or J.W. MORRICE) the highest acclaim among Canadian painters (*see* PAINTING).

As a child Milne drew constantly. Before he embarked for New York City in 1903 to become an illustrator, he had taken a correspondence art course and experimented with photography. He studied at the Art Students League (1903-05), attended lectures by Robert Henri and William Chase, and visited galleries, especially Stieglitz' 291. Finally, he decided to be a painter rather than illustrator. He exhibited vivacious and avant-garde paintings regularly with leading art societies from 1909, at the Montross Gallery,



Sparkle of Glass (c 1927), oil on canvas, by David Milne. The artist forged several influences into a unique and powerful expression (*courtesy National Gallery of Canada, Vincent Massey Bequest, 1968*).

in the famous Armoury Show (1913) and in the Panama-Pacific Exposition (1915) where he won a silver medal.

In 1916 Milne and his wife Patsy (m 1912) moved to Boston Corners in upstate NY, where his work achieved a different power, both productive and innovative. He joined the Canadian Army in 1917 and after WWI painted for the army in England and France. He returned to NY State and painted prolifically, even during summer projects in the Adirondacks. In 1923-24 he spent a winter in Ottawa trying unsuccessfully to establish himself in Canada. He finally returned to Canada in 1929 (separating from his wife in 1933), and from then on painted in Ontario, mainly in Temagami, Toronto and at Baptiste Lk near Bancroft. His work became known after he sought the patronage of Alice and Vincent MASSEY, who organized several exhibitions, the first of which was seen by Douglas DUNCAN, who later became Milne's agent and dealer, and Alan Jarvis, later director of the National Gallery.

Milne's art was formed by both American and French impressionism and by Henri Matisse's fauvism. Claude Monet, especially in the aesthetic unity of his paintings, was the most pervasive influence. Milne forged these influences into his own powerful way of seeing and painting. He endowed the simplest subjects — houses, barns, flowers, trees and still lifes — with majestic stature. Figures appear frequently in his work in New York and Toronto, but the landscape dominated until the last 10 years of his life when a series of fantasies emerged. These may have been inspired by Kathleen Pavey, whom he met in 1938 and who became his second wife, and certainly by the birth of his only child, David, in 1941. Nevertheless the strong biblical references in them suggest a symbolic understanding of life, death, rebirth and resurrection. The *Ascension* series best illustrates his serious intent, but the *Noah and the Ark* series shows also that he could be amused by his biblical reinterpretations.

Approximately half of Milne's paintings are oils and half are watercolours. The National Gallery of Canada and the Winnipeg Art Gallery both have excellent collections of this work. *Billboards* (1912), *Painting Place* (1930), *Boston Corners* (1917), *Raspberry Jam* (1936) and *White Poppy* (1946) are fine examples of his work at different periods. Milne also invented a method of making colour drypoints and he returned to this medium sporadically over 20 years (1927-47). Many critics consider these drypoints his finest works. Milne's unpublished letters to his friend James Clarke, the Masseys and others, his "Autobiography" (1947) and his journals are a rich store of observations, thoughts and descriptions unparalleled in Canadian art.

David P. Silcox

Reading: David P. Silcox, *David Milne* (1967); Silcox and David Milne Jr., eds, "David Milne: His Journals and Letters of 1920 and 1921," *Artscanada* 30, 3 (Aug 1973); J. O'Brien, *David Milne: The New York Years 1903-1916* (1981).

Minas Basin is the broadest part of the S-eastern head of the Bay of FUNDY, and lies entirely within NS. It merges westward into Fundy, through Minas Channel, 5 km wide, and eastward into Cobequid Bay, and is widest (30 km) S of Parrsboro, NS. Its depth, generally less than 40 m, is over 100 m in Minas Channel. The bottom consists of large sand bodies swept by strong tidal currents, changing to mud flats nearer the shore. Its daily tidal range of 15-16 m is among the highest in the world. The N shore is straight, with small coves and islands, and cliffs rising to 100-200 m; the S shore is mainly low, with undulating good agricultural land and hayfields on former salt marshes. Farming includes mixed cattle husbandry, vegetable growing, egg production and apple growing. Coastal marshes in the SW were a focal area of ACADIAN French settlement in the early 17th century. Major towns are WOLFVILLE, WINDSOR and Parrsboro. GRAND PRÉ, dating from Acadian times, is a national historic park. I.A. Brookes

Miner, John Thomas, "Jack," conservationist, lecturer (b at Dover Center, Ohio 10 Apr 1865; d at Kingsville, Ont 3 Nov 1944). He moved to Kingsville with his family in 1878 and helped in the family tile business. He developed an early passion for nature and spent much of his time in the forest. He became an avid and skillful hunter, known for good humour and boundless energy. A hunting accident fatal to his brother and other family tragedies diverted his energy into religious zeal and passion for conservation. He tried to attract geese to his property (1904), establishing in 1908 one of the first bird sanctuaries in N America, officially declared a provincial crown reserve in 1917. Miner's many lectures on the sanctuary throughout N America and Europe inspired similar efforts elsewhere and instilled a conservation ethic in many people, eventually earning him the Outdoor Life Gold Medal and the OBE. His attitude towards predators as "evil vermin" has been much criticized, but was typical before the ecological importance of predation was understood. His 1927 warnings against pollution of the GREAT LAKES were prophetic. Miner early recognized the importance of international co-operation in migratory bird conservation and, before banding was regulated, obtained bands from Percy A. TAVERNER and tagged thousands of waterfowl, placing biblical scriptures into the bands. National Wildlife Week, proclaimed in his honour, his sanctuary and 2 autobiographical books continue as his legacy. Martin K. McNicholl

Reading: J. Miner, *Jack Miner and the Birds* (1923) and *Wild Goose Jack* (1969).

Mineral, element or chemical compound formed in nature by inorganic processes. Minerals may be composed of one element such as carbon (diamond) or gold, or of several elements. Most minerals are characterized by a definite chemical composition, expressed by a chemical formula indicating the types of atoms and their numbers. These atoms are arranged in an orderly 3-dimensional pattern forming a crystalline material. Some solids (including natural glasses) and liquids (eg, water, mercury) lack the orderly atomic arrangement and are referred to as mineraloids. COAL, PETROLEUM and amber, lacking both a definite chemical composition and an orderly atomic structure, are not minerals, although they are referred to as MINERAL RESOURCES. Pearls, CORAL and shells are composed of crystalline calcium carbonate but are not minerals because they were formed by living organisms. Laboratory grown (ie, synthetic) compounds are also nonminerals, although their

chemistry and structure may be identical to naturally occurring minerals.

There are about 3000 known mineral species; about 80 new species are discovered yearly. To establish a new species, all data relating to the mineral, including its chemical, structural, physical and optical properties, must be approved by the Commission on New Minerals and New Mineral Names of the International Mineralogical Assn. The association also judges the acceptability of the proposed name. Minerals are named in various ways, some in honour of a person (eg, weloganite, after Sir William E. LOGAN), a locality (athabascaite), an institution (mcgillite), the chemical composition (cobaltite), or a distinctive property such as colour (azurite) or magnetism (magnetite). Many names are derived from Latin or Greek words describing characteristic features, eg, albite [Lat *albus*, "white"] or rhodonite [Gk *rhodon*, "rose"]. All accumulated scientific data concerning the newly named mineral are published in a recognized international journal, such as the *Canadian Mineralogist*, for dissemination worldwide.

Minerals occur as components of ROCKS and, less commonly, as concentrations in rocks. Individual minerals may be readily recognized in coarse-textured rocks (eg, granite) but not in fine-grained rocks (eg, lava, shale). Concentrations of minerals range from small occurrences to large deposits and are formed by various processes, including solidification of mineral-bearing solutions in rock openings (eg, fissures, cavities), precipitation from mineral-rich waters as in springs and saline lakes, and solidification of gases during volcanic eruptions. In each case, minerals grow when appropriate temperature and pressure allow atoms in magma (molten rock), solutions or gases to group together into the basic, mineral-forming building blocks.

Structurally, minerals are grouped into 7 crystal systems, each giving rise to characteristic geometrical shapes. These systems — cubic (isometric), tetragonal, hexagonal, trigonal, orthorhombic, monoclinic and triclinic — are derived from 7 basic boxlike forms, each made up of atoms arranged in a precise and orderly fashion. During crystal growth, these basic building blocks align themselves symmetrically in 3 directions to produce a crystalline solid. If there is sufficient space during growth, a crystal with smooth geometrical faces, reflecting its internal structure, may form; usually, growth conditions are not ideal and minerals form as masses of generally microscopic crystals or in other aggregates (fibrous, powdery, flaky, globular, etc).

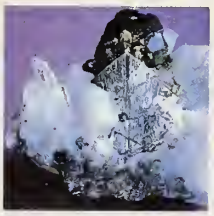
Mineral Identification

Minerals are defined and identified on the basis of their chemical composition and structure. A chemical analysis may range from a test for the presence of one or a few elements to a complete quantitative analysis. The techniques may be simple (eg, a flame test) or may involve sophisticated instruments (eg, electron microprobe, optical spectrograph). Minerals may, however, be identified without use of elaborate laboratory equipment. The most noticeable properties are those influencing appearance.

Form or Habit refers to the characteristic shape in which the mineral is formed. It may be fibrous (asbestos), lamellar or scaly (mica), platy (barite) or globular (hematite). Crystal forms, such as cubes and octahedra (fluorite and magnetite), rhombs (calcite) and 6-sided prisms (quartz and beryl) may also be readily recognized.

Colour, if constant, as in the metallic minerals (gold, copper, chalcopyrite), may be diagnostic. Other minerals (eg, spinel, fluorite, corundum) may occur in various colours. Colour in minerals results from atoms or structural defects (colour centres) that absorb certain portions of the spectrum of light; the unabsorbed portion is reflected or transmitted to the eye as colour. The colour of the powdered mineral (its streak) is more reliable than that of the intact mineral. The streak is produced by rubbing the mineral across an unglazed porcelain plate. Yellow, brown or black sphalerite has a cream-white streak; black or reddish brown hematite has a dark red streak. Some minerals produce a fluorescent colour when exposed to ultraviolet light, eg, the white, tungsten-ore mineral scheelite fluoresces bluish white, a property used in PROSPECTING for it. Minerals that continue to fluoresce after the ultraviolet light source has been removed are referred to as phosphorescent.



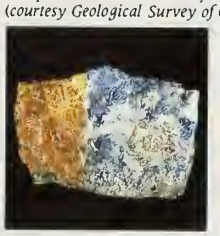


Agate (quartz) from Lake Superior (left) (*courtesy Geological Survey of Canada*) and asenopyrite from BC (right) (*courtesy National Museum of Natural Sciences*).





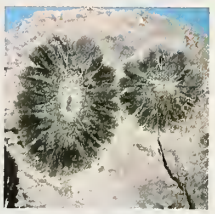
Beryl in feldspar from Lacorne, Qué (left), and beta-uranophane from Faraday Mine, Bancroft, Ont (right) (*courtesy Geological Survey of Canada*).



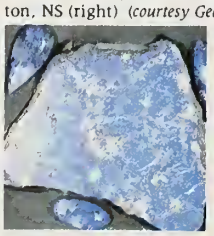


Cancrinite and sodalite from Blue Mountain, Ont (left), and grossular garnet from Asbestos, Qué (right) (*courtesy National Museum of Natural Sciences*).



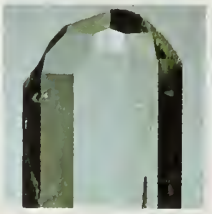


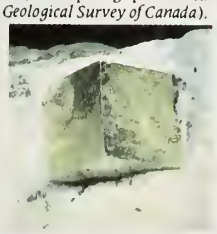
Graphite from Baffin I (left) (*courtesy National Museum of Natural Sciences*) and selenite in gypsum rock from Walton, NS (right) (*courtesy Geological Survey of Canada*).



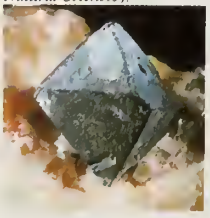


Lazulite (lapis lazuli) from Baffin I (left) (*courtesy National Museum of Natural Sciences*) and phlogopite mica from Otter Lake, Ont (*courtesy Geological Survey of Canada*).





Natrolite from Ice River, BC (left), and pyrite from Mont St-Hilaire, Qué (right) (*courtesy National Museum of Natural Sciences*).





Uraninite from Payne Mine, Gatineau Park, Qué (left), and stilbite from the Bay of Fundy (right) (*courtesy National Museum of Natural Sciences*).

Lustre, the reflection of light from mineral surfaces, is classified as metallic or nonmetallic. Various terms are used to describe nonmetallic lustre, including vitreous (glassy), adamantine (brilliant), resinous, waxy or oily, silky, pearly and earthy (dull). Lustre is generally more characteristic of a particular mineral than colour.

Transparency and Opacity depend upon the mineral's ability to transmit or absorb light. Metallic minerals, strong light absorbers, are opaque. Transparent minerals transmit most incident light; these minerals are potential GEMSTONES. Translucent minerals both absorb and transmit light; objects viewed through them appear blurred. Some mineral species vary from transparent to almost opaque, depending upon the degree of impurity and structural defects they contain.

Specific Gravity is the density or weight of a substance, compared to the weight of an equal volume of water (specific gravity, 1). Galena, an ore of lead, has a density of 7½, ie, is 7½ times heavier than water. The atomic weight of elements forming the mineral and the packing arrangement (ie, whether atoms are close or far apart) affect specific gravity. In stream gravels, minerals are separated by their specific gravity, heavier ones settling to the bottom.

Hardness, the relative ability of a mineral to resist scratching or abrasion, is among the most useful diagnostic properties. The Mohs' mineral scale of relative hardness is used to assign an approximate hardness value to a mineral. The scale consists of 10 minerals in order of increasing hardness: talc, 1; gypsum, 2; calcite, 3; fluorite, 4; apatite, 5; orthoclase, 6; quartz, 7; topaz, 8; corundum, 9; diamond, 10. Each mineral will scratch those with lower hardness and be scratched by those higher on the scale. Zircon, which scratches quartz but not topaz, has a hardness of 7½. The hardness of a mineral depends upon the strength of the bonds, or electrical force, holding atoms together; the scratch breaks those bonds.

Breakage Cleavage, a smooth, flat break produced between planes of atoms, results from weakness in the force binding parallel planes of atoms to each other. Minerals may cleave in one or more directions, or not at all. Cleavage is described according to the number and direction of cleavage planes and by the smoothness of the cleavage surface (perfect, good, fair, poor). Mica minerals have a perfect cleavage in one direction and can be split into sheets. Galena has 3 cleavage directions at right angles to each other; each cleavage surface is parallel to a cube face and the cleavage is referred to as cubic. Fracture, a break across planes of atoms resulting in an irregular, nonplanar surface, occurs in minerals having no distinct planes of weakness. All minerals show some type of fracture; minerals that cleave in one or more directions may fracture in others. Fracture is described as conchoidal or shell-like (quartz, glass), hackly or jagged (native copper), splintery (jade) or uneven (feldspar).

Tenacity or Cohesiveness is the breaking strength of minerals. "Tough" minerals (eg, jade) are so difficult to break that boulders are generally sawn. Brittle minerals shatter or crush

to a powder when struck; diamond, the hardest mineral known, and talc, the softest, are brittle. Other minerals are deformed more easily than broken: a malleable mineral (gold) can be hammered into sheets; a sectile mineral (silver) can be cut into shavings; a ductile mineral (copper) can be drawn into wire; flexible minerals (graphite) can be bent; and elastic minerals (mica) will spring back after being bent.

Magnetism and Radioactivity, properties shown by only a few common minerals, are easily detected. Magnetism refers to the reaction of a mineral in a magnetic field. Magnetite is strongly attracted to a hand magnet; pyrrhotite and ilmenite are less strongly attracted. Radioactive minerals (uraninite, thorite) contain unstable atoms (uranium, thorium) that emit radiation detectable by a scintillometer or a Geiger counter. In metamict minerals (betafite, allanite) radioactivity causes destruction of the internal atomic structure and the minerals become noncrystalline.

Optical Properties refer to the behaviour of light passing through a mineral. Light travels more slowly in minerals than in air and the amount of slowing varies from mineral to mineral. With the loss of speed, light changes its path, or is refracted. The degree of slowing, referred to as the index of refraction, may be expressed as the ratio of the speed of light in air to the speed in a given mineral. For example, light travels at 299 330 km per second in air (refractive index 1) but slows down to 123 916 km/s in diamond (ie, light travels 2.41 times as fast in air); hence, the refractive index of diamond is 2.41.

All minerals, except those in the cubic (isometric) system, split an incoming light ray into 2 rays when it travels along certain crystallographic directions. Each ray is slowed down to a different degree; hence, each ray will have its own index of refraction and the mineral will have 2 indices of refraction along certain directions. Such minerals are referred to as optically anisotropic; minerals with only one refractive index are described as isotropic. To determine the refractive index, mineralogists use the petrographic (polarizing) microscope; gemologists, the refractometer.

X-Ray Powder Diffraction is the most universal laboratory method of mineral identification. The technique uses an X-ray source, a cylindrical camera lined with a strip of photographic film, and a small amount of the mineral powder mounted on a rod inside the camera. A beam of X-rays strikes the mineral which reflects (diffracts) the X-rays from different sets of parallel planes of atoms; the reflected rays are recorded on the film as a series of concentric lines of varying intensities. The lines represent distances between atomic planes and the intensities are related to the kinds and distribution of atoms in the atomic plane. Since the distances and intensities of the lines (ie, the powder diffraction pattern) are characteristic for each mineral species, the film gives a "fingerprint" of that mineral. An unknown mineral is identified by matching its pattern with a standard pattern.

Classification of Minerals

Modern mineral classification is based on chemical composition. Each chemical class is subdivided into groups or families according to similarities in structure and, to a lesser degree, in chemistry. Minerals in each group have similar properties and were formed in similar geological environments.

Native Elements The 20 or so minerals formed of one element include metals (eg, gold, silver), semimetals (arsenic, bismuth, antimony) and nonmetals (sulphur, carbon as graphite or diamond).

Sulphides, Sulphosalts A sulphide mineral is composed of sulphur with one or more metallic elements (eg, galena, chalcopyrite) or sulphur with a semimetallic element (realgar). A sulphosalt, or double sulphide, is composed of sulphur with both metallic and semimetallic elements (pyrargyrite). Sulphides and sulphosalts are generally opaque, have metallic lustre and a hardness of 1–6, and occur commonly in veins. They include the important ore minerals.

Oxides, Hydroxides Oxide minerals are composed of oxygen with one or more metals or semimetals (eg, hematite). If hydrogen is also present, as in goethite, the mineral is classed as a hydroxide. Oxides generally have simple chemistry and structure.

Halides are minerals composed of the halogen elements (fluorine, chlorine, bromine, iodine) with a metal (eg, halite or table salt, fluorite). Halides are generally soft, brittle and light in colour; some are water soluble. The halides form an important group of industrial minerals, including halite, sylvite (a source of potash), chlorargyrite (ore of silver) and fluorite.

Carbonates, Nitrates, Borates Minerals in these classes have the same basic structural unit (ie, a radical) consisting of 3 oxygen atoms arranged in an equilateral triangle. In each class, a different type of atom is positioned in the centre of the triangle: the centre position in carbonates is occupied by a carbon atom and the radical is CO_3; in nitrates by nitrogen (radical NO_3); in borates by boron (radical BO_3). Each triangular unit is held to similar ones by atoms of metallic elements. Carbonate minerals are most common; calcite and dolomite are the major constituents of limestone and marble. Carbonates are generally soft and soluble in acids; nitrates are water soluble and occur only in arid regions.

Sulphates, Phosphates, Chromates, Arsenates, Vanadates Minerals in these classes have the same type of basic building block (radical), a tetrahedron (pyramid shape) with one oxygen atom at each of its 4 corners and an atom characteristic of the class inside. In sulphates the inner atom is sulphur and the radical is SO_4; the others are phosphorus in phosphates (PO_4), chromium in chromates (CrO_4), arsenic in arsenates (AsO_4) and vanadium in vanadates (VO_4). Atoms of metallic elements unite the tetrahedra to form minerals. Barite and gypsum are important sulphates; apatite is an important phosphate.

Molybdates, Tungstates The radical in minerals in these classes is the tetrahedron of 4 oxygen atoms surrounding an atom of molybdenum in molybdates (MoO_4) or tungsten in tungstates (WO_4). These tetrahedra are distorted by the large atoms inside.

Silicates, minerals containing silicon and oxygen, make up over 90% of Earth's crust and about one-quarter of known mineral species. The basic building block of silicates is the silicon-oxygen tetrahedron (SiO_4). The silicates are classified into 6 groups according to ways in which the tetrahedra are joined to each other: in neosilicates, the basic SiO_4 tetrahedra are held together by atoms of other elements (eg, zirconium in zircon); in sorosilicates, pairs of tetrahedra share one corner atom and the "bow tie" shaped units formed are held together by atoms of other elements (eg, hemimorphite); in cyclosilicates, which have a ring structure, each tetrahedron shares a corner oxygen atom with the 2 adjoining tetrahedra (eg, beryl); in inosilicates, which have a chain structure, each tetrahedron shares an oxygen atom with the 2 adjoining tetrahedra and the chains are aligned and joined by atoms of other elements (eg, pyroxene); in phyllosilicates, which have a sheet structure, each tetrahedron shares 3 oxygen atoms with other tetrahedra (eg, mica minerals); in tektosilicates or framework silicates, all 4 oxygen atoms of each tetrahedron are shared (eg, quartz).

ANN P. SABINA

Reading: R.I. Gait, *Exploring Minerals and Crystals* (1972); W.L. Roberts et al, *Encyclopedia of Minerals* (1974).

Mineral and Mining Engineering Mineral engineering is that branch of ENGINEERING concerned with the application of scientific and technical knowledge to the search for and production of valuable MINERALS from naturally occurring surface, underground or below-water deposits. Mining engineering, an essential part of mineral engineering, is also concerned with the construction of civil works such as tunnels, subways, power plants and shelters and, thus, is related to both CIVIL and MECHANICAL ENGINEERING. Minerals are inorganic substances but engineers and economists commonly include materials derived from organic matter (eg, COAL; OIL AND NATURAL GAS) in their classification. A mineral occurrence is called an ore deposit when its valuable minerals can be extracted at a profit.

History in Canada

The native people of Canada were known to have used minerals (eg, COPPER) before the arrival of Europeans. Early explorers of N America showed intense interest in the mineral potential of the New World. It was not however until the establishment of the GEOLOGICAL SURVEY OF CANADA (1842) that scientific principles were used to determine the extent of Canada's mineral wealth. The mid-1850s (especially the GOLD RUSH) saw the beginning of a series of major finds of economic minerals. To meet the need for qualified individuals to help exploit the new-found wealth, engineering schools were established to teach core courses in civil, mechanical and mining engineering. These included King's College, Fredericton, NB, in 1854; McGill, Montréal, in 1871; School of Practical Science, Toronto, in 1873; Ecole polytechnique, Montréal, in 1873; Royal Military College, Kingston, in 1876; and the School of Mining and Agriculture, Queen's University, Kingston, in 1893. The Canadian Institute of Mining and Metallurgy was established in 1898; its membership in 1982 was about 13 000.

Because Canada's ECONOMY has remained resource based, mineral and mining engineers and their colleagues who discover and exploit economic minerals (geologists, geophysicists, geochemists, and electrical, mechanical, chemical and metallurgical engineers) continue to play a vital role in Canada's economic well-being. Continuous improvements in mining technology have greatly reduced the hazards for mine employees (see MINING SAFETY). Canadian advances in dealing with the logistics of mineral extraction, such as floating a prebuilt processing factory to a remote site, have extended the range of usable resources. Considerable advances have also been made in technologies for extracting the required ore from the rock in which it is embedded.

Applications

The normal sequence of mineral engineering activities includes exploration (ie, PROSPECTING), evaluation, financing, development and extraction of the ore and, then, separation, concentration and refining of the desired minerals, using chemical, physical, electrical and metallurgical systems. The environmentally acceptable disposal of the resultant wastes is an integral part of the process. Exploration activities may still involve the traditional individual prospector looking for surface outcrops or other ready evidence of mineral deposition. Modern mineral exploration, however, makes increasing use of highly organized and specialized REMOTE SENSING methods. The benefits of surface geological mapping can be substantially extended by the use of aerial or satellite photography. Geophysics is concerned with the detection of anomalies related to gravitational, seismic, magnetic, electromagnetic, radioactivity and electrical conductivity measurements in Earth's crust. These changes may indicate the presence of valuable underground mineral occurrences.

GEOCHEMISTRY is used to identify unusual concentrations of chemicals in surface soils, water and vegetation, as clues to the proximity of an ore deposit.

The evaluation of mineral occurrences to determine their potential value and to establish proven, probable and possible quantities of ore requires detailed sampling from surface pits and diamond drill holes. Even after extensive drilling has outlined a potential ore body, it may be necessary to carry out bulk sampling from underground shafts, drifts, crosscuts and stopes before the true value of the deposit can be accurately calculated and MINING costs established. Pilot-plant studies may be carried out to confirm or modify mining methods and treatment systems. Because of the highly competitive nature of the mineral industries, the evaluation of relatively low-grade ore deposits is becoming increasingly rigorous. Methods for funding mineral production will depend on the level of risk and the total capital requirement for the recovery procedures involved. Normally, the establishment of a limited liability company and sale of equity shares is necessary. Alternatively, some or all of the funding may be obtained through loans guaranteed by the ore proven in the evaluation stage.

Some minerals (eg, PETROLEUM) may be extracted from the earth via drilled holes, using induced pressure and solvents. Dredging is used to mine unconsolidated materials from below the water. Recovery of mineral nodules from the deep-sea bed requires further development of the dredging method (*see* OCEAN MINING). Minerals may also be leached from surface or underground deposits by circulating solvents or microbial fluid, with later precipitation or other suitable disposal of the leached material. Surface and underground deposits may be exploited by open pit or underground mining methods.

The development phase of mining activity involves mining engineers in complex decisions on rate of ore extraction, methods of mining and treatment of broken ore. A critical path schedule is established and, based on this schedule, equipment is purchased and a work force mobilized. Because many of these decisions interrelate, the mine planner will be involved in selection of equipment for drilling, blasting, waste control, transportation, pumping, power supply, ventilation, ground support and personnel safety. Final mining and process plant design and erection, housing and all of the other complex infrastructure needs will depend on mine location and transport facilities available.

Most mining operations require some form of further processing of broken ore. This processing could be as simple as crushing and washing or may include further steps (eg, grinding, screening, flotation, gravity separation, cyanidation, leaching, precipitation, filtering, roasting), the ultimate purpose being to separate waste from valuable material and to concentrate the latter to meet customer requirements or to prepare for further processing, including smelting and electrical refining (*see* METALLURGY). Environmental considerations require that great attention be given to the disposal of waste products. Atmospheric emissions should be treated to remove unacceptable chemical constituents and solid particulate matter. Processed water should be recycled through the ore-treatment system and, when discharged, should be treated to avoid undesirable constituents reaching rivers or streams. Suspended solids are filtered or settled in restricted basins. When an ore body is completely mined, the site should be returned to an environmentally acceptable condition; eg, plant equipment is removed and access to underground workings sealed, building foundations are normally destroyed and buried, waste dumps are levelled and contoured to fit in with adjacent topography. T.W. KIERANS AND W.G. WEGENAST

Mineral Naming Each MINERAL species is identified by its own appellation, and names have been assigned since antiquity. While there are only some 3000 valid mineral species, nearly 20 000 names occur in the literature. This discrepancy results because different names have been used to describe the same mineral by researchers working independently, or because distinct names have been applied to minerals that later proved to be varieties or mixtures of already known species. Today a much better control is exercised by the Commission on New Minerals and Mineral Names established in 1959 by the International Mineralogical Assn.

Two contrasting tendencies can be seen in mineralogical nomenclature. First, there are the names that convey useful information about the mineral itself and are based on the chemical composition, crystal form, colour, lustre or other properties. For example, caysichite, found near Poltimore, Qué, is named after its chemical composition (Ca, Y, Si, C, H). Secondly, there are minerals with names that communicate very little or no information about the composition or properties of the mineral. Such is the case when names of persons are used: some refer to the discoverer or first analyst of the mineral; others recall a famous person or a scientific institution. For example, steacyite was named for H.R. Steacy, a Canadian mineralogist. Moreover, there are names of minerals that convey information about the region where they have been found. Some are quite specific about the location, eg, sudburyite named for Sudbury, Ont; others refer to a much larger area, eg, labradorite. The suffix "ite" is derived from the Gk word *lithos*, meaning rock or stone. While the vast majority of mineral names end in "ite," some have the suffixes "ine" or "ide."

Minerals Named after Canadian Places

athabascaite	from Martin Lk mine near Uranium City, N of Lk ATHABASCA, Sask
bytownite	for Bytown, former name of city of OTTAWA, 1830–1857
carletonite	for Carleton College, now Carleton U, Ottawa, where mineral first recognized
falcondoite	after Falcondo, subsidiary of Falconbridge Nickel Ltd
froodite	for Frood mine, SUDBURY dist, Ont
gaspeite	from a site in Gaspé Ouest County, GASPÉ Peninsula, Qué
hastingsite	from a site in Hastings County, Ont
hedleyite	from a site near Hedley, SW of Penticton, BC
hilairite	from the site at Mont St-Hilaire, Rouville County, Qué, one of the Monteregians, where about 125 mineral species have been recognized
labradorite	from Paul I, coast of Lab, official mineral of Nfld
langisite	from Langis mine, Timiskaming Dist, Ont
latrappite	from an area near La Trappe, Qué
madocite	from a marble quarry near Madoc, Ont
mattagamite	from a site at Matagami Lake, Qué, spelled Mattagami until 1962
mcgillite	after McGill University, Montréal, Qué
montbrayite	from a site in Montbray township, Abitibi, Qué
monteregianite	after the Monteregian Hills, Qué, 8 extinct volcanoes E of Montréal; see above, hilairite
mordenite	from a site near Morden, NS
muskoxite	from the Muskox Intrusion (named by Charles H. Smith) located S of Coppermine, NWT
pellyite	site near the headwaters of Pelly R, YT
romarchite	from Royal Ontario Museum of Archaeology now Royal Ontario Museum, also hydromarchite
spionkopite	site on Spionkop Creek in SW Alta
sudburyite	for Sudbury, Ont
tancoite	site at Tanco mine near Bernic Lake, Man, Tantalum Mining Corp of Canada
semagamite	site near Lake TEMAGAMI in northern Ont
tintinaite	site near the Tintina silver mines, YT
tulameenite	site near Tulameen River, BC
wakefieldite	site near Wakefield, Qué
yarrowite	site near Yarrow Creek, SW Alta
yukonite	site near Tagish Lake, YT

Some 86 new minerals, discovered, analysed or identified by Canadians, have been enshrined in the international nomenclature with Canadian names. Two branches of the Dept of Energy, Mines and Resources (EMR), the GEOLOGICAL SURVEY OF CANADA (GSC) and the Canada Centre for Mineral and Energy Technology (CANMET), rank very high among the leading institutions that identify and publish scientific studies on new minerals; at this time, they have at least half a dozen new species under examination.

A number of Canadian localities, regions and other geographical features are identified by names from the mineral kingdom. A famous example is Cap Diamant. While investigating the surroundings of the Indian settlement of Stadacona (near Québec City), Jacques CARTIER and his men noticed some sparkling, crystallized minerals attached to the rocks of the nearby cliff, which any modern geologist would describe as a formation of argillaceous limestones and bituminous schists dating back to the Middle Ordovician period (over 450 million years old). This formation forms part of the front of the Appalachians. Understandably, these hexagonal crystals provoked great interest among Cartier's sailors, particularly those specimens showing a range of colours caused by the presence of minute quantities of bitumen. Samples of the newly found "diamonds" were brought back to France, where an informed mineralogist instructed Cartier and his men about the great difference between rock crystal and the most precious stone known to man. It is probably this incident that is responsible for an old French saying, still heard in some parts of Normandy and Brittany: "Faux comme un diamant du Canada" [Fake as a Canadian diamond]. Samuel de CHAMPLAIN, founder of Québec (1608), made the same discovery some 70 years later, and the promontory was, accordingly, named Cap Diamant.

Many more Canadian geographical names have been derived from minerals. Dozens of lakes, creeks, points, inlets, hills and islands have names such as agate, amethyst, calcite, copper, emerald, garnet, gold, jasper, quartz, ruby, silver, sulphide, topaz and zircon, to name just a few of the minerals and precious and semiprecious stones currently used for this purpose across the country. JEAN-PAUL DROLET

Mineral Resources On a world map, Canada covers as much territory as Europe, rests firmly on a solid base (the US), extends to the North Pole, reaches from the Atlantic to the Pacific oceans and, as if greedy for more land and water, stretches to pull in the islands of Vancouver and Newfoundland and a few more along the coasts. On the E, W and N there are oceans; the land extends not only *a mari usque ad mare* but *ad mare* once more. Beyond its importance as one of the main suppliers of food (wheat) to the rest of the world, Canada is probably best known as

a storehouse for a host of MINERALS: metals, nonmetals, structural materials and fuels.

Mineral Endowment Few countries can claim a mineral domain that covers nearly 10 million km^2 and embraces 5 main GEOLOGICAL REGIONS, each possessing its characteristic features. Dominating this territory is a massive central upland of Precambrian rocks known as the Canadian SHIELD, which underlies about half the total area of Canada (most of Qué, Ont and Man and large parts of Sask and the NWT, including the eastern parts of the ARCTIC ARCHIPELAGO). This vast expanse of ancient IGNEOUS and SEDIMENTARY rocks, bush and bog is one of the world's richest orebearing regions, and has been Canada's leading source of a great variety of precious and base metals and has large reserves of ferrous and uranium minerals. Because of its enormous size and favourable geological features, the Shield still has great potential for the discovery of additional mineral deposits. One geological region, the Superior Province of the Shield, has been the greatest source in Canada of copper, lead, zinc, gold, silver, nickel, iron, cobalt, platinum, magnesium, titanium and uranium.

Between the Shield and the Western Cordillera, and stretching from the US border to the Arctic Ocean, lie the Interior Plains (Interior Platform). Under the rich, fertile soil of the southern plains lies a vast storehouse of PETROLEUM, coal, potash and salt, contained in thick sequences of gently dipping sedimentary rocks. The northernmost part of the region holds promise for further discoveries of fossil fuels. Exploration is being extended through most of the plains, including areas in the Arctic Archipelago. The central part contains the famous Athabasca rock formations, where accumulations of heavy-oil sands show reserves and resources equal to any in the world.

West of the Interior Plains is the Cordilleran Region composed of high mountains, lower plateaus and valleys, underlain by various sedimentary and volcanic rocks. It covers most of BC, the YT and part of the NWT, and has extensive and varied mineral wealth. Whereas the western and central parts are mainly sources of a great variety of metals, the Eastern Cordillera is noted chiefly for coal, gas, petroleum and some industrial minerals.

Eastern Canada, SE of the Shield, contains a broad belt of mountains and plains known as the Appalachian Region. It underlies all of NB, NS and PEI, parts of Newfoundland, and that part of Québec lying S of the St Lawrence R and E of a line between Lk Champlain (US) and Québec City. A great variety of minerals is found there, particularly asbestos (Eastern Townships, Qué) and coal (NS); important deposits of lead and zinc occur in NB and Newfoundland, and industrial minerals (salt, potash and gypsum) in NB and NS.

The Innuitian Region, lying mainly in the Arctic Archipelago, is underlain mainly by folded sedimentary rocks and by gently dipping strata, which contain important petroleum resources (eg, Sverdrup Basin). Older rocks of the Cornwallis Belt contain lead and zinc, including the rich Arvik deposit which supports Canada's most northerly mine, Polaris, on Little Cornwallis I. Other minerals, such as salt and gypsum, have also been identified in the region.

Of increasing importance are the continental shelves extending off the coasts of Canada and underlain mainly by seaward-dipping sedimentary and, in places, volcanic rocks. They include the Pacific, Atlantic and Arctic continental shelves, the last known to extend between the arctic islands, beneath the Beaufort Sea and along the coast of Baffin I. Canada has the second-largest continental margin — that vast submerged area that is the geological prolongation of Canada's landmass into the seas. Increased attention has been paid in recent years to exploration for petroleum and natural gas, particularly off the Atlantic coast where the shelf extends out more than 320 km.

Minerals and Economic Development In the course of its history, and more particularly since Confederation (1867), Canada has taken its place among the richest nations of the world. The people of Canada have discovered and brought into production a rich variety of minerals (metals, industrial minerals and ENERGY resources), making Canada one of the world's leading mineral producers (surpassed only by the USSR and the US for value and diversity of production).

QUARRYING and MINING are among the oldest industries in Canada. The record dates from the

Minerals Named after Canadian People

aplowite	Albert Peter LOW
barnesite	William Howard Barnes (b 1903), mineralogist NRC
berryite	Leonard Gascoigne Berry (b 1914), mineralogist, Queeen's U, past president of Mineralogical Soc of America (1964), editor of *The Canadian Mineralogist* (1957-75)
boyleite	Robert William Boyle (b 1920), geologist, GSC
cabriite	Louis John Cabri (b 1934), mineralogist, CANMET, EMR
cernyite	Petr Cerny (b 1934), mineralogist U of Manitoba
chapmanite	Edward John Chapman (1821-1904), geologist and mineralogist, U of T
collinsite	William Henry Collins (1878-1937), geologist, former director GSC
dadsonite	Alexander Stewart Dadson (1906-1958), contributed to development of Yellowknife gold deposits
dawsonite	Sir John William DAWSON
donnayite	Joseph Dérisé Hubert Donnay (b 1902), mineralogist-crystallographer, McGill and Laval universities; Gabrielle (Hamburger) Donnay, (b 1920) crystallographer-mineralogist, McGill
dresserite	John Alexander Dresser (1866-1954), geologist, author of *The Geology of Québec*, also strontiodresserite
ferrierite	Walter Frederick Ferrier (1865-1950), geologist and mining engineer
frohbergite	Max Hans Frohberg (1901-1970), geologist
gaidonnayite	Gabrielle (Hamburger) Donnay, crystallographer-mineralogist, McGill
gaitite	Robert Irwin Gait (b 1938), curator of mineralogy, ROM
garyansellite	Harold Gary Ansell (b 1943), mineralogist, GSC
gittinsite	John Gittins (b 1932), petrologist, U of Toronto
gormanite	Donald G. Gorman (b 1922), mineralogist, U of Toronto
gunningite	Henry Cecil Gunning (b1901), geologist, GSC
hawleyite	James Edwin Hawley (1897-1965), mineralogist, Queen's
haycockite	Maurice Hall Haycock (b1900), former head minerology section, EMR
howlite	Henry How (1828-1879), chemist, U of King's College, Windsor, NS, author of *The Mineralogy of Nova Scotia*
jagowerite	John Arthur Gower (1921-1972), mineralogist, UBC
jamborite	John Leslie Jambor (b 1936), mineralogist, CANMET
keithconnite	Herbert Keith Conn (b 1923), Manville Products Corp, provided samples for study
kulanite	Alan Kulan (1921-1977), prospector, Ross River, YT
larosite	Frederick Alfred La Rose, prospector, discovered silver at Cobalt, Ont
lemoynite	Charles Le Moyne, Baron de LONGUEUIL
mandarinoite	Joseph Anthony Mandarino (b 1929), mineralogist, curator, ROM
michenerite	Charles Edward Michener (b 1907), geologist, Canadian Nickel Co, Toronto
moorhouseite	Walter Wilson Moorhouse (1913-1969), geologist, U of Toronto
neyite	Charles Stuart Ney (1918-1975), geologist in charge of early exploration of deposit where mineral discovered
nuffieldite	Edward Wilfred Nuffield (b 1914), mineralogist, U of Toronto
parsonsite	Arthur Leonard Parsons (1873-1957), mineralogist, U of Toronto, ROM
pavonite	Martin Alfred Peacock (1898-1950), [Lat *pavo*, "peacock"], professor, U of Toronto, past president, Mineralogical Soc of America (1948)
penikisite	Gunar Penikis (1936-1979), a discoverer of phosphate occurrence in northeastern YT
petarasite	Peter Tarasoff (b 1934), amateur mineralogist, assistant director, Noranda Research Centre
poitevinite	Theophile Eugene Poitevin (1888-1978), mineralogist, GSC
prosperite	Prosper John Williams (b 1910), South African mineral dealer, Ont and Alta
robinsonite	Stephen Clive Robinson (1911-1981), mineralogist, Queen's and GSC
rucklidgeite	John Christopher Rucklidge (b 1938), mineralogist, U of Toronto
sabinaite	Ann Phyllis Sabina (b 1930), geologist, GSC
satterlyite	Jack Satterly (b 1906), geologist, Ont Dept of Mines and ROM
spencite	Hugh Swaine Spence (1885-1973), Dept of Mines, now called tritomite-(Y)
sperrylite	Francis Lewis Sperry (d 1906), chemist at Sudbury who first found the mineral
spertiniite	Francesco Spertini (b 1937), chief geologist, Jeffrey mine, Asbestos, Qué
steacyite	Harold Robert Steacy (b 1923), mineralogist, GSC
sterryite	Thomas Sterry HUNT
twinnite	Robert Mitchell Thompson (1918-1967), mineralogist, UBC; mineral name derived from Thompson, ie, "son of Thomas," Thomas based on Aramaic for "twin"; the mineral thomsonite existed already
tyrrellite	Joseph Burr TYRRELL
weloganite	William Edmond LOGAN
wicksite	Frederick John Wicks (b 1937), curator of mineralogy, ROM
yofortierite	Yves Oscar Fortier (b 1914), geologist, former director of GSC

Annual Values of Canadian Mineral Production

Year	Production (Millions$)	Value per capita ($)
1886	10.2	2.23
1890	16.8	3.50
1895	20.5	4.05
1900	64.4	12.15
1905	69.1	11.51
1910	106.8	15.29
1915	137.1	17.18
1920	227.9	26.63
1925	226.6	24.38
1930	279.9	27.42
1935	312.3	28.84
1940	529.8	46.39
1945	498.8	41.15
1950	1 045.5	76.24
1955	1 795.3	114.37
1960	2 492.5	139.48
1965	3 714.5	189.11
1970	5 722.1	266.58
1975	13 336.3	584.92
1980	31 841.7	1 330.28

time of the early explorers Cartier, Frobisher and Champlain. In the 1850s, gold discoveries in BC, oil finds in Ontario and the expansion of Cape Breton coal production marked a turning point in mineral history from events of primarily local importance to developments destined to have wide-ranging impact. BC's entry into Confederation (1871) came about largely because of the rapid growth of the West Coast colony following the GOLD RUSHES. The discovery of petroleum at Oil Springs, Ont, in 1857, followed by gold finds in Québec in the 1860s, attracted increased attention to the mineral possibilities of eastern Canada. During the 1870s, the country emerged as a major phosphate supplier to the fertilizer industry, with the development of deposits throughout eastern Ontario and southwestern Québec. The mineral potential became more clearly evident with the discovery of asbestos in the Eastern Townships (1877) and the fabulous Sudbury nickel-copper discovery (1883). Cape Breton coal, the development of the Wabana iron mine in Newfoundland (1893), the Intercolonial Railway, industrial expansion of Ontario and Québec assisted by mineral development, and the start of an IRON AND STEEL INDUSTRY, all were important in the subsequent economic development of Canada.

In the years following Confederation through the 1890s, increasing exploration in southern BC led to many gold, silver and base-metal discoveries, including the Rossland copper-gold deposit (1889) and the famous lead-zinc deposit at Kimberley. The Athabasca oil sands of northern Alberta, which were to commence production only in recent years, received attention in a Senate committee report of 1887, following investigations made by the GEOLOGICAL SURVEY OF CANADA a few years earlier. In 1896 placer gold was found in the KLONDIKE, YT, giving rise to one of the world's most spectacular gold rushes. It is reported that between 1898 and 1905 more than $100 million worth of gold was mined from the sands and gravels of creeks near Dawson. Even at this early stage, large deposits of coal, oil and gas were evident in that part of the North-West Territories later to become Alberta. Ontario's mineral potential inspired considerable optimism, especially since good progress was being made in finding the best ways of extracting metals from the Sudbury copper-nickel ore. Asbestos was the leading mineral in Québec at that time, followed by copper. In the Atlantic area, NS coal was the dominant mineral commodity, although Newfoundland's copper had gained world prominence.

Although economic policy, based on railways, immigration and tariffs, did not adversely affect the mineral sector, it was closely linked to the railway-building programs of the 1870s and 1880s. After 1896, a new period of expansion began, particularly in the PRAIRIE WEST. The resulting impetus to the production of capital goods increased demand for more minerals for the manufacturing sector. During WWI, the steel industry almost doubled in capacity. Diversification increased, changing the steel industry from a specialized industry serving the railway-building market to one equipped to supply a range of products to meet the needs of a new industrial economy. In the 1920s the mining and metallurgical base was broadened by the Noranda (Qué) copper-gold enterprise, the Flin Flon copper-zinc operation on the Man-Sask border, and the Britannia copper mine near Vancouver; by metallurgical expansion at Sudbury and the establishment of the Trail smelter in BC; and by many other developments, including the drilling of the first oil well at Fort Norman, NWT, and the discovery of a major deposit of natural gas in the Turner Valley field near Calgary (1914), followed by oil production (1924). Mineral development was slower in Saskatchewan. The first copper-zinc ore from the Man-Sask boundary area came from the Mandy mine in 1917. Not until the Flin Flon smelter was built (1930) did the Prairie provinces contribute to Canadian metal production. It was also in 1930 that Gilbert LABINE discovered silver-radium ores at Great Bear Lk, NWT.

In WWII, Canada became an important source of strategic materials. Expansion of production was particularly great in the steel and nonferrous-metals industries and in the electrical-apparatus, tool and chemical industries. Between 1939 and the peak of the war-materials output, steel production doubled and aluminum output increased fivefold. During the war years, production of nickel, copper, lead and zinc had a value of over $1 billion. Following the war, the country quickly converted to peacetime activities, and interest in mineral-resource development was renewed after the huge drawdown of resources of the war period, when there was little exploratory activity. The new discoveries, such as crude oil, iron ore, natural gas, potash, copper, zinc and uranium, not only launched the mineral industry on its greatest period of expansion but also provided an impetus to the capital goods industries.

Minerals and Metals Essential to Canada (excluding fuels)

Produced in Canada (surplus exported)

Abrasives
Aluminum (metal)*
Antimony (compounds)*
Arsenic (oxide)
Asbestos*
Bismuth
Cadmium*
Calcium
Cement*
Clays and shales*
Cobalt*
Copper*
Ferrosilicon
Gold*
Gypsum*
Helium
Indium
Iron ore*
Lead*
Limestone and lime*
Magnesium
Mica
Molybdenum (compounds)*
Nepheline syenite* and feldspar
Nickel*
Peat*
Pollucite (cesium)
Potash*
Pyrite*
Pyrochlore (columbium)
Pyrophyllite
Radium*
Salt*
Sand and gravel*
Selenium
Silicon metal
Silver*
Sulphur*
Tellurium
Titanium (dioxide)*
Tungsten (oxide)*
Uranium (oxide)*
Zinc*

Produced in Canada but not in right form (or deficit imported)

Antimony (metal)*
Ball clay
Barite and celestite
Bentonite
Cesium (metal)
Columbium (metal)*
Fireclays
Gallium
Gemstones*
Granite (black)
Graphite
Platinum group*
Rare earths
Rhenium
Rubidium
Silica sand*
Soapstone (talc)*
Tantalum (metal)*
Thallium
Tin
Titanium (metal)*
Tungsten (metal)*

Not now produced in Canada (imports)

Bauxite
Beryllium
Boron
Bromine
Chromium*
Corundum and emery
Diamonds
Fluorine (fluorspar)
Fuller's earth
Garnet
Gemstones (high quality)
Germanium
Hafnium
Iodine
Kaolin
Kyanite
Lithium
Manganese
Mercury*
Perlite
Phosphorus (phosphate rock)
Pumice
Strontium
Thorium
Vanadium
Vermiculite
Zirconium

* See individual entries

Mineral Production by Province, 1983

	Millions$	Percent
Alberta	22 218.0	61.7
Ontario	3 566.7	9.9
BC	2 826.0	7.9
Saskatchewan	2 736.1	7.6
Québec	1 916.6	5.3
Newfoundland	690.3	1.9
Manitoba	637.6	1.8
NWT	561.1	1.6
NB	513.7	1.4
NS	248.5	0.7
YT	59.4	0.2
PEI	1.5	0.004
Total	35 975.5	100.0%

Since 1945, total mineral output value has increased in every year except 1958, rising to the 1981 total of over $30 billion. This era has been marked by many major finds: nickel-copper deposits in Manitoba, lead-zinc, molybdenite and copper in BC, base metals and asbestos in Qué, Ont, Man, Nfld, the YT and BC. The discovery of the famous Alberta LEDUC oil field (1947), was followed by great expansion of the fuels industry. In the early 1950s uranium was discovered in Ontario and Saskatchewan, making Canada the owner of the largest known reserves in the world. At this time, iron ore became one of the most important minerals in Canada as the huge deposits in Québec-Labrador were exploited and titanium was discovered on Québec's North Shore. Major base-metal mines were brought into production in NB and made possible an important smelter industry. The world's largest deposits of potash were discovered in Saskatchewan and N America's first tantalum mine was opened in Manitoba. The largest known reserves of zinc and silver in the world were discovered near Timmins, Ont.

The development of mining communities has helped to expand the frontiers of the nation and to provide economic activity in RESOURCE TOWNS across the country. Many of these towns are familiar: Labrador City and Wabush in Nfld; Bathurst in NB; Gagnon, Fermont, Sept-Îles, Schefferville, Chibougamau, Rouyn-Noranda, Val d'Or, Matagami, Murdochville, Black Lake in Qué; Wawa, Cobalt, Manitouwadge, Balmerton-Red Lake, Sudbury, Timmins, Temagami, Kirkland Lake, Elliot Lake in Ont; Leaf Rapids, Lynn Lake, Flin Flon and Thompson in Man; Esterhazy in Sask; Blairmore and Grande Cache in Alta; Ashcroft, Logan Lake, Cassiar, Kimberley, Peachland, Sparwood, Stewart and Trail in BC; Yellowknife and Pine Point in the NWT; Whitehorse and Faro in the YT. Canadians are also ushering in a new era to the Far North, mining gold on the fringe of the ARCTIC CIRCLE and developing the Arvik lead-zinc deposit on Little Cornwallis I, only 100 km from the North Magnetic Pole. Accompanying the development of metal and industrial mineral resources has been an equally significant development of petroleum and COAL. Minerals, vital to a modern industrialized country and to the high standard of living of its people, have had an important impact on the social and economic development of Canada.

The Mineral System The mineral system comprises several components that are circumscribed by geography, economics, politics and the international context in which the system operates. An important element that transcends

Rank Held in the World by Canada as Producer of Minerals (based on 1981 statistics)

Mineral	*Rank*
Nickel	1st
Zinc	1st
Asbestos	2nd
Gypsum	2nd
Potash	2nd
Elemental sulphur	2nd
Uranium concentrate	2nd
Molybdenum	2nd
Titanium concentrate	2nd
Gold	4th
Platinum group	3rd
Aluminum	3rd
Copper	4th
Lead	4th
Silver	4th
Cadmium	4th
Iron ore	6th
Antimony	7th

the whole mineral system is TRANSPORTATION. Mineral development depends on efficient and economical means of transportation (railways, highways, waterways and air), which link the resources to domestic and foreign markets. Crude minerals and products (excluding petroleum) account for over half of all revenue freight moved by Canadian railways; and half of all cargoes loaded at Canadian seaports for international markets are made up of minerals. In turn, materials for mineral development comprise a large portion of the tonnage moved by the transport industry.

From mining to marketing, the mineral industry provides much direct and indirect employment, stimulates a broad range of manufacturing and service industries and, through export sales, contributes substantially to Canada's balance of payments. Apart from large amounts of new investment, mineral development accounts also for much of the new railway construction, for several new ports and for many Canadian frontier communities. Mining has helped Canadians attain one of the highest standards of living in the world. But the mineral industries are dependent on the economic well-being of Canada's trading partners in the world economy: production is adversely affected by a severe slowdown of growth rates in the world economy and changing geographic patterns of industrial growth and mineral consumption. Both of these factors have affected the mineral sector in the early 1980s. A further problem is the capital expenditure necessary for the opening of new mines to replace depleted deposits. Studies estimate that 200-250 new mines will have to be developed in the 1980s and 1990s, if Canada is to hold its place in world markets.

Facts About the Industry, 1983

Fuels	$24.96 billion	69.4%
Metals	$ 7.24 billion	20.1%
Nonmetals	$ 1.90 billion	5.3%
Structural materials	$ 1.70 billion	4.7%
Other minerals	$ 0.17 billion	0.5%
Total	$35.98 billion	100.0%

The total value represents over 10% of Canada's GNP

Canada ranks third in the world (after the USSR and the US) for value and diversity of mineral production. For value of production for all minerals, including fuels, Canada ranks sixth, after the USSR, the US, Saudi Arabia, China and Iran. For nonfuels only, Canada's value of production ranks fourth, after the USSR, the US and South Africa. Per capita, Canada ranks first among major mineral-producing countries

About 45% of total crude production is exported to over 90 countries. In the case of nonfuel minerals, exports account for over 70% of sales

Minerals, crude and fabricated, represent about one-third of Canada's total commodity exports, and a much greater percentage of manufactured goods of mineral origin are included

For reasons of economics and geographical distribution of resources, Canada also imports large quantities of minerals, some of which are already being produced in this country: energy minerals (oil and coal) and iron ore are the most important. The energy minerals account for 80% of imports. Others include bauxite and alumina, which are smelted to produce aluminum, phosphate rock and metals such as chromium, manganese and tin

Canadian ownership in the nonfuel sector is over 60%, with a large percentage of the industry being managed by Canadians; in the fuels sector foreign ownership stood at 64% in 1984

In recent years, the estimated cost of finding a minable deposit in Canada has averaged about $25 million. Over the past 30 years, the time from discovery to production has averaged about 6 years. Although very few of the many prospects located and investigated by exploration in Canada each year become producing mines, our overall record is enviable

Present Status The Canadian mining industry not only enjoys good distribution in every major region (from coast to coast and into the North) but is also highly diversified. Over 60 mineral commodities (metals, nonmetals, structural materials and fuels) are produced from nearly 300 mines and quarries and processed in hundreds of mills, smelters and refineries. In fact, Canada produces most of its mineral requirements and has substantial proven reserves and undeveloped resources to meet its growing domestic and export needs.

Growth of the mining industry is tied very closely to a number of factors: international demand for minerals, competitive prices in the world markets, climate for mineral development in Canada, availability of workers in remote areas and introduction of advanced technology. In 1983 confidence in a potential boom in the mineral industry, after the down cycle of recent years, has been demonstrated by the many new developments in several regions of Canada: coal in BC, potash and uranium in Saskatchewan, gold and silver in Ontario, several new gold mines in Québec, potash in NB and coal in NS. As one of the world's most diversified suppliers and largest exporters of mineral products, the Canadian mining industry will continue to meet future demand on the world markets. Canada's known economic mineral reserves and known undeveloped resources, coupled with technical expertise, a favourable energy environment and easy access to world markets (principally the huge US market), offer limitless opportunities. J.P. DROLET

Mingan, Îles de, Québec, are 15 islands and 40 or more islets stretching for 80 km in the Détroit de Jacques-Cartier between Ile d'ANTICOSTI and the N Shore of the ST LAWRENCE R, 175 km E of SEPT-ÎLES. They are a striking example of sedimentary rock formations left by retreating glaciers, and are noted for picturesque "flowerpot" rock formations and limestone cliffs. The islands are a sanctuary for migratory birds and seabirds, and a feeding area for blue finback and other whales. Naturalists have identified 256 species of WILDFLOWERS here. Indian burial grounds indicate they were inhabited before Jacques CARTIER first reported the islands in 1535. Surveys have also uncovered 16th-century Spanish coins and the remains of BASQUE habitations. Frontenac gave the islands to Louis JOLLIET 1679 for cod fishing and seal hunting, which remained the chief uses. The HBC gained title to the islands 1836 and sold them to Siebens Oil and Gas Co 1973. DOME PETROLEUM became the owner when Siebens's assets were taken over in 1979. Geological surveys identified industrial uses for the limestone deposits, but they were never commercially exploited. In 1983 Parks Canada bought the islands for $5 million, securing them as a national wilderness park.
HENRY F. HEALD

Minimum Wage, lowest hourly wage that an employer is legally permitted to pay to employees. There are 2 sets of minimum-wage laws reflecting the division of powers between the federal and provincial governments. The federal minimum wage covers employees in designated federal industries while the provincial minimum wage covers most other employees — farm labourers being a notable exception. The 1984 federal minimum wage was $3.50 per hour, a level lower than that of most provinces. Minimum wages were initially legislated in Canada during the 1920s, but economists have for many years disagreed about their effectiveness, arguing that they may price low-skilled workers out of the market and cause unemployment. D.A. SMITH

Mining is the work of extracting ROCKS and solid MINERALS of economic value from the Earth. These products include metallic ores (eg, IRON, COPPER, LEAD, ZINC), industrial minerals (eg, LIMESTONE, rock SALT, POTASH, GYPSUM), native metals (principally GOLD and SILVER), COAL, oil sands, URANIUM ores and precious stones. Excavation of SAND AND GRAVEL is a mining activity; QUARRYING for building and monument stone is a special branch of mining. The creation of underground spaces, such as storage chambers or drainage tunnels, uses many mining techniques but is not generally considered to be mining, unless the solids removed also have some value. The production of liquids and gases, as in the PETROLEUM INDUSTRY, is not usually considered mining. Mining is a major primary industry, as are AGRICULTURE, FORESTRY and FISHERIES, but differs in being a "one-crop" industry: minerals and rocks, once removed and used, cannot be replaced or regenerated. New mineral deposits must be found continually and new mines opened to replace exhausted ones. Most industrial activities require materials originally obtained by mining. A few mine products can be used in their natural state, but many must be processed by concentration, extraction, purification or fabrication.

History Mining has been practised since prehistoric times, when people began to dig for stones, weapons and pigments. In southern Africa, caves made to get iron-oxide pigments are at least 40 000 years old. In western Europe, pits dug for flints are several thousand years old. Prehistoric people collected loose pieces of native copper, gold, silver and gemstones from streams or the ground. Quarrying was widely practised when Stonehenge and the Pyramids were built. Advances in technology and civilization, indicated by the terms "Copper Age," "Bronze Age" and "Iron Age," required quantities of ore obtainable only by mining. Thus began the digging of trenches, caves and pits; operations later extended to excavation of shafts, tunnels and underground chambers. Ancient operations were restricted by limitations on TECHNOLOGY available and dependence on human labour as the main energy source. The difficulty of removing water prevented deep mining in wet places and hard ores could be broken only by hammering or wedging, or by heating and dousing with water. By the Middle Ages, advances had been made in mining and METALLURGY, although they remained dependent on manual labour. Two especially important improvements came later: the application of explosives and steam power. The use of explosives in mining, which began around 1627, eliminated much of the arduous work needed to break rocks. Steam was first applied for industrial power around 1700, in Cornwall, England, for working mine pumps. The invention of steam railway locomotives, mine hoists, etc, followed a few years later.

In the Western Hemisphere, no underground hard-rock mining was done before the arrival of the Spanish. Mining had been limited to placer work, chiefly for gold and silver, and to quarrying building stones and digging native copper, flints and obsidian from outcrops. The search for gold was a principal goal of the voyages of many explorers and of the campaigns of the conquistadors. Their plundering of the na-



Gold miners pose beside ore cars at a typical mining operation in the Yukon, *c*1900 (*courtesy Yukon Archives, Government of Yukon*).

tives' collections was followed by placer mining, then by mining of lode deposits of gold, silver, tin, lead, mercury and copper, often using forced labour.

In N America, British and French explorers were less successful in finding precious metals. In 1577 Martin FROBISHER took back to England, from Baffin I, some 200 t of rock; he believed it to contain gold, but it proved worthless. Raleigh, in 1584, had hoped to find gold but, failing in this, turned to colonization. Discoveries of silver and iron, in NS, were reported in 1604 by Master Simon, a mining engineer with Samuel de CHAMPLAIN, and the coal outcrops along the shores of Cape Breton I were known to early sailors and settlers. In 1643 a shipment of coal from NB to New England was reported, and in 1672 Nicolas DENYS prepared a report on the coal resources of the Maritimes for Louis XIV of France.

Mining and metallurgical operations were started in eastern N America as settlement proceeded. Small ore bodies of lead (for bullets) and of copper were opened; iron deposits were also mined. By the early 1700s, several iron foundries were in operation in the eastern states and at FORGES ST-MAURICE at Trois-Rivières, Qué. As the fur traders moved west, they noted that copper ornaments and small tools were widely traded by natives of the Lk Superior district. This copper was obtained from loose pieces and surface outcrops of native metal. Traders sought the sources of the metal but did not establish productive mines. Samuel HEARNE journeyed to the COPPERMINE R (1771) hoping to locate the source of copper carried by northern Indians, but found only small amounts of ore. The first mines of important size in northern N America were opened about 1845 to exploit the Michigan copper ore bodies near Lk Superior; Cornish miners working these brought their knowledge of mining and ore processing to the continent.

The discovery of placer gold near Sacramento (1848) triggered the California Gold Rush (1849). The flow of miners to the goldfields spilled over into other parts of the western US and N into Canada, leading to the discovery of many other mineral deposits. The Fraser R GOLD RUSH (1858) brought an influx of miners and traders into interior BC, prompting the formation of a British colonial government. The KLONDIKE GOLD RUSH (1897-98) was an exciting but brief episode. Since then, placer mining has received less attention but is still carried out on a small scale in the YT and in northern and central BC.

When BC joined Confederation, a transcontinental railway connection was promised. As the CPR was being built, nickel-copper ore was discovered near SUDBURY, Ont (1883). Prospectors flocking to the district soon staked many of the deposits there. During the following half century, others ranged further into northern Ontario and northwestern Québec, finding the silver veins of the COBALT area, the gold veins of the TIMMINS and KIRKLAND LK areas and the copper and zinc ore bodies of northwestern Québec. PROSPECTING and the establishment of new mines has continued, and about 280 mines are now in operation in Canada.

Coal has been mined in NS and NB since the early days of settlement. In western Canada, coal was first noted at DRUMHELLER, Alta, in 1793, but coal mining began about 1835, when the Vancouver I coal seams were opened near NANAIMO to serve coastal trade. As railways brought settlers into the Prairies, plains coal seams were mined to provide fuel for local use and foothill and mountain seams were opened to serve both railways and settlers. Petroleum development (1947-60) caused severe losses of coal markets, forcing many western mines to close. However, recent growth in export markets, particularly in Japan, and in the use of coal for ELECTRIC-POWER GENERATION has revived the industry. It now comprises fewer but larger mines, with over 90% of production from surface operations.

Canadian Mines Mining has been carried out in all provinces and territories, except PEI. In BC, the Britannia Mine, N of Vancouver on Howe Sound, was a major producer of copper ores for many years. Its ore bodies have been depleted, but some parts of the mine are maintained as a museum. The LeRoi Mine, Rossland, which yielded rich copper ores in the early 1900s, is the site of a museum demonstrating how work was done some 75 years ago. Several large open-pit copper mines operate in the Highland Valley near KAMLOOPS. The largest, Lornex, has recently expanded its output to about 100 000 t per day. The famous Sullivan Mine, at KIMBERLEY, has been one of the world's largest producers of lead and zinc ores since the 1920s.

In 1932 the Eldorado Mine, beside Great Bear Lk, NWT, was opened for the radium and silver in its ores. Operations were suspended in 1940 but were resumed in 1942 to meet wartime demands for uranium. It was operated to produce uranium until 1960, then closed. It reopened in 1964 as a silver mine, finally closing in 1981.

The Flin Flon Mine, Man, began production in 1930, although the ore outcrops were discovered in 1915. The mine, noted for its unusual name, remains an important producer of copper, zinc and precious metals.

The Blind R district, Ont, is one of the world's major uranium-producing areas. Discovery of its ore bodies in 1953 and establishment of its first producing mine 2 years later were triumphs of geological reasoning and mine planning and administration. The Sudbury district, where the first ore bodies were located in 1883-85, is the world's most important nickel mining and smelting area. Large amounts of copper and other valuable metals are also produced. Methods of separating copper from nickel in the smelting and refining processes had to be found before the ores could be profitably exploited. The district boasts several of the largest underground mines in the world. The Creighton Mine

The first mine in Ontario at Marmora, Ont, watercolour by Susanna Moodie, *c*1870 (*courtesy Public Archives of Canada/C-174*).





Cominco lead-zinc smelter at Trail, BC (*photo by Doug Leighton*).

has the deepest vertical shaft in the Western Hemisphere, extending 2175 m below the surface. Gold mines, notably in the Timmins and Kirkland Lk districts, have passed peak production but the important recent gold discoveries in the Hemlo district will more than make up the loss. The Kidd Creek Mine near Timmins, which produces principally copper and zinc, is now the largest mine in northern Ontario. The Cobalt area silver mines led to a staking rush. In the 60 years following the discovery of silver ores in 1903, over 500 000 oz (troy) of silver were taken from the mines. The area is quiet now.

Mines in northwestern Québec have been important contributors to the mineral wealth of the nation since 1926, when the Noranda copper-zinc mine came into production. Some of the earliest-worked ore bodies have been depleted but others have sustained production.

Coal mining in Cape Breton I has continued for over 200 years and, with the associated coking and IRON AND STEEL works, is the island's most important industry. Mining has followed the seams beyond the shoreline for over 8 km, and mining to greater distances is projected as drilling from ships has established the presence of coal seams far under the ocean floor (*see* OCEAN MINING). In a mining museum at GLACE BAY, visitors can descend into part of an old coal mine.

These are only a few of the mines and districts important in Canada's mining industry. Others include coal mines in BC, Alta and Sask; BITUMEN mines in northern Alta; uranium and potash mines in Sask; nickel mines in Man; iron mines in Ont, Qué and Lab; and asbestos mines in Qué.

T.H. PATCHING

Pouring liquid aluminum, casting centre at Grande Baie, Qué (*courtesy Alcan Aluminium Limited*).



Mining Safety and Health Mining has been considered, with some justification, a dangerous occupation. Disastrous mine fires and explosions receive much publicity, but single injuries and fatalities also occur, as they do in many other industries. Safety statistics for an industry can be expressed in several ways, eg, frequency of fatalities or injuries, number of working days lost through injuries. These differences in standards and methods mean that care must be taken when comparing statistics from different industries or countries, or from different mines. However, surface mining is generally about as safe as work in other heavy surface industries: most injuries result from work with machinery. Workers in underground mines face additional hazards because working space is usually more restricted, illumination and visibility are lower, and ventilation is more difficult. Most underground injuries result from rockfalls and from work around equipment; others from slips, falls and explosions. In COAL mines, accidents and fatalities are often more frequent than in other mines because the rock strata are usually weaker and methane gas may be present. Fires and explosions of methane and coal dust have caused great losses of life, especially because of the carbon monoxide and carbon dioxide produced and the resulting depletion of oxygen.

The frequency of accidents and injuries has been much reduced by the efforts of miners' unions, employers, engineers and research workers. The development of better methane detectors, safety lamps, flameproof electric equipment and safer explosives has greatly reduced the frequency of mine fires and explosions. Shielded and remote-controlled equipment minimizes exposure of miners to dangerous areas; better knowledge of strata control and rock mechanics, and better supports (eg, rock bolts, hydraulic supports and cemented fill) have reduced the frequency of falls of rock. Increased use of personal protective equipment (eg, hard hats, goggles, respirators) has also diminished the number and severity of injuries.

Safety generally means freedom from injury or fatality; health is a state of well-being, the absence of disease or infirmity. Several occupational diseases may result from prolonged or excessive inhalation of mine dusts: silicosis from dust containing free SILICA; pneumoconiosis (black lung) from coal dust; asbestosis and certain forms of cancer from ASBESTOS dusts. Radon gas, from URANIUM ores, may be related to a higher incidence of lung cancers in uranium miners, notably among smokers. In modern mines, because of increasing attention to dust suppression at source and dust reduction by improved ventilation, the incidence of dust-related diseases has been greatly reduced. Present ventilation standards are expected to prevent the occurrence of such diseases in future.

Hearing loss may develop in miners working in noisy places for prolonged periods. In mines, the NOISE hazard is often accentuated by the confined spaces. In recent years noise-abatement measures have been developed, eg, the muffling and enclosure of noisy equipment. Where these measures are not feasible, the wearing of hearing-protective devices is generally mandatory.

These improvements in TECHNOLOGY have been accompanied, sometimes forced, by laws, regulations and codes of practice controlling the conduct of mining operations. To ensure that SAFETY STANDARDS are met, mine inspectors are appointed by most governments and given authority to assess penalties for infraction of regulations or to stop work if conditions are unsafe. In coal mines, the qualifications of workers and supervisors must usually be approved by government boards. Regular safety inspections by supervisors are routine in well-managed mines, and frequently miners' representatives are also empowered to make inspections. Increasing emphasis is being placed on training new workers in safe work methods because most accidents are now caused by human error. Aside from human and legal considerations, strict attention to safety standards is warranted for purely economic reasons: as has often been shown, safety and profit are inseparable. Great improvements in safety have been made and some companies now claim that employees are safer at work than at home or on the highways.

In Canada, provincial governments are generally responsible for legislating and enforcing safety and health standards; the federal government is responsible for works in the YT and NWT and for certain mines in the provinces. The federal government tests and certifies equipment and materials, eg, diesel engines, explosives, electric devices and motors. Regulations differ among the various governments and are subject to revision as new information becomes available and as policies evolve. All

Dog miner at work in the 19th century (*courtesy Public Archives of Canada/C-949*).



governments carry out other functions related to worker safety and health, including maintaining records, administering WORKERS' COMPENSATION for injuries and conducting or supporting research programs. *See* DISASTERS. T.H. PATCHING

Mining Work Force Mining is estimated to support, directly or indirectly, about 6% of all Canadian employment. When at full strength, metal mines employ about 60 000 people; coal mines, 11 000; quarries, 3 000; and nonmetallic mines, 14 000. About 30 000 are employed in nonferrous smelting and refining plants. Many more are employed in associated industries, eg, IRON AND STEEL, MANUFACTURING, TRANSPORTATION, CONSTRUCTION, etc. In Canada mining pays the highest average wages of any major industry; straight wage, bonus, salary and contract schemes are in effect at various mines. Most operations are unionized. The higher costs of living in remote mining communities are often offset by subsidies or other benefits. Nevertheless, many small companies, especially those engaged in northern mining, have difficulty hiring and retaining a competent, steady work force during periods of full employment elsewhere.

Mining has been a predominantly male activity. Laws prohibit employment of juveniles; until recently, the engagement of females as mine workers was generally forbidden. In part, this was a reaction to conditions prevalent 150 years ago, when over half the underground workers in western Europe were women, and children under 12. In recent years, however, legislation has allowed hiring of women as underground labourers in some provinces. The proportion of women so employed is still small. Some are engaged in surface mining operations, as physical strength is not needed to operate most powered vehicles and machines. In most countries, very few are employed in underground work because, although the operation of some kinds of underground equipment does not require great effort, the environment is not considered attractive, customs are slow to change and some tasks still require considerable strength.

Until recently, mining was a labour-intensive industry. However, wages have increased rapidly in the last 3 decades, and the need to mine larger tonnages of lower-grade ores and to increase productivity has become more urgent. Improvements in equipment, resulting in mechanization of many tasks, have reduced the number of workers required. Consequently the industry has become capital intensive and, in many mines, investment in equipment now exceeds $100 000 per miner. Concurrently the proportion of conventional miners has diminished, while that of mechanics, electricians, technicians, etc, has increased.

Certification of coal mine workers and supervisors is usually required, with minimum standards set by federal or provincial governments. This is to ensure that miners and officials are aware of hazards and will follow approved procedures where explosive gas and coal dust may be present. Government certification in other mining industries is not usually required but employers generally provide training programs. These programs range from simply assigning new employees to work with more experienced workers, to formal courses, sometimes with union and government participation. A recent development in some areas is the awarding of certificates of competence to miners who have achieved certain standards of experience and skill. Many companies also provide apprentice training programs for tradespeople (eg, mechanics, electricians). T.H. PATCHING

Ministère de la Marine, the section of the French government that administered Canada during its last 100 years as a French colony. The Marine, variously described as a ministry, department, or secretariat of state, combined administration of the navy, the colonies and seaborne trade. It was an expression of the MERCANTILIST idea that colonies and the trade they produce are fundamental to the wealth and power of the state, which thus maintains a navy to protect them and to destroy the wealth and power of rival countries.

Cardinal Richelieu, Louis XIII's first minister, created the prototype of the Marine in 1624 and in 1626 became "grand master" of navigation and trade. This gave him authority without creating a permanent bureaucracy. It was left to Louis XIV's most trusted servant, Jean-Baptiste Colbert, to create a government department in the modern sense. An edict 7 Mar 1669 established the Marine, to be housed in offices at Versailles, where with a permanent staff Colbert established its policies and procedures. The Marine was divided into *bureaux* headed by *premiers commis* or "first clerks," the powerful civil service mandarins of their day. It was the Bureau du Ponant (from 1710, Bureau des Colonies) that administered Canada.

Under Colbert, France had the largest navy in Europe. But after 1690, even though the colonies were increasing in importance, the French became disenchanted with naval strategy and the fleet was allowed to deteriorate. In the 18th century hard-pressed controllers general kept the Marine chronically short of money. Protection for the colonies declined accordingly, and until the AMERICAN REVOLUTION France did not again attempt to equal Britain upon the seas. *See also* COLONIAL OFFICE. DALE MIQUELON

Ministry of Overseas Military Forces, est Nov 1916 to administer Canadian forces in the UK, especially in the training of reinforcements, and to act as the communications channel between the Militia Dept, the British War Office, and the Canadian Corps in France. When the CANADIAN EXPEDITIONARY FORCE went overseas, no provision had been made for its administration. Sir Sam HUGHES, minister of militia, George Perley, acting high commissioner in Britain, and Col Max AITKEN, Canadian military representative at the front, were involved in CEF affairs. To end confusion, PM Borden planned to establish a military council in England. Meanwhile, Hughes established an Acting Sub-Militia Council. Borden then appointed Perley minister of overseas military forces on 31 Oct 1916, and an angry Hughes, requested to resign, did so. Sir A.E. Kemp succeeded Perley in Oct 1917, and the office was abolished in July 1920. RICHARD A. PRESTON

Mink The American mink (*Mustela vison*) is a small, amphibious WEASEL, inhabiting wetlands throughout Canada, excluding the tundra, and abundant on the BC seashore. They are dark brown with some white on the chest and abdomen. Although the feet are not webbed, mink swim and dive well. The fur is dense and lustrous and serves as insulation even in water. Males reach 1.8 kg in weight and 60 cm in length; females weigh less than 1 kg. Mink feed on a variety of fish, invertebrates (especially sea crabs), small mammals and amphibians. Except along the Pacific coast, they breed Feb-Mar and give birth in late Apr and May. On the coast they breed May-June and give birth in July. The litter size is usually 5 (range 1-10) and young reach adult weight in 4 or 10 months (females and males, respectively). The mink is the most valuable Canadian furbearer. Each year, 70 000-80 000 are trapped and up to one million are produced on ranches. *See* FUR FARMING; FUR TRAPPING. IAN MCTAGGART COWAN

Minnedosa, Man, Town 2637 (1981c), inc 1883, is located 205 km NW of Winnipeg, on the E side of the Little Saskatchewan R. The area was popular for buffalo hunting. Settlement began in 1870 near a trail to the NW. The site was first called Tanner's Crossing after John Tanner, who established a toll ferry and later a bridge across the river. Competitive communities sprang up nearby, but a gristmill and sawmill operation at Tanner's Crossing attracted trade and settlement. In the 1880s Minnedosa — a name of Sioux origin, meaning "swift water" — became the major supply and grain and livestock trading centre in NW Manitoba. Settlers included Hungarians, Scandinavians, and English "gentlemen's sons" sent to Canada to learn farming. When the boom ended, Minnedosa was financially overextended, and Neepawa and Dauphin soon surpassed it as regional centres. Today, Minnedosa serves the area's grain and livestock farms and has several industries — farm implement and prefabricated home manufacturers, a creamery, a feed mill, a gasohol plant and a ceramics company. D.M. LYON

Minnow Many people refer wrongly to any small fish as a minnow. Properly, minnows are small to large freshwater fish of class Osteichthyes, order Cypriniformes, family Cyprinidae. The largest fish family, with over 1500 species (including carp, squawfish, dace, bream, etc), it is found worldwide, excluding S America, Australia and the Far North. Forty-nine species occur in Canada. Some have restricted ranges (eg, redside dace, *Clinostomus elongatus,* of Lk Ontario drainages); others are found coast to coast. Carp (*Cyprinus carpio*) and goldfish (*Carassius auratus*) are familiar Asian minnows that have been introduced and become established in several provinces. Minnows inhabit waters from bogs to large lakes and rivers throughout Canada, except insular Newfoundland, and are often the most numerous fishes, as both species and individuals. Many are quite small, attaining lengths of only 60 mm as adults, eg, the northern redbelly dace (*Phoxinus eos*). The northern squawfish (*Ptychocheilus oregonensis*), unusually large for a minnow, may reach 120 cm in length. Minnows are characterized by toothless jaws (pharyngeal teeth are present); soft fin rays (carp and goldfish have stiffened rays in dorsal and anal fins); and cycloid (smooth) scales, often giving them a silvery sheen. A series of bones, the Weberian apparatus, connects the swimbladder to the ear. This makes their ability to detect sound exceptional and is probably important to their success. Injured minnows release "fright scents" into the water, which cause fear reactions in other members of the species.

Breeding males may be as brightly coloured as tropical aquarium species and may develop obvious tubercles (nodules) on the head, scales and fins. In the breeding season, some species (eg, hornyhead chub, *Nocomis biguttatus*) construct nests a metre in diameter by piling up pebbles with the mouth. Food varies with species. The chiselmouth (*Acrocheilus alutaceus*) of BC has a chisellike cutting edge to its lower jaw, used to scrape algae from rocks. Species with long, coiled intestines feed on algae and bottom ooze; those with short guts feed on insects, crustaceans and molluscs. The northern squawfish preys on other fishes. Minnows are not considered good to eat, and few are large enough to attract anglers. They are important as food for more valuable fish and as bait. Certain species, eg, pugnose minnow (*Notropis emiliae*), are sensitive to urbanization and to agricultural practices that increase the silt load in rivers. Abundance and distribution of such species serve as indicators of environmental conditions. BRIAN W. COAD

Minority Government, one that does not have a majority of MPs attending its caucus. A minority parliament (in which no party can claim a majority of MPs) need not result in a minority government if 2 or more parties are willing to form a coalition government, but since 1867 no peacetime coalition governments

and only one wartime coalition (1917) have existed. Since 1921 there have been 8 minority parliaments (1921, 1925, 1957, 1962, 1963, 1965, 1972 and 1979) and 9 minority governments (the 1925 parliaments had both Liberal and Conservative governments), 4 of them Conservative, 5 of them Liberal. Of the former (1926, 1957-58, 1962-63 and 1979-80), none endured for more than a few months and only one (1957-58) did not fall on a vote of confidence. Of the 5 Liberal governments, one (1925-26), under Mackenzie King, left office following the refusal of the governor general to grant a dissolution (*see* KING-BYNG AFFAIR). A second Liberal government (1972-1974) was defeated on its budget, but it is generally agreed that it sought defeat in the correct belief it could win a majority in an election. The remaining Liberal minority governments (1921-25, 1963-65 and 1965-68) were able to gain the support of the third parties. The balance of power in minority parliaments in Canada has been held by reformist parties of the broad left (Progressives, CCF, NDP) or, occasionally, by a regional French Canadian party (Créditistes) — parties that have feared and distrusted the intentions of the Conservative Party, which was, in any event, unable to compromise its policy positions to accommodate them. The Liberal Party, however, has always been willing to accommodate them, at least minimally. For example, the King government's ability to retain the confidence of the Commons from 1921 to 1925 depended partly on the strong antitariff policy favoured by the PROGRESSIVE PARTY. The Pearson minority governments of 1963-65 and 1965-68 and the Trudeau minority government of 1972-74 wooed the NDP by enacting, or by committing themselves to enact, the Canada Pension Plan, the Canada Assistance Plan, the Guaranteed Income Supplement for old-age pensioners, universal medicare, nonpartisan redistribution of seats in the House of Commons, regulation of election expenses and the establishment of Petro-Canada. Perhaps the Liberal governments would have enacted these measures anyway, but undoubtedly the possibility of being hanged within a fortnight concentrated their minds and imparted an urgency to their legislative programs. In contrast, immediately following the election of the Conservative minority government of 1979-80, PM Clark announced he would govern as if he had a majority. He tried, even to the extent of allying with the Liberal Party and NDP, to deprive the Créditistes of their standing as a recognized political party in the House of Commons, although his government depended for its existence upon the votes of those same Créditistes. D. KWAVNICK

Mint, low-growing perennial HERB (genus *Mentha,* family Labiatae) with aromatic leaves and small blue flowers. It spreads rapidly in moist ground. Over 200 species have been described, but that number has been reduced to about 15 valid species: 7 Australian, 7 Eurasian and 1 circumboreal. Field or wild mint (*M. arvensis*) is the only species native to Canada. It was used by N American Indians as tonic for stomach disorders, heart ailments and chest pains. *M. spicata* (spearmint, garden or green mint), cultivated in Europe for centuries and probably introduced to N America by the Puritans, is now used primarily as a culinary herb. Strongly flavoured peppermint (*M. piperita*) is grown for commercial preparation of menthol. A powerful antiseptic with local anaesthetic properties, mint is widely used for toothache, headache, chest complaints and rheumatic pains. An antispasmodic, it is used for seasickness and to relieve stomach cramps. It makes a palatable tea, which is good for colds and insomnia. GILLIAN FORD

Minting From 1858 to 1907 most issues of Canadian COINS were struck at the Royal Mint in London, Eng, with additional issues from the Heaton Mint of Birmingham. The Royal Mint in Ottawa was opened in 1908 as a branch of the Royal Mint in London, and operated as such until 1931. When the Dominions were made equal with Great Britain by the STATUTE OF WESTMINSTER, the Ottawa mint became independent and was renamed the Royal Canadian Mint. It operated as a branch of the Dept of Finance until 1969, when it became a CROWN CORPORATION. Today the Royal Canadian Mint strikes coins for foreign countries as well as for Canada. Since 1965 a branch mint at Hull, Qué, has produced special issues and sets for collectors. Since 1974 the mint that opened at Winnipeg, Man, has shared with Ottawa the production of the nation's coinage.



Royal Canadian Mint in Winnipeg, Man (*photo by Hans Blohm/Masterfile*).

To make coins, metal ingots are rolled into sheets of the proper thickness, from which the blanks are cut. The blanks are cleaned, polished and sent to the coining room, where they are struck by dies. A die is developed by a lengthy and painstaking process. A master punch is first produced by means of a reducing machine. A model in hard plastic, about 20 cm in diameter, is scanned by a tracer at one end of the machine. At the other end, a cutter duplicates the movements of the tracer and cuts the design in reduced size on a steel block about 7.5 cm in diameter. A second reducing machine then scans the block and reproduces the design, in the intended size of the coin, onto another steel block. This final reduction, the master punch, is used to sink the master matrix. Details lacking in the master punch are punched into the matrix, which is used to produce the working punches. The working punches are then used to sink the working dies, which strike the coinage. Since 1945 all coinage dies have been chromium plated to give longer die life and a better finish to coins. R.C. WILLEY

Minto, Gilbert John Murray Kynynmond Elliot, 4th Earl of, soldier, governor general of Canada, 1898-1904, viceroy of India, 1905-10 (b at London, Eng 9 July 1845; d at Minto Castle, near Hawick, Scot 1 May 1914). Lord Melgund (his title before succeeding to the earldom) served as military secretary to Gov Gen Lord Lansdowne, 1883-85, and as F.D. MIDDLETON's chief of staff during the NORTH-WEST REBELLION. In 1898 he became governor general; his term was marked by controversy and political strife. He was inexperienced in government, distrustful of politicians and determined to play an active part in Canadian public life, and his criticism of his government's handling of the SOUTH AFRICAN WAR crisis, his interest in reforming the Canadian Militia and his support for Joseph Chamberlain's imperial preference campaign, all caused tension. More positively, he attempted to forge closer ties between French and English Canadians, preserve the written and material record of Canada's past, promote sports (the Minto Cup in lacrosse) and protect Canada's northern miners and native peoples from the neglect and mismanagement of government.

CARMAN MILLER

Reading: Carman Miller, *The Canadian Career of the Fourth Earl of Minto* (1980).

Mirabel, Qué, City, pop 14 080 (1981c), inc 1971, located some 55 km NW of MONTRÉAL, is one of Québec's youngest cities and also one of its most extended (covering some 750 km^2). It was created in Jan 1979 through the arbitrary merger of 14 existing municipalities whose lands had been expropriated in Mar 1969 for the construction of the new international airport for Montréal, since named "Mirabel" in honour of a little hamlet that has now disappeared. The dismemberment of this ancient land and its new orientation has completely changed the regional structures and habits of its population. The airport, linked to Montréal by the Laurentian Autoroute, is in the centre of town. The region's economy still depends on agriculture.

GILLES BOILEAU

Miramichi River, 220 km long from Juniper, NB, to the Gulf of ST LAWRENCE, arises in central NB. Its 2 branches, the SW and NW Miramichi, join at Beaubears I, near NEWCASTLE, NB. Seaward from here, and throughout the open shallow Inner Bay, river water forms a fresh, less dense layer on top of saltier denser water. This is the picturesque Miramichi Estuary formed some 4000 years ago when currents and waves built a barrier of sand islands across the drowned, ice-deepened valley in the soft sandstones and shales of Pennsylvanian age. The effect of the sea is felt 65 km inland at Redbank as a regular rise and fall in the river flow.



Earl of Minto, governor general of Canada 1898-1904 (*courtesy Public Archives of Canada/C-51950*).



Early view of the Miramichi River from Beaubears I, where the 2 branches of the river meet. From the time of the settlement by the Acadians, the river has been the centre of fishing and forestry for NE New Brunswick (*courtesy New Brunswick Museum*).

Since their settlement by ACADIANS after the fall of LOUISBOURG and by English lumbermen, later turned shipbuilders, the scenic shores have been the focus of the dual economic life of fishing and forestry. Besides the lengendary ATLANTIC SALMON run — the foremost in eastern N America before its devastation by overfishing, pollution and unknown causes — smelt, gaspereau, shad, eel, herring, mackerel and lobsters are exploited. Formerly, extensive log rafts plied the river's waters; now major forest industries at CHATHAM and Newcastle depend on the Miramichi for shipping and effluent disposal. The spirit and independence of the Miramichi inhabitants are characterized by their survival, sometimes immersed to their necks in riverwater, of the Great Miramichi Fire (1825) in which 200 people died and almost one-quarter of NB's forests were burned. The obverse side of this individualism is the salmon poaching notorious along the length of the river. The origin of the name is unknown. KATE KRANCK

Miron, Gaston, poet, publisher (b at Ste-Agathe-des-Monts, Qué 8 Jan 1928). Miron spent the period 1947-53 discovering through everyday events the values of his province — its landscapes, people, heritage, social conditions and politics. In 1953 he and a few friends founded the Montréal publishing house L'Hexagone, and he continued his explorations of contemporary society. His poetry, for a long time oral, has been published in *L'Homme rapaillé* (1970) and *Courtepointes* (1975) and has captured an international audience. His poems are rooted in the here and now, but remain faithful to Québec's ancestral language, customs and usages, crystallizing isolated images: the man we meet on the street and whom we find in ourselves; the man committed to a political struggle; the collective and social individual caught up in a common destiny; and the land. Through these themes, his writing exalts and reconciles opposing elements in a time frame that is repetitive but that tends towards an ultimate transcendence. The poetry is dense and measured.

Miron was the first poet to show the Quebecer as he is. He had a definite influence on poetry of the 1960s and 1970s and he awakened the N American and European reader to a particular and universal anthropological reality.
EUGÈNE ROBERTO

Miscou Island, 64 km², comprises the most eastern part of Gloucester County, NB, on the W side of the Gulf of St Lawrence and at the entrance to CHALEUR BAY. The island is characterized by white sandy beaches, spruce trees, deep-sea fishing, lakes and salt lagoons, and a lighthouse at the northern tip, Miscou Pt. Originally inhabited by the MICMAC, it was discovered by Jacques CARTIER in 1534. Populated by settlers from France and the Channel Islands (hence its unique "patois" of Old French), the island passed to Britain in 1763. Its name derives from the Micmac *Susqu* meaning "boggy marsh" or "low land". DAVID EVANS

Miss Canada The representation of Canada as a sweet but coy young lady was a Victorian convention that was abandoned about the time of WWII. A popular depiction of Miss Canada was in winter garb — wearing skates, an overcoat, a tuque and a sash. At other times she was shown royally resisting the blandishments of a conniving Uncle Sam, symbolic of the US, siding instead with a portly John Bull, representative of Great Britain. Miss Canada is also a title awarded annually since 1946, on the basis of beauty, talent, personality, etc, to contestants with regional titles by the Miss Canada Pageant.
JOHN ROBERT COLOMBO

Mission, BC, District Municipality, pop 20 056 (1981c), inc 1969, area 25 333 ha, is located on the N bank of the FRASER R, 70 km by road E of Vancouver. An Oblate priest, Father Fourquet, established a mission on the present site 1860-61. Large-scale development began after the CPR was completed (1885) and a bridge built across the Fraser (1891). A community known as Mission Junction sprang up. Renamed Mission City in 1922, it amalgamated with the old district of Mission to form the present municipality, which has 2 main communities, Mission and Hatzic, and 4 smaller ones: Steelhead, Stave Falls, Silverdale and Ruskin. Hatzic, to the E of Mission, is mainly residential and is separated from Mission by land owned by the province as part of the agricultural land reserve. Mission's economy is based on lumbering, manufacturing, dairying and fruit and vegetable growing. A major landmark is the Benedictine monastic complex, Westminster Abbey, moved to Mission from Burnaby in 1954. ALAN F.J. ARTIBISE

Mistassini, Qué, Town, pop 6682 (1981c), inc 1976, is located on the Rivière Mistassini, to the N of LAC SAINT-JEAN. Mistassini in Indian means "big rocks." Settlement dates from 1892, when the Trappist fathers from OKA came to found a monastery in the forests N of Lac Saint-Jean. The monks also built a flour mill and a sawmill. Mistassini is a small service centre for surrounding parishes. Its population grew with the construction of the Dolbeau paper mill (1927) and power stations on the Péribonka R (1954-60). The town's growth forced the monastery to move to the nearby countryside (1979). Each Aug Mistassini holds its Blueberry Festival, honouring the small, blue fruit found in such abundance in the district. MARC ST-HILAIRE

Mistassini, Lac, 2336 km², elev 372 m, max length 159 km, is located in central Québec, 360 km E of JAMES BAY and 220 km NW of LAC SAINT-JEAN. Fed by numerous small lakes and streams, it drains to the W, via Lakes Mesgouez and Némiscau, following the course of the Rivière de RUPERT. It is the largest natural lake in the province. A series of rocky island ridges virtually divide it into 2 separate lakes. It is surrounded by black and white spruce, white birch, poplar, larch, jackpine and balsam, which support a fairly extensive logging industry. The waters of the lake contain whitefish, pike, gray and lake trout, and freshwater seals have been reported. The caribou have been overhunted, but moose are still frequently seen. The area has also been overtrapped, and the population of fox, otter, lynx, marten, mink and beaver have been seriously reduced. The lake was discovered by Abbé Charles Albanel in 1672, and was long a centre of the FUR TRADE. It still has a trading post, a Church of England mission and a Cree reservation. Geologist Albert Peter LOW wintered at the lake in 1884-85 and surveyed it June-July 1885. Today the area is famous for its production of blueberries, contributing greatly to the 13 million kg annual Canadian harvest. The name derives from the Cree word *mista-assini,* meaning "great stone." DAVID EVANS

Mistletoe family, Loranthaceae, includes about 30 genera and over 1000 species. It is predominantly tropical but has members in temperate regions. Plants are mostly small shrubs, parasitic on gymnosperms and woody flowering plants. They are attached to hosts, drawing nutrients from them through modified roots (haustoria). Severe infestations may produce abnormal growth of branches, called "witches' brooms." Flowers are small, usually greenish and, in N American species, unisexual. Fruits, fleshy berries with shelled seeds, are eaten by birds, which wipe the seeds from their beaks onto trees or deposit them in droppings. The only Canadian genus, *Arceuthobium,* comprises about 10 species, 4 of which are native to Canada. Three tend to parasitize particular trees: *A. americanum,* pine; *A. douglasii,* Douglas fir; *A. pusillum,* spruce. Only *A. campylopodum* has several hosts. *A. pusillum* occurs in the East, the others in the West. Most mistletoes are leafy and often evergreen, but *Arceuthobium* species have leaves reduced to scales, thus appearing leafless. The genus is unique in the explosive discharge of seeds from fruits. Some western Indian groups ate boiled berries, and used "leaf tea" for contraception. Some species may be toxic to livestock. Familiar mistletoe, *Viscum album,* is native to Europe, Africa and Asia. It has long been associated with ancient Celtic religious ceremonies, and its modern use as a Christmas decoration may derive from this. *See* PLANTS, NATIVE USES.

Mitchell, Charles Alexander, scientist, veterinarian, medical historian (b at Clarksburg, Ont 9 Aug 1891; d at Ottawa 8 July 1979). After graduating from the Ontario Veterinary Coll, Toronto, in 1915, he worked for the Dominion Dept of Agriculture 1914-57 and was Dominion Animal Pathologist 1944-57. Author of numerous articles, he was internationally recognized for his secret work on animal diseases during WWII. A strong supporter of organized VETER-

INARY MEDICINE, Mitchell was closely involved in the formation of regional and national veterinary associations and local medical study groups. In addition he researched and reported on many aspects of Canadian veterinary and medical history. Late in life he became director of research 1958-72 at Ottawa Civic Hospital. From 1958 to 1970 he was also associate professor in the Faculty of Medicine at U of Ottawa.
J.F. FRANK

Mitchell, Humphrey, electrician, trade unionist, politician (b at Old Shoreham, Eng 9 Sept 1894; d at Ottawa 1 Aug 1950). After serving in the Royal Navy in WWI, Mitchell settled in Hamilton, Ont, to work as an electrician. He served 2 years as president and 22 as secretary of the Hamilton and District Trades and Labor Council and chaired the Ontario executive of the TRADES AND LABOR CONGRESS OF CANADA. He was elected city alderman (1929-31) and in a 1931 by-election won a seat in the House of Commons. Although an independent labourite, he refused to join the new CCF and eventually gravitated towards the Liberals. After his defeat in the 1935 general election, he entered the federal Department of Labour; he later headed a number of wartime commissions and boards on labour matters. From 1941, just before he regained a parliamentary seat, until his death he was minister of labour under KING and ST. LAURENT. The introduction of new compulsory collective-bargaining legislation during his tenure laid the basis for Canada's postwar industrial-relations system.
CRAIG HERON

Mitchell, James, lawyer, politician, premier of NB (b at Scotch Settlement, York County, NB 16 Mar 1843; d at St Stephen, NB 15 Dec 1897). Mitchell was a prominent lawyer in St Stephen and during the early years of his career was also inspector of schools for Charlotte County. An MLA from 1882 to 1897, he served as provincial surveyor general, commissioner of agriculture, receiver general and provincial secretary before becoming premier in 1896. Poor health forced him to retire after 15 uneventful months, and his administration accomplished little of lasting significance.
ARTHUR T. DOYLE

Mitchell, Joni, stage name of Roberta Joan Anderson, pop singer, songwriter (b at Fort Macleod, Alta 7 Nov 1943). Initially a folksinger in Calgary and Toronto, Mitchell moved to the US in 1966, eventually settling near Los Angeles. Widely influential as a lyric stylist, her songs "Urge for Going," "The Circle Game" and "Both Sides Now" were popular in recordings by other artists. Subsequently, through her own albums (*Blue, Court and Spark, Hejira*) she outstripped her folk beginnings and, with her collaboration in 1978 with Charles Mingus (*Mingus*), reached into jazz. Her album *Clouds* received a Grammy Award in 1969.
MARK MILLER

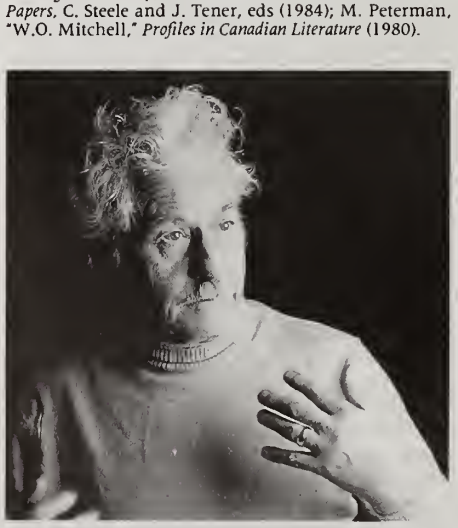
Mitchell, Peter, lawyer, politician (b at Newcastle, NB 4 Jan 1824; d at Montréal 25 Oct 1899). A colourful swashbuckler, Mitchell became a celebrity as Canada's first minister of fisheries but died bitter and unrewarded. In politics from 1856 and a strong supporter of Confederation, he became premier of NB in 1866 through a fluke. In the Senate 1867-72 and elected to the Commons in 1872, he was Sir John A. MACDONALD's minister of fisheries 1867-73 and proved himself both innovative and aggressive. He created an international incident when Canadian gunboats seized American fishermen in Canadian waters. The PACIFIC SCANDAL ended Mitchell's influence, though he remained in politics for several years and purchased the Montréal *Herald*. His self-esteem increased, as did his unreliability. He drifted to the Liberals, nursing grievances against Macdonald and others.
CARL M. WALLACE

Mitchell, William Ormond, novelist, dramatist (b at Weyburn, Sask 13 Mar 1914). In his treatment of prairie settings and language, W.O. Mitchell has depicted the West in fiction and influenced many later writers. He studied at U of Man and U of A. In 1944, after teaching 2 years, he settled in High River, Alta, where he remained until 1968 except for 3 years as fiction editor at MACLEAN'S (1948-51). After 1968 he was writer-in-residence at Banff School of Fine Arts, U of C, U of A and Massey Coll, Toronto. He has been at U Windsor since 1978, and lives there and in Calgary.

In 1947 Mitchell achieved instant recognition with the publication of his classic *Who Has Seen the Wind*. The novel examines the initiation of the boy Brian into the meaning of birth and death, life, freedom and justice. The children and the eccentrics, the ever-drunken Ben and the madman Saint Sammy, are the most vivid characters. Mitchell portrays the beauty and power of the prairie and the wind, symbolizing God. Allan KING directed the feature film based on the novel (1977). Mitchell's second novel *The Kite* (1962) is also concerned with life and mortality. Here Mitchell combines comic anecdotes with a more archetypal theme of the quest that ends in celebration and immortality. *The Vanishing Point* (1973) was a reworking of an early unpublished novel. Set on the Paradise Valley Reserve, its theme is the resolution of alienation; it is an affirmation of racial and personal interconnectedness. His novel *How I Spent My Summer Holidays* (1981) returns to the theme of initiation, but the vision is much darker. Hugh leaves childhood innocence to pass into a world of betrayal, guilt, repression and violence. In the end, the old man Hugh is left only with knowledge. His most recent novel, *Since Daisy Creek*, appeared in 1984.

Mitchell also wrote many plays for radio and TV. The popular *Jake and the Kid* (1961) originated in stories written for *Maclean's*; the series ran weekly on CBC Radio 1950-56. Around the hired man and the adolescent Kid, Mitchell wove the adventures of the community of Crocus, Sask. The eccentric characters, tall tales and local dialect added to the audience's enjoyment. The series was televised in 1961. The early radio plays *The Devil's Instrument* (1949) and *The Black Bonspiel of Wullie MacCrimmon* (1955) were later revised as full-length plays; the latter was staged in 1979 by Theatre Calgary as were *The Kite* (1981) and 2 plays written for the stage, *Back to Beulah* (which won the Chalmers Award, 1976) and *For Those in Peril on the Sea* (1982). Mitchell also experimented with a musical, *Wild Rose*, in 1967.
CATHERINE MCLAY

Reading: C. McLay, "Introduction" to *The W.O. Mitchell Papers*, C. Steele and J. Tener, eds (1984); M. Peterman, "W.O. Mitchell," *Profiles in Canadian Literature* (1980).



W.O. Mitchell, author of *Who Has Seen the Wind*, a novel that portrays the prairies (*photo by Peter Paterson*).

Mite, common name for some members of order Acari, a large, diverse group of tiny ARACHNIDS. Worldwide, about 30 000 species of mites have been described, of an estimated 250 000; in Canada, about 2000 of an estimated 10 000. Mites may exceed INSECTS in numbers of individuals: up to 1 million mites, representing some 100 species, may occur in one square metre of forest soil and litter in Canada. The earliest fossils are 380 million years old. Mite remains of present-day genera are commonly found in pieces of 80 to 100-million-year-old amber from Canada, Mexico and Europe. As their common name indicates, "mites" are unusually small; most range from 0.1 to 10 mm. Mites come in all colours; many are dull, but some, especially water mites, are bright red, blue or green. Like spiders, mites lack well-defined abdominal segments, but, unlike spiders, their abdomen is not separated from the rest of the body by a narrow waist. Mites grow by gradual metamorphosis: egg, six-legged larva, 1-3 eight-legged nymphal stages and eight-legged adult. Mites and TICKS are the most ubiquitous single animal group, living in nearly every terrestrial and aquatic habitat, including the sea. Mites may disperse by air currents or by birds, mammals and flying insects. Many have developed nonpredacious feeding habits, eg, feeding on bacteria, yeasts, fungi, algae, mosses and higher plants. Others parasitize insects and vertebrates (except fish), some being found in secretive spots, eg, inside bird quills, under lizard scales, in lungs of seals, and in human facial pores. Mites are both destructive and useful. Herbivorous spider mites are pests of various crops, forest trees and ornamentals. Some eriophyid mites, also herbivorous, form galls or transmit plant viruses, including wheat streak mosaic in Canada. Mites cause great economic losses in stored grain, other food and organic products. House dust mites concentrate allergenic materials. Other mites, eg, chiggers, mange and scabies mites, are important parasites and sometimes transmit human and livestock diseases. Some species are beneficial as predators of herbivorous mites; others feed on weeds. The importance of oribatid mites in decomposing and recycling organic matter in soil is just beginning to be understood.
EVERT E. LINDQUIST

Mitel Corporation, *see* ELECTRONICS INDUSTRY.

Mladenovic, Milos, professor, editor (b S of Belgrade, Serbia 1903; d at Montréal 4 1984). With degrees in law and commerce from Belgrade and a doctorate from the Sorbonne, he joined McGill's history dept in June 1950. He introduced courses on eastern European, USSR and Byzantine history and also lectured on the Soviet legal system. He examined the history of war as part of "the general historical process," stressing above all the reciprocal influences of social structure and the forms taken by military conflict. Mladenovic devoted the greater part of his life to his graduate students, who published a festschrift in his honour in 1969, *Eastern Europe: Historical Essays*, and a symposium of essays on war and society in 1972, *War and Society in the 19th Century Russian Empire*. At one time in the 1970s, 7 departments of history, 2 of political science and one of Byzantine studies were chaired by his former students. From 1964 to 1974 he was editor of *The New Review*, the only scholarly journal in Canada devoted to eastern European history. He has published numerous books, articles and reviews in English, French, German and Serbian.
J.L. BLACK

Moberly, Walter, civil engineer (b at Steeple Aston, Eng 15 Aug 1832; d at Vancouver 14 May 1915). He came to Canada as a child and studied in Canada W, later moving to BC. In 1859 he was appointed superintendent of public works and in 1862 was involved in the construction of the Yale-Cariboo wagon road (*see* CARIBOO ROAD).

He was assistant surveyor general of BC 1864-66 and then spent 4 years in the US. In 1871 he was in charge of surveys for the route of the CPR through the Rocky Mts and BC. He published his reminiscences, *The Rocks and Rivers of British Columbia*, in 1885. ERIC J. HOLMGREN

Moccasin Though they were of 2 major types, there were as many kinds of moccasins distributed throughout N America as there were tribes who manufactured them. Moccasins found in the Arctic and on the Plains are hard soled, consisting of a deerskin upper sole sewn to a heavier and stiffer bottom sole. Soft-soled moccasins, made from a single piece of hide, are characteristic of the Subarctic, the northern prairies and northeastern N America. The soft-soled variety have a wider distribution and are more efficient for use with SNOWSHOES. RENÉ R. GADACZ

Mockingbird, common name for some members of the THRASHER family (Mimidae). The northern mockingbird (*Mimus polyglottos*), the only mockingbird in Canada, is a rare, permanent resident across Canada and is slowly extending its range northward. Grey above, greyish white below, its white wing patches and white outer tail feathers are conspicuous in flight. Its loud, musical, repetitive song is often given at night and includes mimicked vocalizations of other birds. Northern mockingbirds inhabit dense thickets and woodland edge, maintaining territories year-round, defending food sources in winter. Breeding occurs May-July; clutches contain 4-5 eggs. J.C. BARLOW

Modern Dance, *see* DANCE, MODERN.

Moffat Communications Limited, controlled by Randall L. Moffat, owns and operates radio stations in Vancouver, Calgary, Edmonton, Moose Jaw-Regina, Winnipeg and Hamilton. The company also owns CKY-TV, the CTV-network affiliate in Winnipeg, which extends service to 97% of Manitoba's population. Moffat's 80%-owned CABLE-TELEVISION company, Winnipeg Videon Inc, provides service to over 136 442 households. The company also owns 85.5% of 2 cable-television systems in the US. Total assets in 1983 were $61 million, with revenues of $50.3 million. PETER S. ANDERSON

Mohawk, the most eastern member of the IROQUOIS Confederacy, resided in 3 principal villages ("castles") on the banks of the Mohawk R. In 1609 and 1610 they were defeated by their northern neighbours, assisted by CHAMPLAIN. Mohawk hostilities were then channelled eastward, where they drove the Mahicans out of the Mohawk Valley and gained access to the Dutch traders of Ft Orange (now Albany, NY). By 1640 they had exhausted beaver stocks in their own country and so they obtained this trade item by plundering fur fleets coming to trade with the French. A truce between NEW FRANCE and the Mohawk was arranged in 1645. Isaac JOGUES attempted to establish a Jesuit mission in their country, but was accused of witchcraft and executed. Shortly afterward the Mohawk and SENECA combined to drive the HURON from their homeland.

The French burned the Mohawk villages in the autumn of 1666 and then made peace. The Jesuits established a mission and encouraged their converts to move to the St Lawrence, away from English influence, where settlements were established in the 1670s. War again broke out, and the Mohawk towns were burned in 1693, with some of the Catholic Mohawk aiding the French against their kinsmen. The entire Iroquois Confederacy negotiated treaties of peace and neutrality with both the French and English in 1701.

In 1710, 3 Mohawk chiefs and a Mahican journeyed to London where they were presented to Queen Anne. To counteract French Jesuit influence, Anglican missionaries were promised to the Mohawk, and the queen presented communion silver for a chapel. Catholic Mohawk from the St Lawrence played an active role as French allies, participating in the destruction of Deerfield, Mass, in 1704 and Groton, Mass, in 1707.



Huron moccasins (*courtesy National Museums of Canada/National Museum of Man/S77-1857*).

During the 18th century the Mohawk, now living in 2 principal towns, became surrounded by white settlers. They adopted the housing styles of their neighbours and were closely tied to the British administration; the Indian superintendent, Sir William JOHNSON, married a Mohawk, Mary BRANT. Johnson used Mohawk warriors in the final French-English conflict for possession of the continent. Johnson died before the outbreak of the American Revolution. The Mohawk joined that struggle in 1777, under the leadership of Joseph BRANT who had just returned from England. Brant and his Mohawk frequently defeated the Americans, but were forced to flee their homes, which were confiscated and used by the rebel settlers.

After the war, Brant and his followers settled on the Grand R on a grant secured for them by Gov Frederick HALDIMAND (now the Six Nations Reserve). Other Mohawk, under John DESERONTYON, settled on the Bay of Quinte. The Mohawk were largely Anglican, and the Queen Anne communion silver was divided between the 2 reserves. The Mohawk settled in Ontario and those on the St Lawrence became increasingly incorporated in the white man's world. Mohawk from Caughnawaga outside Montréal established a reputation as boatmen and were recruited to ferry Gen Garnet WOLSELEY'S army up the Nile in 1884-85 (*see* NILE EXPEDITION). In later years, men from this same reserve established a reputation as structural-steel workers.

Over 3000 Mohawk continue to speak their native language. Some of them returned to the HANDSOME LAKE RELIGION and established longhouse congregations at Caughnawaga in the 1920s and St Regis (Akwasasne) in the 1930s. Residents of both these communities had been Roman Catholic for some 250 years. *See also* NATIVE PEOPLE: EASTERN WOODLANDS; IROQUOIS WARS; and general articles under NATIVE PEOPLE. THOMAS S. ABLER

Reading: B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

Moisie, Rivière, 410 km long, rises in eastern Québec from Lac Opocopa and flows S to the ST LAWRENCE R. With a DRAINAGE BASIN of 19 200 km^2 and a mean discharge of 490 m^3/s, it is the river of greatest volume along the middle N Shore of the St Lawrence. Its current is swift and rapids numerous. The deep, rugged valley is lined with spruce, fir, birch, aspen and pine. It is one of the best salmon and trout rivers in eastern N America. The HBC has a trading post at the village of Moisie at the river's mouth, some 20 km E of Sept-Îles. The name possibly derives from a Montagnais personal name. JAMES MARSH

Mold, or mould, term for woolly or cottony growths produced by FUNGI, and for species causing these growths. Molds are numerous and common Canadian species have worldwide distributions. Maximum species numbers and growth rates occur under warm, humid conditions, but some molds grow slowly at -20°C, while others continue growing at +60°C. Mold consists of hyphae (filaments), masses of which are called mycelia. Vegetative mycelium develops in organic material or soil; visible mold consists of fertile hyphae and spore-producing structures. Materials in which hyphae grow are digested (decayed) and the fungus absorbs products as nutrients. Decay, an essential natural process, causes deterioration of foods, textiles and structural materials. In addition to causing spoilage, some molds produce poisonous substances (mycotoxins) that render foods unsafe. Mycotoxins may be carcinogenic. Mold infections cause skin diseases (eg, ringworm and athlete's foot). Severe systemic infections (mycoses) are common in some regions. Hay fever may be caused by airborne mold spores. Domesticated and wild animals and birds are subject to similar afflictions. Molds infect and kill insects and cause many plant diseases; some water molds cause fatal fish and crustacean infections. Common blue and green molds, which cause spoilage of fruits, vegetables and jams, are mostly species of *Penicillium* and *Aspergillus*. Some species of these genera are important in industrial production of antibiotics, citric and gluconic acids, etc. Blue cheeses owe their distinctive flavour to species of *Penicillium*. Molds related to black bread mold and *Aspergillus* species are used in production of some Asian foods (eg, tofu, tempeh, saki and soy sauce). R.J. BANDONI

Mole, common name for 20-29 species of predominantly burrowing insectivores of family Talpidae, restricted to Eurasia and N America. Six species occur in Canada. Moles have cylindrical bodies; dense, velvetlike fur; pointed, mobile snouts (with fingerlike appendages in the star-nosed mole); minute eyes and external ears greatly reduced or lacking. The five-toed feet show varying degrees of adaptation for swimming (Old World water moles) or burrowing. Moles usually mate in spring; gestation lasts 4-6 weeks; litters average 2-5 young. They may live 3-4 years. Canadian species are largely subterranean, preying mainly on soil invertebrates. They may eat their own weight in food daily. Shrew, coast and Townsend's moles (*Neurotrichus gibbsii, Scapanus orarius, S. townsendii*, respectively) live in extreme southwestern BC; eastern mole (*S. aquaticus*), in Essex County, Ont; hairy-tailed mole (*Parascalops breweri*), in forests of Ont and Qué; and the somewhat aquatic star-nosed mole (*Condylura cristata*), from the Maritimes to Man and N into the boreal forest. C.G. VAN ZYLL DE JONG

Molecular Biology, subdiscipline of BIOCHEMISTRY that studies the structure, synthesis and degradation of macromolecules (ie, very large molecules) found in living cells, their metabolic regulation (how they are interrelated and balanced during synthesis and degradation) and their expression (how the GENETIC code operates and is controlled through structural interrelationships). Macromolecules include the nucleic acids DNA (deoxyribonucleic acid) and RNA (ribonucleic acid), proteins (including enzymes),

carbohydrates, and complexes of carbohydrates and proteins and lipids (soluble cellular fats and waxes) and proteins. The term was first used by Oswald T. Avery in the late 1940s and was early equated with the study of nucleic acids. As a result of their work on bacteria, Canadian researchers Avery and Colin M. MacLeod and American Maclyn McCarty were the first to provide firm evidence that DNA was the genetic material in the cell (1944). Current interests also include the structure of collagen (cartilage) and keratin (a highly insoluble protein in skin).

The structure of DNA is a double helix, first described in 1953 by Nobel laureates (1962) J.D. Watson (an American who had been influenced by Avery's work) and British researcher Francis Crick. The double helix is composed of 2 antiparallel chains of sugar-phosphate "backbones" with complementary pairs of nucleic-acid bases in the centre. American biochemist Erwin Chargaff's observation of base pairing was important to Watson and Crick's discovery as were the X-ray diffraction studies of British biophysicist Rosalind Franklin. Just before the elucidation of the structure of DNA by Watson and Crick, G. Wyatt (now at Queen's University) described 5-methylcytosine, the first modified base found in DNA molecules, and confirmed base pairing and the base composition of a number of DNAs. DNA was postulated as the template for RNA synthesis by French biochemists Jacques Monod and François Jacob (Nobel Prize, 1965). RNA synthesis is called transcription; protein synthesis from the RNA transcript is called translation. Once the protein is translated, depending on the type of cell, it can then undergo a series of changes (eg, addition of carbohydrate or lipid) to make the complex proteins that are part of many cells.

A large part of research in molecular biology has been undertaken on viruses, the simplest of life forms, because they have no complex cellular structure or cell membrane. Some of the earliest basic studies on viral systems were made by Canadian researcher Felix d'Herelle, who independently discovered bacteriophages (bacterial viruses). Viruses are composed either of DNA or RNA with associated proteins, and thus can be used as model systems for examining replication (DNA synthesis), transcription (RNA synthesis) and translation (protein synthesis). Bacteriophages were the first to be examined in detail. DNA synthesis is best understood in these viruses mainly because of studies led by American biochemist A. Kornberg. More recently, eukaryotic viruses (ie, those that attack nucleated cells) have been used. The virus can be considered a microcosm of the cells and tissues of animals and its molecular biology is controlled by mechanisms analogous to those in cells. Viruses that have RNA as their genetic material are called retroviruses; some retroviruses have been implicated in human CANCER. However, most viruses that attack eukaryotic cells are DNA viruses.

Molecular biology has expanded recently as a result of the application of recombinant DNA techniques (ie, GENETIC ENGINEERING), following the isolation of restriction enzymes in 1970 by American biochemist Hamilton Smith (Nobel Prize, 1978). Restriction enzymes cut DNA molecules at specific sites (base sequences). Joining enzymes can link together the DNA fragments. These enzymes were used to join different DNA molecules together in gene-splicing experiments to form recombinant molecules, first on bacterial cells and viruses. In 1977 the first recombinant molecules composed of mammalian DNA inserted into bacterial elements called plasmids were contracted. Plasmids are particles found in some bacterial cells that contain DNA, but are not part of the chromosomal apparatus of the bacterium. The next important discovery was of "split genes," ie, the RNA synthesized from the DNA of eukaryotic cells can be much larger than the final messenger RNA product, because those segments of the RNA product that are not necessary to code for the protein message are cut out, and the remaining RNA spliced together.

This work was followed by the development of powerful, fast and relatively easy methods for determining the base sequence of DNA, ie, the order of the base components in DNA. Two laboratories, those of Walter Gilbert in Cambridge, Massachusetts, and Fred Sanger in Cambridge, England, developed different methods. Gilbert, Sanger and Californian Paul Berg (who performed the first cloning experiments) received a Nobel Prize in 1980. The advent of these technologies has led to a complete change in classical and molecular genetics. The ability to explain clinical observations at the level of the DNA molecule has led to a better understanding of many hereditary diseases. Changes in the DNA at the base sequence level cause differences in the messenger RNA sequence which, when translated into protein, result in the wrong protein being made or in an altered protein, leading to a dysfunction characteristic of the GENETIC DISEASE. Many genetic concepts have been revised; eg, multiple gene copies have been proven to exist for many proteins.

Canadians have played an important part in the development of molecular biology. Gobind KHORANA, who received the Nobel Prize for the first chemical synthesis of a nucleic-acid molecule in 1968, started his work at the British Columbia Fisheries Research Laboratories, Vancouver. Khorana's many students include G. Tener (UBC), who developed a chromatographic column for separating nucleic acids over a range of sizes, an innovation that has had tremendous methodological impact on molecular biology; and M. Smith (UBC), who was a member of Sanger's laboratory when the first DNA virus molecule was sequenced in 1977. Groups are now undertaking research in molecular biology in all major Canadian universities (within laboratories in faculties of Medicine and Science), in the BIOTECHNOLOGY companies located in most provinces, and in many federal and provincial laboratories. *See* NATIONAL RESEARCH COUNCIL OF CANADA; RESEARCH, PROVINCIAL ORGANIZATIONS.

JOHN H. SPENCER

Molecules in Interstellar Space Atoms had been detected in the interstellar medium by 1921 and, between 1936 and 1942, C.S. BEALS, then at the Dominion Astrophysical Observatory (DAO), Victoria, and Adams and Dunham in the US, detected optical transitions of the molecules CH, CN and CH^+ in interstellar space. Andrew MCKELLAR (DAO) found that the CN molecule showed evidence of an excitation of about 3 K. This temperature was not understood at the time, but is now known to result from microwave cosmic background radiation.

In 1963 the first detection of a molecule (the hydroxyl radical OH) at centimetre-wavelength radio frequencies was made by Weinreb, Barrett, Meeks and Henry of the Massachusetts Institute of Technology. The detection at millimetre wavelengths of the more complicated molecule ammonia (NH_3), by Townes, Welch and their collaborators at Berkeley in 1968, led to a flurry of further discoveries. Using earth-satellite Copernicus, Lyman Spitzer Jr and his co-workersat Princeton detected molecules in the ultraviolet. About 53 molecules have been detected, many by US astronomers using the Kitt Peak (Arizona) millimetre-wave telescope. When fully explored, using SPACE TECHNOLOGY, the infrared region is expected to produce a rich yield of new molecules.

Spectra from interstellar molecules give a wide variety of information about the interstellar medium and have shown that a significant fraction of the medium is clumped into molecular clouds, ranging from less than 100 times the mass of the SUN to a million solar masses. Within these clouds the visible stars in the GALAXY are formed. Molecular radiation provides information about the temperature, density and velocities within the clouds, and the clouds themselves are being used to map the structure of our galaxy. Improvements in the sensitivity and angular resolving power of telescopes have allowed detection of radiation from molecular clouds in several nearby galaxies. When larger millimetre-wave telescopes, now being constructed, are operational, research opportunities will be even greater.

Radiation detected from interstellar molecules usually arises from changes in a molecule's state of rotation. Substitution of an isotopic species of one of the atoms in the molecule (which produces a significant change in the rotation speed) is therefore easy to detect. This technique allows measurement of isotope ratios of several common atoms (eg, hydrogen, carbon, oxygen, nitrogen, sulphur) in a number of clouds throughout the galaxy; these studies have indicated that, apart from anomalies in the region of the galactic centre, the isotopic composition of the rest of the galaxy (including our solar system) appears to be fairly uniform.

Canadians have made significant contributions to the search for new interstellar molecules. In the early 1970s the molecules HCN and HC_3N were detected, the latter by UBC graduate Barry Turner working at the National Radio Astronomy Observatory in Virginia. This sequence was greatly extended by a group of Canadian radio astronomers from the Herzberg Institute of Astrophysics (named for Gerhard HERZBERG, 1971 recipient of the Nobel Prize in chemistry for his study of the spectra of molecules). Inspired by T. Oka, the principal investigators were Lorne Avery, Norm Broten and John MacLeod who, with the British spectroscopist Harry Kroto, used the 46 m telescope at ALGONQUIN PROVINCIAL PARK to discover successively the molecular sequence HC_5N, HC_7N, HC_9N. Subsequently, another team at the same institute detected $HC_{11}N$, at present the heaviest interstellar molecule detected. Scientists are now trying to establish the existence in interstellar space of the simplest amino acid, glycine, which is a building block of DNA and therefore of life forms.

WILLIAM SHUTER

Molinari, Guido, painter (b at Montréal 12 Oct 1933). He studied briefly at the School of Design at Montréal Museum of Fine Arts (1950-51), and began making drawings and paintings combining automatic methods with a disciplined approach. He was a leader in the development of a rigorous colour abstraction in Montréal. Characteristic of his paintings in the 1960s were vertical, hard-edged bands of colour. Pictorial space in these paintings was created by the spectator's perception of the shifting and mixing of the colours. More recently, colour in his work has been reduced to very dark values, and rather than narrow bands, the paintings are divided into 2 to 5 large vertical sections.In 1956 Molinari was a founding member of the Association des artistes non-figuratif de Montréal. He exhibited at the Biennale in Venice in 1968, where he was awarded the David E. Bright Foundation prize. In 1977 he participated in the Paris Biennale, and in 1980 he was awarded the Paul-Émile BORDUAS prize by the Québec government. Molinari teaches at Concordia U and has exerted a powerful influence on younger artists, through his teaching, his theoretical writing and his opinions, firmly held and strongly stated.

MARILYN BURNETT

Mollusc, soft-bodied, usually shelled INVERTEBRATE belonging to one of the largest animal phyla (Mollusca) with some 100 000 living and about 35 000 FOSSIL species. Molluscs are found

on land and in salt and fresh water, and include SNAILS, ABALONE, CLAMS, MUSSELS, OCTOPUSES and SQUID. Molluscs range from some of the smallest invertebrates (snails and clams, measured in millimetres) to the largest (giant squid, up to 15-20 m long). The group is characterized by a muscular foot on which the animals creep; a calcareous shell secreted by the underlying fleshy mantle; and a feeding structure, the radula, consisting of a membrane, bearing sharp cusps, thrusting out from the mouth (found in all major groups except Bivalvia). Food particles (plant or animal tissue) are rasped on the inward or return stroke and are borne into the gullet and through the alimentary tract in grooves lined with cilia (hairlike projections). Bivalves feed mainly on waterborne food particles, captured by a mucus-filtering system formed from the gills. Mollusc shells consist of calcium carbonate crystals (sometimes with magnesium carbonate) interspersed in an organic framework. The mineralized shells have left a rich fossil history dating back to the earliest evidence of animal life. The ancestral mollusc is thought to have been a small, creeping, bilaterally symmetrical inhabitant of ocean shallows, bearing a shield-shaped shell. It ate fine algae scraped from rocks. Seven major classes of living molluscs evolved: Monoplacophora, Polyplacophora (chitons) and Gastropoda (snails) most closely resemble the primitive form; Aplacophora, Scaphopoda (tusk-shells), Bivalvia (clams) and Cephalopoda (octopuses) represent more radical divergences from the ancestral type. Molluscs, because of their diverse and often beautiful shell shapes, accessibility, and importance as food and disease vectors, have played important cultural and economic roles in human history. Malacology studies the diversity, classification and EVOLUTION of molluscs. A brief discussion of the 7 major molluscan classes follows. THOMAS CAREFOOT

Monoplacophora, small class comprising some 7 species in genus *Neopilina;* no Canadian species are known. First discovered live in 1952 from deep-dredge collections off the Pacific coast of Costa Rica, these small (0.3-3 cm long) animals were hitherto known only from fossils of the Cambrian period (570-500 million years ago). Their primitive features, eg, single, shield-shaped shell (hence, name Monoplacophora), poorly developed head, and repetitive systems of paired kidneys, gills and foot retractor muscles, suggest that Monoplacophora represent one of the earliest molluscan groups. They are adapted for life at great depths and eat unicellular plants and animals and sponge material grazed from the sea bottom. THOMAS CAREFOOT

Polyplacophora, the chitons, marine class comprising some 600 living species, ranging from a few centimetres or less to over 30 cm long. The name, meaning "bearer of many plates," refers to the 8 distinctive, overlapping shell-plates. The protective shell and broad, adhesive foot permit life on rocks in wave-disturbed intertidal zones. They eat unicellular algae, scrapings from seaweeds and occasionally animal matter. The poorly developed head, rudimentary nervous system, primitive larval form and multiple gills suggest that chitons diverged early from the main line of molluscan evolution. The gum-boat chiton (*Cryptochiton*) of the Canadian West Coast is one of the world's largest chitons. THOMAS CAREFOOT

Gastropoda, the largest molluscan class, with 75 000 living and about 15 000 fossil species, includes some of the most common invertebrates: limpets, abalones, PERIWINKLES, conchs, WHELKS, SLUGS and snails. Gastropoda are harvested and cultured for food worldwide. Certain freshwater snails are important disease vectors, acting as intermediate hosts for liver and blood flukes that parasitize humans (eg, schistosomiasis). Snail shells are prized for their form and beauty. Gastropods occupy more habitats and represent more species than any other molluscan class. This extensive adaptive radiation was made possible through 3 major changes from the molluscan ancestral plan: development of a complex head with elaborate receptors and nervous system; coiling of shell; and torsion, involving a 180° twisting of the shell and visceral mass over the lower body section. Coiling and torsion evolved independently. Coiling probably preceded torsion, converting the ancestral shell from a simple, flattened shield to a fully protective retreat. The earliest form of coiled shell (found only in extinct species) was planospiral, ie, each spiral lying outside of the preceding one in the same plane (eg, like a coiled rope). This large, unwieldy and probably unbalanced shell was improved by evolution of asymmetrical coiling about a central axis. The new shell had its centre of gravity squarely over the body midline. The outward projection of the largest whorl of the shell creates the mantle cavity (lined with the shell-secreting membrane), which houses gills and sensory equipment for testing water quality and receives discharge of kidneys, gonads and rectum.

Torsion, thought to have occurred after the evolution of a planospiral shell, formed the gut and nervous system into a U-shape and brought the mantle cavity from its posterior position to an anterior one. Torsion occurs in the larval stage of living gastropods. Its significance in gastropod evolution is disputed. Some argue its importance to larvae (protective withdrawal into mantle cavity); others, to adults (enhanced respiratory stream). An important consequence of the shifting of the mantle cavity to the front was the potential for fouling the head region with rectal and kidney wastes. The solution, involving redirection of water flow for respiration, resulted in considerable modifications of shell design. For example, the perforated shells of abalone and keyhole limpets allow a unidirectional flow of water through the mantle cavity: in over the head, past the gills, then past the rectal and kidney outlets, exiting via the shell holes.

Gastropods are separated into 3 subclasses. Prosobranchia, the largest, is mainly marine and includes gastropods having full torsion, eg, limpets, abalones, whelks. periwinkles and conchs. Among members of this subclass exploitation of habitats and food types has been extensive; some even live as parasites. Foodstuffs include dead organic material, microscopic phytoplankton, seaweeds and animal prey (including fish). In snails the food-procuring device is the radula, which in cone shells has evolved into poisonous barbs that can be thrust into prey. Therefore, certain cone shells can be highly toxic to humans. The second subclass, Opisthobranchia, is almost entirely marine, with some 1100 species including sea slugs, sea hares, sea butterflies and bubble shells. Opisthobranchs have undergone detorsion in their evolution, shifting the mantle cavity to the side. Associated with this has been a tendency towards reduction or loss of shell and mantle cavity, and a loss of gills. Shell loss may have led to evolution of defences characteristic of opisthobranchs, eg, ability to swim, acid secretion, protective internal spines (spicules), camouflage coloration, and secondhand use of stinging cells seized intact from coelenterate prey. The third subclass, Pulmonata [Lat, "lung"], probably evolved from the Prosobranchia. Pulmonates include some 20 000 species of land snails and slugs, freshwater snails, and a few marine snails, having in common a loss of gills and conversion of mantle cavity into a lung. This highly successful group includes numerous crop and garden pests. THOMAS CAREFOOT

Aplacophora, obscure class of shell-less Mollusca (aplacophora means lacking shell) comprising some 250 living species. Aplacophorans live in marine bottom sediments or on hydroids and soft corals throughout the oceans. These small (up to 5 cm long), worm-shaped animals have a vestigial head and archaic nervous system; shell, mantle and foot are absent. Aplacophorans are largely predators or scavengers and use the radula to procure food. Their evolutionary position among molluscs is unclear, as the extent of their primitiveness or specialization is unknown. Aplacophorans superficially resemble polyplacophorans; therefore, the 2 groups are sometimes combined in a separate taxon, Amphineura. THOMAS CAREFOOT

Scaphopoda, small class of burrowing marine molluscs, the tusk or tooth shells, comprising some 350 living species. The shell, ranging from less than 1 cm to 5-6 cm long, is cylindrical and resembles an elephant's tusk, open at both ends. The animal lies buried in sediment with the smaller, posterior end of shell near the surface of the substratum. A ventilating current circulates through the shell, exiting from the hole at the posterior tip. Scaphopods eat microscopic organisms collected by small tentacles. Tusk shells, specifically genus *Dentalium,* were prized as ornaments and were used as a medium of exchange by Northwest Coast Indians. THOMAS CAREFOOT

Bivalvia, also called Pelecypoda ("hatchet-foot") or Lamellibranchia ("comb-shaped gills"). The class includes clams, mussels, SCALLOPS, OYSTERS and shipworms, and is exclusively aquatic. Approximately 12 000 species are known. In Canada there are 415 marine and about 200 freshwater species. Bivalves are used for food and were important to coastal native peoples. They now support fishing and AQUACULTURE on the Atlantic and Pacific coasts. Bivalves provide mother-of-pearls and freshwater and marine pearls. Most Canadian bivalves are 1-10 cm long, but species shorter than 1 mm and longer than 1 m are known. A hinged shell, consisting of 2 calcareous valves (half-shells) joined by a hinge ligament on the back, is characteristic of the group. The hinge region frequently has interlocking teeth that align the valves. Many bivalves have 1 or 2 protruding tubes (siphons) for entry and exit of water. The head is reduced as sensory functions are located on external body parts. Gills are small in groups that feed by sorting food from sediment, big in those that pump large volumes of water to trap suspended food particles. Gills may be minute or entirely replaced by a muscular flap used to catch small prey. The foot is used for locomotion and especially for digging, but may be absent in adults of sedentary forms. The sexes are usually separate, but some species are hermaphroditic. Alteration of sex, depending on age or external conditions, occurs in several groups. Fertilization is usually external and development occurs in the plankton. A number of species living in cold, boreal or deep water brood the young within the shell or in a specially constructed pouch. The nervous system is simple, consisting of 3 pairs of interconnected ganglia (nerve masses). Specialized sensory organs include statocysts that monitor position; complex eyes on the mantle margins or siphons in some groups; and other organs sensitive to vibration. The alimentary system includes a stomach with complex ciliary sorting mechanisms that communicate with complex digestive diverticula (glandular tubes or sacs). Many groups possess a crystalline style (secreted, translucent rod), in the midgut or in a separate pouch, that aids in digestion. The intestine may be short or coiled. The alimentary system may be reduced or entirely absent. Scallops and a few other groups can swim briefly to avoid enemies, but the enclosing shell enforces sedentary habits (eg, lying on or buried in sediment, attaching to solid objects or boring). This life mode has limited the adaptive potential to

minor structural changes; however, bivalves have been a successful group from earliest times. Frequently they occur in large numbers, and the filtering forms are an important link between the planktonic (drifting) and benthic (bottom-dwelling) communities. Their origin is unknown and their classification subject to change. Five living subclasses and 12 orders are recognized based on fossil, shell structure, anatomical and biochemical characteristics.

FRANK R. BERNARD

Cephalopoda ("head-foot") Extensive modification of the molluscan head-foot resulted in the cephalopod's characteristic parrotlike beak, surrounded by a ring of grasping appendages: 8 sucker-covered arms for the octopods, 8 arms and 2 tentacles with suckers or hooks for squid and CUTTLEFISH, and 60-94 simple arms in the primitive chambered or pearly nautilus. Of the 650 living cephalopod species, only 3 species of genus *Nautilus* have external shells. These are the last living tetrabranchiates (4-gilled cephalopods), although thousands of shelled Nautiloidea and Ammonoidea from the Paleozoic (between 570 and 225 million years ago) and Mesozoic (between 225 and 65 million years ago) are known from fossils. The hollow shells provided buoyancy and protection, but modern dibranchiate (2-gilled) cephalopods have given them up, apparently for flexibility and speed. These predatory, marine carnivores have little in common, externally, with other molluscs. Their shell-less muscular mantles work as pumps to force water through a funnellike tube that can be aimed in any direction. This jet-propulsion system provides for high-speed swimming with rapid direction changes, comparable to that of fish. Their swimming manoeuvres, complex arm movements, rapid colour changes and sophisticated camera eyes (resembling human eyes) require the most complex nervous systems in the invertebrate world. Only birds and mammals have larger brains relative to body size. Octopuses, sometimes called devil fishes, are easily trained and have been studied as examples of how animals learn. Squid, too, are important for research; their giant nerve cells were a key to understanding the electrophysiological basis of nerve function.

Although most of the world's cephalopods are tropical or subtropical, 46 species occur along Canada's coasts. This limited variety is made up for by size and quantity. Specimens of the giant squid or kraken (*Architeuthis dux*) found in Newfoundland, have reached nearly 20 m long (including tentacles) and may weigh up to 454 kg. Giant squid are the largest invertebrates known. On the Pacific coast, *Octopus dofleini*, the world's largest octopod, may exceed 80 kg. This octopus is fished commercially, as are 3 species of squid: *Loligo opalescens* in the West, *Loligo pealei* and *Illex illecebrosus* in the East. The arrow squid, *I. illecebrosus*, is famed for its exploits on Newfoundland's "squid jigging grounds." It was originally caught as cod bait, but recent annual catches of up to 150 000 t make this a major fishery in its own right, and one of the world's largest cephalopod FISHERIES. Dried or frozen, this "fish bait" is considered a delicacy in Oriental and Mediterranean markets. When cooked quickly, it is tender and has a delicate flavour resembling that of shrimp and scallops. Cephalopods are one of the largest, under-used food resources. Deep-sea cephalopods are a major food for many whales. It has been estimated that sperm whales alone consume some 800 million t annually, over 10 times man's total annual fish catch. Cephalopod fisheries are particularly attractive because most cephalopods grow rapidly, spawning and dying after only 1-2 years.

R.K. O'DOR

Reading: R.D. Barnes, *Invertebrate Zoology* (1980); Arthur H. Clarke, *Freshwater Molluscs of Canada* (1981).

Molluscan Resources Although Canada's coastline is extensive and contains many diverse molluscan species, the resource is economically relatively small. In 1982 about 178 000 t valued at $248 million were taken. SCALLOPS and SQUID from the Atlantic coast were the dominant species, accounting for 95% by weight and 97% by value of all molluscs from both coasts. There is no molluscan fishery in arctic waters. In Canada most molluscs are fished rather than cultured. For most species the short growing season results in growth rates too slow for profitable culture. The OYSTER is the only species now cultured in some quantity, although MUSSEL culture is beginning. Expanded production of both is possible but, in general, the potential for molluscan AQUACULTURE in Canada is not great. The occurrence of paralytic shellfish poison can limit the use of some species. The toxin derives from poisonous planktonic dinoflagellates on which bivalves feed. Although harmless to molluscs, it can be fatal to humans. Except for scallop and partially for squid, most species are fished for or cultured by individual fishermen or families. Native people fish certain species (eg, CLAMS) commercially and for food. Federal and provincial governments participate in regulation as well as controlling factors such as sanitation, pollution, lands and marketing. Jurisdictions differ from province to province as a result of agreements developed through the years. Scallops are fished by vessels 20-30 m long, pulling drags over the bottom in depths up to 100 m. The centre of the fishery is on GEORGES BANK, ownership of which was contested by Canada and the US until Oct 1984, when the International Court at The Hague awarded the eastern-most one-sixth, rich in scallops and groundfish, to Canada. It is unlikely that production can be increased beyond the level of past catches. Only the adductor mussel is used, sold fresh or frozen. On the Atlantic coast, oysters are cultured in shallow waters below the low-tide mark. Oyster ground is leased from the federal government and planted with oyster seed collected by various means. Oysters are marketed in the shell, usually by the dozen, and are eaten raw. On the Pacific coast the oyster industry uses a Japanese species that normally grows in intertidal areas. These zones are leased from the provincial government. Oysters are shelled and sold by volume of meat. Clams occur in both intertidal and subtidal areas and are fished by hand and by mechanical harvesters. Some are sold fresh but most are canned. A number of commercial species occur on both coasts and the fishery is regulated by season, quota or size. ABALONE live in rocky subtidal areas of the Pacific coast and are fished by divers. The catch is regulated by size and area quota. Most abalone are sold frozen to Japan. The centre of squid production is Newfoundland where they are fished by jigs and nets. Squid are used locally for bait and exported to Japan for food.

D.B. QUAYLE

Canadian Mollusc Production, 1982
(Source: Dept. of Fisheries and Oceans, Ottawa, 1984)

	Atlantic		*Pacific*	
Species	*Live Weight (1000s of t)*	*Value (Millions$)*	*Live Weight (1000s of t)*	*Value (Millions$)*
Clams	6.2	3.9	4.6	4.1
Oysters	1.3	1.3	1.6	0.9
Abalone	—	—	0.5	0.5
Scallop	65.1	60.5	—	—
Squid	12.3	2.5	—	—

Molson, Eric Herbert, industrial capitalist (b at Montréal 16 Sept 1937). Molson was educated at Bishop's, Princeton and McGill. In 1959 he entered the family company, Molson Breweries of Canada, as an apprentice brewer, became assistant brewmaster 1961, brewmaster 1966, VP 1970 and president 1973. In June 1982 he bought 10% of the voting shares of MOLSON COMPANIES from D.G. Willmot to become the largest shareholder and VP of the parent corporation.

JORGE NIOSI



John Molson, brewer and banker, in a postcard reproduction portrait, *c* 1860 (*courtesy Public Archives of Canada /PA-125770*).

Molson, John, brewer, banker, steamship builder (b at Spalding, Eng 28 Dec 1763; d at Île Ste-Marguerite, Qué 11 Jan 1836). Orphaned as a child, he attended private boarding schools, immigrated to Canada at age 18, and in 1786 used his parents' legacy to become sole owner of a small brewery in Montréal. He had the business sense to exploit Montréal's growth as entrepôt in the fur trade and commercial base for developing the hinterland of Upper Canada. In 1816 he took his 3 sons into partnership as John Molson and Sons. He used cash payments from brewing to finance banking activities and build a steamboat line operating between Montréal and Québec City. He also built hotels and a distillery and financed the CHAMPLAIN AND ST LAWRENCE RAILROAD. Molson introduced the early steam engine to Montréal industry and became a close friend of James Watt. He sat in the House of Assembly of Lower Canada 1816-20, became president of the Bank of Montreal in 1826, and in 1832 was appointed a member of the Legislative Council of Lower Canada, where he upheld the interests of English-speaking businessmen amid the emerging discontent of French Canadians. Molson must be counted among the most prominent entrepreneurs in Canada during the first third of the 19th century.

ALBERT TUCKER

Reading: M. Denison, *The Barley and the Stream* (1955).

Molson Companies Limited, with head offices in Montréal, is one of Canada's larger breweries. Incorporated in 1930 as Molson's Brewery Limited (est 1786), the company became Molson Breweries Limited in 1962 and Molson Industries Limited in 1968, and it adopted its present name in 1973. These name changes reflect the changing nature of the company. From 1967 to 1980 the company acquired

interests in everything from furniture products to hardware stores and warehousing, and it is now a diversified Canadian corporation. Today, its principal businesses are brewing, retail merchandising and marketing special chemicals. It owns 10 breweries in 7 provinces and leases or franchises over 300 retail, plant and warehouse facilities across Canada. As of 1983, the company had annual sales or operating revenue of $1.5 billion (ranking 59th in Canada), assets of $935 million (ranking 90th) and 11 100 employees. The Molson family and estate own 38%. DEBORAH C. SAWYER

Molson Prize, annual awards funded by Molson's "to encourage Canadians of outstanding achievement in the fields of the Arts, the Humanities or the Social Sciences to make further contributions to the cultural or intellectual heritage of Canada." The laureates are chosen by the chairman and president of the CANADA COUNCIL in consultation with a jury chosen from across Canada. The selectors have attempted to choose laureates who are close to the peak of an outstanding career and the terms provide that no individual may be awarded the prize more than once. Between 2 and 4 awards, accompanied by payments of $50 000 each, are made each year.

Molson Prize Recipients

1970	Jean-Paul Audet (scholar) Morley Callaghan (writer) Arnold Spohr (artistic director, Royal Winnipeg Ballet)
1971	Northrop Frye (literary scholar) Duncan MacPherson (cartoonist) Yves Thériault (writer)
1972	Maureen Forrester (contralto) Rina Lasnier (poet) Norman McLaren (filmmaker)
1973	John James Deutsch (economist) Alfred Pellan (painter) George Woodcock (writer)
1974	Celia Franca (dancer, choreographer, artistic director of National Ballet) W.A.C.H. Dobson (scholar) Jean-Paul Lemieux (painter)
1975	Alex Colville (painter) Pierre Dansereau (ecologist) Margaret Laurence (writer)
1976	Denise Pelletier (actress) Jon Vickers (tenor) Orford String Quartet
1977	John Hirsch (theatre director) Bill Reid (sculptor and carver) Jean-Louis Roux (actor and theatre director)
1978	Gabrielle Roy (novelist) George Story (lexicographer) Jack Shadbolt (painter)
1979	Jean Duceppe (actor) Betty Oliphant (principal and director of National Ballet School) Michael Snow (painter)
1980	Michel Brault (filmmaker) Lois Marshall (singer) Robert Weaver (editor and radio producer)
1981	Margaret Atwood (writer) Marcel Trudel (historian) John Weinzweig (composer)
1982	Gilles Vigneault (singer) Louis Edmond Hamelin (geographer) Jack McClelland (publisher) Allan Cairns (political scientist)
1983	Brian Macdonald (choreographer) Francess Halpenny (professor)
1984	James Eayrs (professor) Marcel Dubé (dramatist)

Molybdenum (Mo), silver-grey metallic element with an unusually high melting point (2610°C). It is an important alloying element in iron, steels and specialty alloys and is used frequently in combination with other ferrous additives. The molybdenum content in these products ranges from a fraction of 1% to as much as 20%. A commonly used refractory (heat-resistant) metal, molybdenum is also used in catalysts, dyes and pigments. In IRON AND STEEL manufacture, the addition of molybdenum imparts hardness, strength and corrosion resistance and improves weldability. The principal mineral source of molybdenum, molybdenite (MoS_2), may be used as a solid lubricant and as an additive to greases and oils. About 58% of world output comes from primary molybdenum mines; the balance is a by-product of copper mining. Canada, the world's second-largest producer (after the US), produces about 16 000 t annually. About 95% of Canada's output is produced in BC, the remainder in Québec. Canada consumes 6-10% of this output and exports the balance, mostly to the European Economic Community and Japan. Molybdenum contributed about 0.09% of the GNP in 1981. It is second only to copper in value among minerals in BC. *See* MINERAL RESOURCES. D.G. FONG

Monarchism is based on ancient principles favouring a symbolic leader, state traditions, nonpartisan public relations and modern principles of parliamentary democracy. Canada, an autocratic monarchy before RESPONSIBLE GOVERNMENT was established, has become a constitutional monarchy in which the sovereign, GOVERNORS GENERAL, and LIEUTENANT-GOVERNORS act on ministerial advice. Constitutional monarchy helps resolve the problem of ensuring that politicians can be elected, criticized, defeated and held responsible and accountable, a difficult feat if symbolism and administration are combined in one person. Executive functions are divided among the sovereign, governors general and lieutenant-governors, who exercise symbolic and decorative duties relating to public relations for the state, formal powers (eg, assenting to legislation) used on ministerial advice, and emergency powers for unusually serious constitutional crises such as electoral deadlock. The PRIME MINISTER, as partisan government leader, is not given formal powers of his own by the Constitution Acts; he advises on the use of the CROWN'S powers as first minister responsible to Parliament. This combination, at federal and provincial levels, of reigning without governing and governing without reigning has worked comparatively well in Canada. With both levels of government sovereign in exercising their allotted powers (*see* DISTRIBUTION OF POWERS and CONSTITUTIONAL LAW), the queen is the only official associated with all the state's powers and is therefore the focus of authority at a modest cost to Canada, which contributes nothing towards the queen's maintenance and comparatively little to that of her representatives.

The Atlantic provinces, Ontario and BC have traditionally supported the Crown. Attitudes on the Prairies towards the Crown have been recently affected by Prairie discontent with Ottawa, by the influence of American preference for a congressional as opposed to a parliamentary system and by a long series of partisan patronage appointments to governorships by one party during 50 of the last 60 years. Québec enthusiastically supported the monarchy until about 1955 when the Crown became a factor in arguments about nationalist symbolism. Nevertheless, the Crown was strongly entrenched in the Constitution in 1982 by a formula requiring the support of Parliament and all 10 provincial legislatures before its status could be altered.

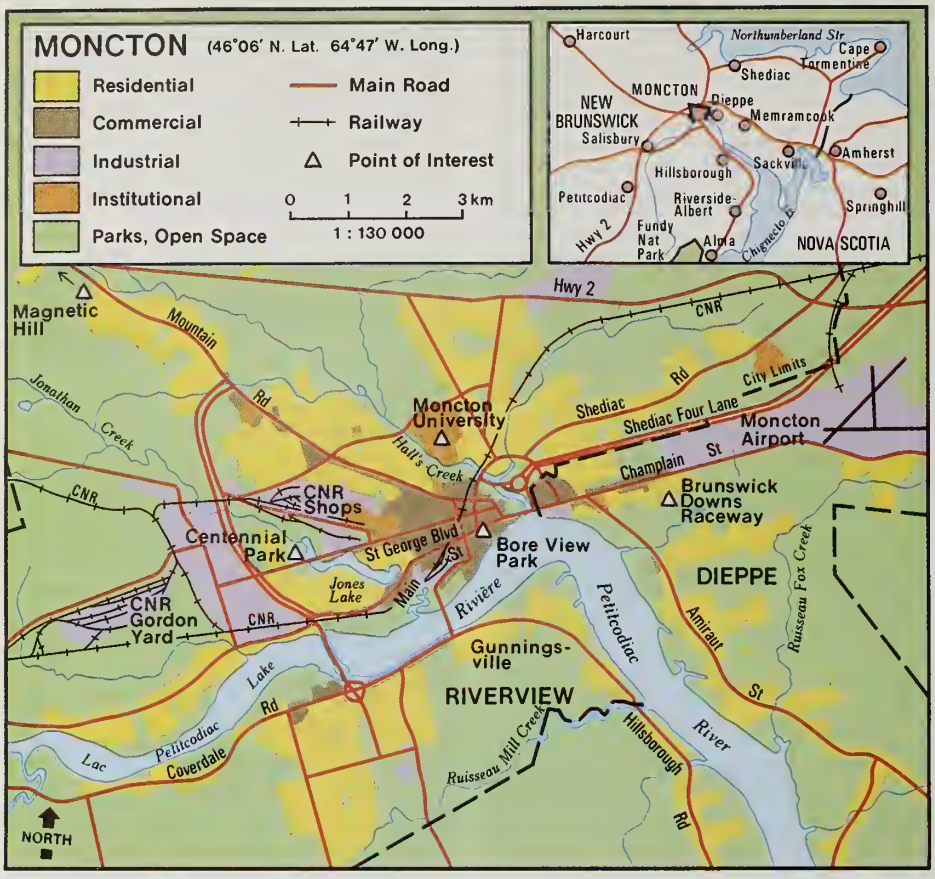
Monarchism concerns ways of governing as well as forms of government. Canada's monarch and governors, monarchal in theory for constitutional reasons, are democratic in their ways of governing, while many presidents elsewhere have become, in practice, absolute monarchs. Ironically, even Canadian premiers may be said to have acted occasionally as absolute monarchs. The governments of premiers W. ABERHART (Alta), M. DUPLESSIS (Qué), M. HEPBURN (Ont) and J. SMALLWOOD (Nfld) were one-man enterprises. The misunderstanding about monarchism has resulted largely from the troublesome Canadian weakness of maintaining high-profile premiers in office for excessively long periods and of one-party dominance and patronage overshadowing the Crown and submerging the Opposition. Indeed, monarchism as a way of governing is inevitable in some form in every political system; the main questions concern its type — absolute or constitutional.
FRANK MACKINNON

Monashee Mountains are a 400 km long ridge in southern BC. To the W they merge with the Okanagan and Shuswap highlands; their eastern boundary is the S-flowing COLUMBIA R. The name, meaning peaceful mountain, was given by a Scottish prospector. The border area around ROSSLAND, Grand Forks and Greenwood was settled in the 1890s and has had prosperous periods of copper mining and smelting.
PETER GRANT

Monck, Charles Stanley, 4th Viscount in the Irish peerage and **1st Baron** in the UK peerage, governor general of BNA, 1861-67, governor general of Canada and PEI, 1867-68 (b in Templemore, Tipperary, Ire 10 Oct 1819; d in Ire 29 Nov 1894). Monck was educated at Trinity Coll, Dublin, and then called to the Irish Bar at King's Inn in 1841. An Irish peer from 1849, he represented Portsmouth as a Liberal in the House of Commons and served as a lord of the Treasury. Appointed governor general of BNA in 1861, Monck displayed considerable diplomatic skill in dealing with the serious Canadian-American tensions of the day. A keen advocate of the defence and political consolidation of BNA, Monck was one of the architects of the GREAT COALITION, devised to carry CONFEDERATION, and he worked assiduously to overcome opposition to Confederation in NS and NB. As a mark of favour, the British government extended his term so that he might become the first governor general of Canada. Rideau Hall was purchased during his term to serve as official vice-regal residence. From 1874 to 1892 he served as lord lieutenant of Dublin County, Ire. CARMAN MILLER

Monckton, Robert, British army officer (b at Yorkshire, Eng 24 June 1726; d at London, Eng 21 May 1782). Monckton arrived in Nova Scotia in 1752 and took part in the establishment of LUNENBURG in 1753. Two years later he engineered the first British success of the SEVEN YEARS' WAR when he captured Ft Beauséjour (NB) in June, and that fall he supervised the deportation of the ACADIANS. Lieutenant-governor of NS from Dec 1755, in 1758 Monckton raided Acadian settlements on the Saint John R. The following year he took part in the siege of Québec as second in command to James WOLFE. Wounded on the Plains of Abraham, he left Québec in Oct for further service in the southern colonies and the West Indies, where he stayed until 1763. A competent and humane soldier, Monckton was briefly considered for the command in N America, but never returned. By the time of his death he had become a lieutenant-general. STUART SUTHERLAND

Moncton, NB, City, pop 54 743 (1981c), inc 1890, is situated in eastern NB on a bend of the Petitcodiac R. Its first settlers, who were of German origin, called their community The Bend. The modern name, first used in the 1860s, honours Robert MONCKTON, a British commander who became lieutenant-governor of Nova Scotia. Today, almost one-third of the population claims French as a mother tongue; the remainder is English speaking.



History Moncton's early prosperity was intimately linked to SHIPBUILDING. The turning point in its economic history was the establishment of a shipyard by George and Joseph Salter in 1849. By 1850 the shipping trade had become important enough that Moncton was made a port of entry. The town was incorporated in 1855 and that same year the first bank, the Westmorland Bank, was established. The decline of wooden ships wreaked disaster on Moncton. The bank collapsed and Moncton lost its status as an incorporated town in 1862. The beginnings of a new era, however, came with the railway, especially in the post-Confederation period when Moncton became the headquarters of the shops for the INTERCOLONIAL RY and a railway centre.

Economy It is the railway industry for which the city is best known today. Moncton is often referred to as "The Hub of the Maritimes" because all railway lines in and out of the Maritimes must pass through it. The CNR is the city's largest nongovernment employer and has played a vital part in the well-being of Moncton.

Townscape Moncton is home of UNIVERSITÉ DE MONCTON, a French-language university established in 1963, the only such university in Canada outside Québec. It also has the distinction of having the first law school in the world teaching COMMON LAW in the French language. Sites of interest in Moncton include Magnetic Hill, where cars appear to coast uphill, and the tidal bore, which features some of the highest tides in the world.

SHEVA MEDJUCK

Monetarism, an economic theory identified with American economist Milton Friedman, which argues that the growth of income is principally determined by the growth rate of the money supply, and that the control of inflation depends entirely on MONETARY POLICY. Governments have 2 major macroeconomic policy levers at their disposal — monetary policy, which determines the amount of money in circulation, and FISCAL POLICY, which determines the level of government taxation and spending. Government attempts to manipulate and coordinate these policies to try to achieve full employment with stable prices while hoping to eliminate sharp swings in the level of economic activity. Monetarists reject the Keynesian position that fiscal policy can and should be used to stabilize the economy, claiming that larger government spending to increase employment and economic growth has only short-term results (*see* KEYNESIAN ECONOMICS). To monetarists the economy is self-stabilizing because market forces will eventually establish an appropriate growth rate for the economy, and therefore the manipulation of fiscal policy is destabilizing. Keynesians, on the other hand, argue that the economy needs to be stabilized because cyclical fluctuations are not self-correcting; they believe that monetarist policy aimed at reducing inflation is just as likely to reduce the overall growth of the economy and increase unemployment.

Monetarists and Keynesians basically agree that stable prices in theory require growth in the money supply equal to the growth of output. They disagree on the advisability of government intervention in the form of fiscal policy to stabilize the economy. Because monetarist policy limits the growth of the money supply, interest rates may swing up and down sharply. Monetarism also reflects political conservatism, based on a belief in a small, inactive government.

The BANK OF CANADA is charged with the authority to regulate Canada's money supply. In Nov 1975 the governor of the Bank of Canada, G. Bouey, announced a historic change in national monetary policy. In reaction to concern over inflation, the bank established a target for annual growth of the money supply. The target would be gradually lowered over a period of several years, a policy that came to be known as "gradualism." This approach was based on monetarist tenets, eg, that the existing inflation was too high and therefore a threat to long-term economic stability and that inflation could be lowered by lowering the growth of the money supply. Critics of monetarism in Canada have charged that the bank's monetarist policies have had a high social cost in causing slower economic growth and higher unemployment. Some monetarists, on the other hand, have accused the bank of proceeding too gradually in bringing down the growth of the money supply.

W.F. FORWARD

Monetary Policy refers to any of a number of government measures undertaken to affect financial markets and credit conditions with the ultimate objective of influencing the overall behaviour of the economy. In Canada, monetary policy is the responsibility of the BANK OF CANADA, a federal crown corporation that implements its policy decisions largely through its ability to alter the Canadian money supply. The money supply is that portion of the financial wealth of Canadian households which has sufficient liquidity to be considered money. At the least it includes coin, currency, and chequing-account deposits in chartered banks, all of which have perfect liquidity in that they represent, at face value, an immediate means of payment for purchases made. Some economists broaden the money-supply definition by including additional chartered-bank deposits (eg, savings accounts) or deposits in other financial institutions such as trust companies or credit unions.

The Bank of Canada is not able to control the money supply directly, because the deposit portion of the money supply results from decisions made within the private BANKING system. By taking deposits from individual Canadian households and firms and then lending these funds, the commercial banks, in essence, "create" money because, in theory, the new funds will be redeposited in the banking system. However, the money-creation powers of the commercial banks are constrained by 2 factors. First, if INTEREST yields on other financial assets rise, Canadians will probably choose to hold a relatively smaller portion of their wealth as coin, currency and (largely low-yield) money deposits. Second, the banks are limited in loan expansion by the need to retain reserves (basically cash in the vault, and deposits of the individual banks at the Bank of Canada) to meet possible withdrawal needs. By altering interest rates and the level of banking reserves, or both, the Bank of Canada can manipulate the money supply indirectly with a high degree of precision (particularly over periods of 3 to 6 months or longer).

One method of manipulating the money supply, termed open-market operations, involves the trading of Canadian government securities in the secondary bond and treasury bill markets. A purchase of government bonds by the Bank of Canada represents an immediate increase in the stock of money held by the general public, raises banking system reserves, and therefore has a multiplied indirect effect on the total money supply. The added demand for bonds also puts downward pressure on bond yields and hence on the overall level of interest rates. Through a sequence of opposite effects, a sale of bonds will decrease the money supply and raise interest rates. The Bank of Canada can also affect interest rates and banking-system reserves by altering the BANK RATE (ie, the interest rate paid by the chartered banks on loans made to them by the Bank of Canada). However, since March 1980, the Bank of Canada has abandoned the bank rate as a formal policy tool and instead has allowed it to float passively one-quarter of 1% above the rate paid on 90-day treasury bills.

Control of the money supply is a powerful tool for influencing the general behaviour of the Canadian ECONOMY. For example, stimulative monetary policy (ie, a higher rate of money-supply expansion) will put downward pressure on interest rates, strengthen business investment

and housing demand, and hence raise the overall level of demand in the economy. During a cyclical downturn, when there is heavy unemployment and idle plant capacity, this stronger demand should in theory lead to a rise in output and increased jobs. Reduced money growth, on the other hand, acts as a restraining force on the economy — causing upward pressure on interest rates and reducing both investment and total demand. At a time of high INFLATION, such restraint will help reduce price and wage increases.

Because of the strong links between Canadian and American financial markets, monetary policy also has a major impact on the Canadian-US dollar EXCHANGE RATE. If Canadian monetary policy is significantly more expansionary than US policy, the value of the Canadian dollar will tend to depreciate in relation to the US dollar. A more contractible Canadian policy will result in the reverse effect.

Yet, despite its important effects, monetary policy also has limitations. It cannot, for example, simultaneously stimulate economic demand to reduce unemployment and restrain demand to combat inflation. Nor can the Bank of Canada increase money growth rates to reduce interest rates below US levels while at the same time successfully stabilizing the Canadian-US exchange rate. Therefore, monetary policy decisions often require painful choices ("trade-offs"). Sometimes these trade-offs involve conflicts between the short-term and long-term effects of a particular policy. For example, a sustained rise in money-supply growth may cause an initial increase in both jobs and production, but eventually it will lead to a correspondingly higher inflation rate with little or no permanent effect on employment or output. Similarly a major reduction in the rate of money-supply expansion ultimately will reduce even strongly entrenched inflation, but this accomplishment may take several years during which output and employment both fall. These intertemporal conflicts can be complicated by a third limitation — ignorance — for there are still many unresolved questions concerning the mechanisms whereby changes in monetary policy affect the economy, the nature of the interrelations between real and financial variables, and the exact determinants of wage- and price-setting decisions. Finally, monetary policy is restricted by the impact of other government actions, especially FISCAL POLICY, ie, decisions about government expenditures and taxation. Fiscal policy also influences overall economic demand, and if fiscal and monetary policy are not co-ordinated, they can work at cross-purposes. In Canada the minister of finance and the governor of the Bank of Canada consult regularly. Furthermore, since 1961 there has been an explicit agreement that if any irreconcilable conflict between the 2 arises, the governor must either follow the written (and publicly released) directive of the minister or resign his office. Nonetheless, there is also a strong tradition that, except in such acute circumstances, the Bank should be able to set an independent monetary policy, free from political pressures. Therefore the potential for conflicting policies does exist.

The creation of monetary policy is often a highly contentious issue. Disagreements sometimes occur because of differing factual judgements about current economic circumstances (eg, whether or not a recession has started), or because of conflicting value judgements (eg, whether it is more unfair to have inflation erode the value of fixed pensions or to have recession cause the loss of jobs). Frequently, however, debate reflects broad conceptual differences about the appropriate strategy for monetary policy. Although there are many alternative (and intermediate) viewpoints, 2 general approaches can be distinguished.

Keynesianism Although considerably modified and refined by his followers, English economist John Maynard Keynes's concepts of the use of monetary and fiscal policy, developed during the GREAT DEPRESSION, remain highly influential (*see* KEYNESIAN ECONOMICS). Keynesians place considerable stress on the many influences that tend to destabilize the economy, including shifts in business and consumer confidence, dynamic investment cycles, and international trade, financial and price shocks. Keynesian policy, therefore, tends to be highly activist or discretionary, in the sense that the nature of monetary (and fiscal) actions alters significantly in response to perceived or anticipated shifts in overall economic circumstances. Carried to its logical limit such continual policy shifts are sometimes referred to as "fine tuning."

Keynesians recognize the risk that the policy chosen may sometimes worsen rather than improve economic performance. Some Keynesians, therefore, cautiously argue that while major cyclical swings should be countered by an appropriate policy change, minor fluctuations should be largely ignored. As a group, however, Keynesians are especially concerned that complete failure to react to economic downturns could lead to episodes of prolonged and severe economic stagnation — characterized by falling output and high unemployment — which can and should be avoided.

In his original analysis, Keynes argued principally for discretionary fiscal rather than monetary policy. His followers now generally believe that both tools are powerful and both should be actively used.

Monetarism The most important distinguishing characteristic of monetarists is their strong scepticism about the use of discretionary monetary policy to offset business-cycle fluctuations. Instead they advocate a neutral policy in which money-supply growth rates would be set and maintained at low levels, regardless of economic circumstances. Monetarists dispute the claim that the economy is inherently unstable, arguing that steady money growth coupled with automatic stabilizing influences in the private sector (and possibly automatic fiscal-policy stabilizers) will keep fluctuations to modest proportions. Secondly, they maintain that changes in monetary policy are unlikely to be effective in reducing output and employment oscillations and may actually accentuate them. The existence of potentially long and uncertain lags between the implementation and impact of a policy change is one important element in this argument. Finally, monetarists are concerned about the effect political pressures may have on the choice of a monetary policy. They assert that in practice Keynesian monetary policy will be too stimulative, aiming at immediate employment and output gains and ignoring the potential for higher inflation in the long run.

In the 1960s and early 1970s, the Keynesian approach was dominant, and the generally strong economic performance of the Canadian economy and many other economies was attributed, in part, to the implementation of Keynesian monetary and fiscal policy. However, the frequent bouts of double-digit inflation from the mid-1970s through the early 1980s, coupled with new theoretical analysis by a number of monetarists, greatly increased the influence of monetarist ideas on both academic economists and central bankers, including the Bank of Canada. Currently, many economists would accept elements of both Keynesian and monetarist analysis, while at the same time acknowledging that considerable further research needs to be done on both the nature and impact of monetary policy.

R.G. WIRICK

Reading: D. Bond, R. Shearer and J. Chant, *The Economics of the Canadian Financial System* (4th ed, 1983).

Money consists of anything that is generally accepted for the settlement of debts or purchase of goods or services. The evolution of money as a system for regulating society's economic transactions represented a significant advancement over earlier forms of exchange based on BARTER, a transaction in which goods and services are exchanged for other goods or services rather than money (today, barter is sometimes used as a form of tax evasion and in trade between nations). Money has at least 3 functions: it serves as a medium of exchange; a measure by which prices, debts and wages are expressed; and a store of value. These functions are interdependent, although some theorists (eg, Keynesians, Marxists) stress that money must have intrinsic value (eg, GOLD or SILVER) that represents labour, while others (eg, MONETARISTS) emphasize that the most important characteristic of money is its acceptability as a means of exchange.

In many ancient societies gold and silver served as money. They had intrinsic value, were easily portable and divisible, and were indestructible. Gold and silver coins were minted by the STATE (*see* COINAGE). The 17th century development of goldsmith BANKING in Europe marked the transition to paper money. Goldsmiths issued paper bills backed by the gold in their vaults. During the 18th and 19th centuries European states established central banks to regulate their monetary systems; by the turn of this century most states had taken over the issuance of paper money backed by bullion. Today, however, none of the major state currencies is officially backed by bullion (*see* GOLD STANDARD).

Canada's first paper money was playing cards, specially cut and signed by the governor and issued in 1685 to supplement the chronically short supply of French and Spanish silver coins then used as the main medium of exchange in New France (*see* PLAYING CARD MONEY). The playing cards had no intrinsic value but their inscribed value was supposedly guaranteed by the colonial government. In an attempt to pay for the Seven Years' War the government then issued vast amounts of paper money, the worth of which it could not guarantee. The result was rampant INFLATION.

After the Conquest (1763), the British introduced sterling and for almost a century, pounds, shillings and pence were official money in Canada. In practice this meant setting a sterling value for the various kinds of money in existence. The Spanish dollar was rated at 5 shillings, which meant there were 4 to the pound, a value first established by Halifax merchants. Dollar banknotes were printed, including a $4 denomination to conform to official value of the pound, a value which made it different from the British pound. British money never became dominant, however, and a hodgepodge of money circulated in Canada in the first half of the 19th century, including Nova Scotia provincial money, American dollars, Spanish dollars, American gold coins and "army bills" used by the British forces to buy supplies in the War of 1812. The use of the army money accustomed Canadians to the idea of reliable paper money.

The decision to reject British money and adopt a decimal system like that in the US was made in the 20 years before Confederation. In 1858 a law required that accounts of the government of the Province of Canada be kept in dollars instead of pounds. At the same time, the government began to issue its own money to circulate alongside the bills issued by the BANK OF MONTREAL and other banks. In the first decades after Confederation, most Canadians simply assumed that a dollar was a dollar, whether it was issued by the government in Washington or Ottawa or by a bank. Canada's monetary system always paralleled that of the US, with some notable differences. In 1870 the Dominion government issued

SHINPLASTERS (25¢ government notes) to counteract the effect of an overabundance of American silver coinage in Canada that was worth only 80¢ against the Canadian dollar at that time. The American and Canadian dollars first diverged seriously in the period of high inflation that followed WWI (*see* EXCHANGE RATES). The Canadian dollar dropped to 84¢ US in 1920, but quickly recovered and was steady at about 100 cents in the last half of the 1920s. With the Great Depression, the Canadian dollar dropped to about 80¢ US, a record low until recent times, but the dollar recovered before the economy and was as high as $1.04 US in the mid-1930s. During WWII, the value of the Canadian dollar was fixed at about 91¢ US. From 1952 to 1962, when the Canadian dollar was allowed to "float" rather than having a fixed value in American dollars, it was often worth more than the US dollar because of the flood of American investment in Canada. A dollar crisis hit Canada in the midst of the 1962 federal election campaign and the dollar was pegged at 92.5¢ US. In 1970 the Canadian dollar was again set free to float and quickly rose to be worth more than the US dollar, but this strength was deceptive and the 1976 election of the Parti Québécois in Québec triggered a fall which took it to 75¢ US by late 1984 (*see* CANADIAN-AMERICAN RELATIONS).

The 1970s revived interest in the old idea that inflation was essentially caused by too much money and attempts were made to try and limit the money supply in the economy (*see* MONETARY POLICY). The money supply (total amount of money) includes cash, bank deposits, deposits in financial institutions, certain kinds of short-term notes and sometimes credit cards. The Bank of Canada has several operational definitions of the money supply. M-1 (currency in circulation outside of the chartered banks, ie, the actual cash in people's pockets and bank deposits that can be withdrawn without notice) is the most narrow definition. However, it does not correspond to the US definition of M-1 (in Canada, M-1B, which equals the Canadian M-1 plus chequable savings deposits, is the equivalent of the US M-1). The Bank of Canada had tried prior to 1982 to regulate the supply of M-1 (which amounted at that time to about $30 billion, $13 billion of which was currency) to restrain the money supply in an attempt to lower inflation, but the introduction of computer banking made it difficult to determine if M-1 could accurately measure the existing money supply. The next widest definition of money supply, M-2, includes M-1B, nonchequing personal term and savings deposits and some corporate chequable and nonchequable notice deposits. CanadianM-2, which was close to $140 billion in the mid-1980s, corresponds to the American M-2. The broadest definition of money supply is M-3; it consists of M-2 and nonpersonal term deposits, including certificates of deposit held by business corporations. M-3 amounted to $186 billion in the mid-1980s. The total money supply consists of M-3 plus Government of Canada deposits in chartered banks.

Canada's monetary system is of course linked to the international monetary system, which underwent a serious crisis in the early 1980s. This crisis was manifested in high rates of inflation, even hyperinflation in many countries, high interest rates, erratic gold and silver prices and a Third World debt problem of unmanageable proportions.

The process of monetary evolution which began several thousand years ago is still underway. The exact direction it will take is impossible to predict, but some elements of the functions of money as a store of value, measure of value and medium of exchange will be retained.

D. McGILLIVRAY

Monroe, Walter Stanley, businessman, politician (b at Dublin, Ire 14 May 1871; d at St John's 6 Oct 1952). He was Newfoundland's eighteenth prime minister, June 1924-Aug 1928; his newly constituted party swept to power, ending Albert HICKMAN's brief prime ministership. A well-established and successful businessman, Monroe had served for a short time in William WARREN's Cabinet before that administration was replaced by Hickman's. In May 1924 Monroe was chosen as leader of a new alliance, the Liberal-Conservatives, which defeated Hickman in the June election. During Monroe's term, in spite of deepening financial difficulties, there was some industrial expansion and the long-fought LABRADOR BOUNDARY DISPUTE was settled in Newfoundland's favour. In Aug 1928 he passed the leadership to his cousin Frederick ALDERDICE and returned to his business concerns.

ROBERT D. PITT

Mont-Joli, Qué, Town, pop 6359 (1981c), inc 1945, is located 30 km NE of RIMOUSKI at the entrance to the Matapédia Valley. The development of a transportation infrastructure was the most important factor in the area's urbanization, beginning with the construction of the INTERCOLONIAL RY (1870-73). Further growth resulted from the establishment of train-repair yards. The headquarters of the Canada and Gulf Terminal Ry (linking Mont-Joli and Matane) located in the village in 1910. These developments led to the opening of a foundry that produced railway equipment. WWII saw the arrival of a military airport, firing range and bombing school; this centre has become the present regional airport. The government of Maurice Duplessis built a sanitarium here. One of the first radio stations in Québec opened here in 1922. Today, Mont-Joli has become a service town, and transportation plays a lesser role.

ANTONIO LECHASSEUR

Mont Ste-Anne, Qué, provincial park created in 1969, is located 40 km E of QUÉBEC CITY. Part of the LAURENTIAN HIGHLANDS, its flattened summit (815 m) dominates the N shore of the St Lawrence R. Mont Ste-Anne is internationally known for its SKIING facilities, and World Cup races have been held there since 1971. Downhill skiers enjoy over 50 km of both gentle and steep runs. The area is superbly equipped, with ski jumps, 90 km of illuminated and patrolled ski trails, and a 10 km snowshoe trail. A year-round chair lift takes people to the summit and its outstanding view of the river, its islands and the S shore. The park is a pleasant summer recreation spot with walking trails, bicycle and jogging paths, an 18-hole golf course and camping facilities.

CLAUDINE PIERRE-DESCHÊNES

Mont St-Hilaire Nature Conservation Centre, administered by MCGILL UNIVERSITY, comprises Mont St-Hilaire (one of the 10 Monteregian Hills located 35 km E of Montréal), which rises 400 m above the Richelieu R and covers 11 km^2. The mountain was formed by the intrusion, some 100 million years ago, of IGNEOUS ROCK into sedimentary layers that have since been removed by erosion processes, including GLACIATION. The mountain's several peaks surround Lac Hertel (0.3 km^2), which is drained by a small stream. Variations in altitude and climate produce a pattern of vegetation dominated by forests of pine, oak, maple, beech and birch. Animal species include 41 species of mammal (eg, skunk, fox, raccoon, porcupine, muskrat, squirrel, deer) and some 178 species of bird (eg, pileated woodpecker, warbler, hawk, Canada goose). Indians used the mountain until the 1700s, when French settlers began exploiting its timber and waterpower resources. After 1844, the Campbell family developed it as a tourist resort until 1913, when it was bought by Brig A.H. GAULT. He protected its natural qualities and in 1958 bequeathed it to McGill. Since then it has been managed for conservation, scientific research, education and recreation. In 1960 it became a migratory BIRD SANCTUARY and in 1978 was recognized by UNESCO as Canada's first Biosphere Reserve. The public has year-round access to the western, 6 km^2 nature-centre zone which includes 24 km of trails.

JOHN S. MARSH

Mont Sorrel, an important feature on the S shoulder of the Ypres Salient, captured by German forces on 2 June 1916 from the 3rd Division of the Canadian Corps. Maj-Gen M.S. Mercer, commanding the division, was killed and Brig-Gen V.A.S. Williams, commanding the 8th Brigade, was taken prisoner, the highest-ranking Canadians to be killed and captured during WORLD WAR I. An immediate counterattack that night failed but stemmed any further German advance. A more deliberate counterattack recaptured Mont Sorrel on June 12. Between June 2 and 14 the Canadians lost some 8000 men and the Germans lost 6000.

BRERETON GREENHOUS

Mont-Tremblant, Qué, 968 m, located 140 km N of Montréal, is the highest peak in the LAURENTIAN HIGHLANDS. The Indians called it *manitonga soutana,* meaning "mountains of the spirits." The present name echoes the Indian legend that climbers feel the mountain tremble beneath their feet. In 1894 the Québec government established the Parc de la Montagne-Tremblante, today Mont-Tremblant. This 2564 km^2 recreational park, S of the Canadian SHIELD, contains a major hydrographic network of 965 lakes, 7 rivers and various streams and small waterfalls. Fishing is one the park's main activities. The Mont-Tremblant tourist area bordering Lac Mercier, which has an extensive artificial-snow system, attracts skiers from across N America. In 1983 the Promodev Society invested $25 million in the development and modernization of the area, notably in hotel and condominium construction.

CLAUDINE PIERRE-DESCHÊNES

Montagnais-Naskapi live in the eastern and northern portions of the Québec-Labrador Peninsula. They call themselves, and in Labrador are called, Innu ("person"), and are divided into many regional groups (eg, *Uashau Innuts* — the Sept Iles band). The terms "Montagnais" (French for "mountain people") and "Naskapi" (origin uncertain) both appeared in French 17th-century missionary sources. These terms have been used to refer to different groups over time. By the late 19th century "Naskapi" had acquired the connotation of the far northern "unchristianized" group (the native term is *Mushuau Innuts* — "Barren Land People"), while the group known as "Montagnais" primarily inhabited the forest. The total population is now approximately 8000.

The Montagnais-Naskapi are descended from populations that came to Québec-Labrador thousands of years ago. Although they briefly fought the INUIT, the IROQUOIS, the MICMAC and the ABENAKI, they were not a warlike group, and at least some hostility was a side effect of European contact. In the TADOUSSAC region they played an important role in early Canadian history, as military allies of the French, in wars with the British and their Indian allies (*see* IROQUOIS WARS); CHAMPLAIN formed an alliance with one group in 1608. They also established one of the first known game preserves, and for some years attempted to keep both Europeans and other Indians away from their grounds.

For 2 centuries the FUR TRADE was the focus of their relations with Europeans. Trade at the Gulf of St Lawrence posts was a monopoly of the Crown, first of France and later of Britain, and was leased to private traders. By the mid-1800s most areas were overtrapped, and the Montagnais needed assistance from missions and the government to survive. Soon commercial for-

estry increased their difficulties, and they were excluded from salmon rivers which were leased by clubs and individuals.

Prior to the 1800s most contacts between the Barren Ground subgroup and Europeans were indirect, by trade through neighbouring CREE and Montagnais intermediaries. Life depended on the movements of the Barren Ground CARIBOU. There was a special caribou hunt leader (*Atik Utshimau*) but his authority lasted only for the hunt. Starting in 1830, the HUDSON'S BAY COMPANY opened posts in this northern region, supplied first from Fort Chimo and later from North West River, Labrador. The fur trade had disastrous results, because trapping did not fit with nomadic caribou hunting. Large numbers of people died, some of starvation and others from disease. By the 1950s a still unsettled Barren Ground group was trading at Fort Chimo; sick and starving, they were finally persuaded by the government to settle at the new mining town of SCHEFFERVILLE, Qué.

Although there are strong pressures to abandon the nomadic life, some Montagnais-Naskapi spend part of the winter hunting. Game animals are caribou (for the eastern and northern area), moose (for the west), beaver, bear, lake fish and salmon. The people depend on their ability to travel, using the CANOE in summer, and SNOWSHOES and TOBOGGANS in winter. European items, such as flour, guns and even SNOWMOBILES, are fitted into an essentially native way of life.

The Montagnais-Naskapi developed an intellectually rich tradition on a modest material base. Every part of the caribou was used; the skin was decorated with painted or quill designs to make clothing of many kinds. Drums accompanied sacred singing. A caribou shoulderblade, burned in a prehunt ritual, was believed to foretell the location of game. This belief in animal spirits played a major role in the hunt. Status was gained mainly through the ability to make gifts of meat to others. After the hunt a ceremonial feast of bone fat, *makushan*, was held. Much of the ancestral religion is recorded in legends. The language is part of the Algonquian family, and was one of the first in N America into which Christian texts were translated.

In the early 1970s the Montagnais-Naskapi organized themselves politically, with the Conseil Attikameg-Montagnais in Québec, the Naskapi Montagnais Innu Assn in Labrador, and the Naskapi of Schefferville. In 1975 this last group was excluded from the Agreement in Principle leading to the JAMES BAY AGREEMENT but negotiated a separate agreement, which provides them with a new village N of Schefferville. The other groups are pressing the government for settlement of their LAND CLAIMS. New creative expressions, such as the books of the first Montagnais author, An Antane Kapesh, and recordings by singers such as Phillip MacKenzie, have recently appeared, showing that the culture continues to adapt. *See also* NATIVE PEOPLE: SUBARCTIC and general articles under NATIVE PEOPLE.

ADRIAN TANNER

Reading: G. Henriksen, *Hunters in the Barrens: The Naskapi on the Edge of the White Man's World* (1973); F.G. Speck, *Naskapi: The Savage Hunters of the Labrador Peninsula* (1977); L.M. Turner, *Indians and Eskimos in the Quebec-Labrador Peninsula: Ethnology of the Ungava District* (1894, repr 1979).

Montague, PEI, Town, pop 1957 (1981c), inc 1917, located 45 km SE of Charlottetown, is a picturesque community divided by the Montague R. Until incorporation, the town was known as Montague Bridge. While the original settlement date is unknown, in 1840 the townsite was occupied by 4 partially cleared farms. Situated on a navigable river that flows into the NORTHUMBERLAND STR, Montague began developing around the mid-19th century as a commercial and shipbuilding centre. Economic ties with the surrounding fertile agricultural region sustained Montague when the shipbuilding industry died later in that century. While it still lacks an industrial base, the town has experienced renewed prosperity with the agricultural revitalization that began in the area in the 1960s. Out-of-province investment has started tobacco farms and rejuvenated the mixed- and dairy-farming industries. Because of its central location, Montague is the commercial centre of southeastern Kings County.

W.S. KEIZER

Montcalm, Louis-Joseph de, Marquis de Montcalm, military officer (b at Candiac, France 28 Feb 1712; d at Québec City 14 Sept 1759). Montcalm entered the army at age 9 and served with distinction. In 1756 he was promoted *maréchal de camp* and replaced Baron Dieskau as commander of French troops in N America. He arrived in Québec 13 May 1756 under orders that he was subordinate to VAUDREUIL, the governor general of NEW FRANCE. Vain and contemptuous of colonial authorities and their preference for guerrilla tactics, he developed open hostility to Vaudreuil and labelled the whole administration corrupt. He captured Ft William Henry (Aug 1757), and in July 1758 he conducted a successful defence against a British attack on Ft Carillon. His dispatches to France showed his own efforts to best effect and were critical of Vaudreuil. He was appointed 20 Oct 1758 lieutenant-general — the second-highest rank in the French army. In May 1759 WOLFE and SAUNDERS appeared before Québec. In Sept a series of errors by the French allowed Wolfe to scale the riverbank and land some 4500 men on the Plains of Abraham, less than 2 km from the city. Wolfe's position was threatening but precarious and Montcalm chose the one course of action that could have brought defeat: on the morning of Sept 13 he hastily rushed his troops into battle. The French were routed and Montcalm received a mortal wound from which he died the next morning. Historians have long been at odds with the assessment on the plaque on the Plains of Abraham, of the "gallant, good and great" man. He won some notable victories but suffered the greatest defeat in Canadian military history. *See also* BATTLE OF THE PLAINS OF ABRAHAM, SEVEN YEARS' WAR.

IAN CASSELMAN

Reading: Guy Frégault, *La Guerre de la conquête 1754-60* (1955, tr *Canada: The War of the Conquest* 1969); C.P. Stacey, *Quebec, 1759* (1959).



Marquis de Montcalm, commander of the French forces during the Seven Years' War (*courtesy Public Archives of Canada/C-27665*).

Montcalm Construction Case (1979) *Montcalm Construction Inc* v *Minimum Wage Commission et al* was concerned with whether or not provincial labour laws applied to the employees of a construction company that had a contract with the federal government to build the landing strips at Mirabel Airport on land belonging to the Crown in right of Canada. The Supreme Court of Canada decided that while aeronautics fell within federal jurisdiction (see AERONAUTICS REFERENCE), the salaries paid by an independent business are so far removed from aerial navigation and use of an airport that the power to regulate the matter could not form an integral part of the primary jurisdiction of Parliament over aeronautics or be tied to the development of a federal operation. The court also ruled that federal lands are not extraterritorial enclaves within provincial boundaries and that valid and generally relevant provincial laws apply to them.

GÉRALD-A. BEAUDOIN

Montferrand, Jos, French Canadian of legendary strength who lived in the Ottawa-Montréal region in the early 19th century. He fought many famous boxers of his day, but was particularly active in protecting local Frenchmen from English aggression, once taking on 20 English troublemakers single-handedly. Exploits of extraordinary strength attributed to him include pointing with the plough to give someone directions and leaping so high in a dance that he left the print of his heel on the hotel ballroom ceiling.

NANCY SCHMITZ

Indians making birchbark canoe *c* 1870, near La Malbaie, north shore of the St Lawrence R (*courtesy National Gallery of Canada*).





Lucy Maud Montgomery, author of *Anne of Green Gables (courtesy Public Archives of PEI).*

Montgomery, Lucy Maud, writer, diarist (b at Clifton, PEI 30 Nov 1874; d at Toronto 24 Apr 1942). Raised in Cavendish, PEI, and educated at Prince of Wales Coll (PEI) and Dalhousie, Montgomery was earning money from her pen by the late 1890s. In 1908 her first novel, ANNE OF GREEN GABLES, became an instant best-seller. In 1911 Montgomery married Rev Ewan Macdonald and moved permanently to Ontario. She published 7 sequels to *Anne,* the autobiographical *Emily* trilogy and 2 well-received novels for adults. During her lifetime, she published 22 books of fiction, a serialized version of her life, a book of poetry, and approximately 450 poems and 500 short stories. At her death, she left 10 volumes (over 5000 pages) of unpublished personal diaries (1889-1942) — an outstanding record of social history and of a remarkable woman's life.

Writing for a popular market that demanded "happy endings," Montgomery nevertheless managed to depict an infinite number of human frailties, but she softened these with her natural wit, her benevolent view of mankind and her use of the romance structure. Her ear for dialogue, together with her insight into human nature and her choice of universal themes, has made her Canada's most enduring literary export, and red-haired "Anne" has become a world-famous mythic character. MARY RUBIO

Montizambert, Frederick, physician, public-health official (b at Québec, Canada E 3 Feb 1843; d at Ottawa 2 Nov 1929). Montizambert practised in Québec before entering the Canadian public-health service in 1866. In 1899 he became director general of public health and sanitary adviser to the Government of Canada. He supervised the federal government's disorganized and dispersed health services, published articles on sanitation and studied the use of chaulmoogra oil in the treatment of leprosy. He was a member of many health and medical organizations in Canada, Britain, the US and France. JANICE DICKIN MCGINNIS

Montmagny, Charles Huault de, called Onontio by the Indians, governor of NEW FRANCE (b in France *c*1583; d on Île St-Christophe, W Indies *c*1653). Montmagny succeeded CHAMPLAIN in 1636. His primary concern as governor was defence of the tiny colony; he worked to lay out and fortify Québec C and give some protection to Trois-Rivières. In 1641 the IROQUOIS WARS broke out, and Montmagny built Ft Richelieu (at Sorel, Qué) to counter the threat. In 1747 the establishment of a council (forerunner of the SOVEREIGN COUNCIL), placed some curbs on the exercise of his powers as governor. MARY MCDOUGALL MAUDE

Montmorency, Qué, a village located 12 km E of QUÉBEC CITY, is now part of the municipality of Beauport (pop 60 447, 1981c). The famous 84 m MONTMORENCY FALLS were named in 1603 by Samuel de CHAMPLAIN in honour of the duc de Montmorency, later the viceroy of New France. Gen James WOLFE's troops were defeated on 31 July 1759 on the cliffs of the falls near Courville. The manor, built in 1781 by Frederick HALDIMAND, governor general in chief of Canada 1778-86, known as "Kent House," was inhabited 1791-94 by the duke of Kent, father of Queen Victoria. By the late 19th century, a large textile factory founded in 1889, Montmorency Cotton, located near the falls and served by the CPR, employed most of the local population. It became Dominion Textile in 1905 and still operates. In recent years, after its fusion with Beauport, the area has been turning into a residential suburb of Québec City.

CLAUDINE PIERRE-DESCHÊNES

Montmorency Falls, located 10 km E of Québec City at the mouth of the Rivière Montmorency, where it empties into the St Lawrence R, is the highest waterfall in the province of Québec and the ninth highest in Canada. The Rivière Montmorency rises in the provincial Parc des Laurentides N of Québec City and courses 100 km before reaching the St Lawrence. The 84 m cataract (30 m higher than Niagara Falls) forms a spectacular cascade as it joins the waters N of the ILE D'ORLÉANS. Whether seen from the base or the crest, or from the 1737 m suspension bridge that joins the N shore of the St Lawrence to the Ile d'Orléans, the waterfall has captivated visitors since the days of Samuel de CHAMPLAIN. In wintertime the spray from the waterfall creates a "sugarloaf" cone of ice, often 30 m or more high. Tobogganing down the cone was a popular 19th-century pastime. The nearby community of MONTMORENCY (1869) takes its name from the waterfall. The town's industries are fueled by the hydroelectric power developments at the waterfall, and Québec City is provided with power and light from the same source.

The waterfall was first noted by Jean Fonteneau *dit* Alfonse (who served as pilot in the 1542 expedition of Sieur de Roberval) in his *Cosmographie.* In 1603 Champlain named the waterfall after Henri II, duc de Montmorency, governor of Languedoc and admiral of France, who served as viceroy of New France 1620-25. In July 1759, during the campaign to take all French possessions in Canada, British forces landed near the base of the waterfall and established a fortified camp on the heights to the E. The ensuing Battle of Montmorency (31 July 1759) saw the British, under General James WOLFE, repulsed and forced to evacuate their positions by French forces sent from Québec City. A plaque commemorating this historic event is at the Montmorency church. An enduring tourist attraction over the years, the waterfall has observation points and picnic areas at both its base and crest. DAVID EVANS

Montréal, located in southwestern Québec, is the metropolis of the province and was the most populous city in Canada for a century and a half. Situated on Île de Montréal, the largest in the Hochelaga Archipelago, at the confluence of the ST LAWRENCE and OTTAWA rivers, it occupies a strategic location on one of the world's greatest rivers, at the heart of a hydrographical system covering all of eastern N America. A major industrial centre, commercial and financial metropolis, railway and maritime bridgehead, and home of francophone culture in N America, Montréal is one of the world's great cities and enjoys international acclaim.

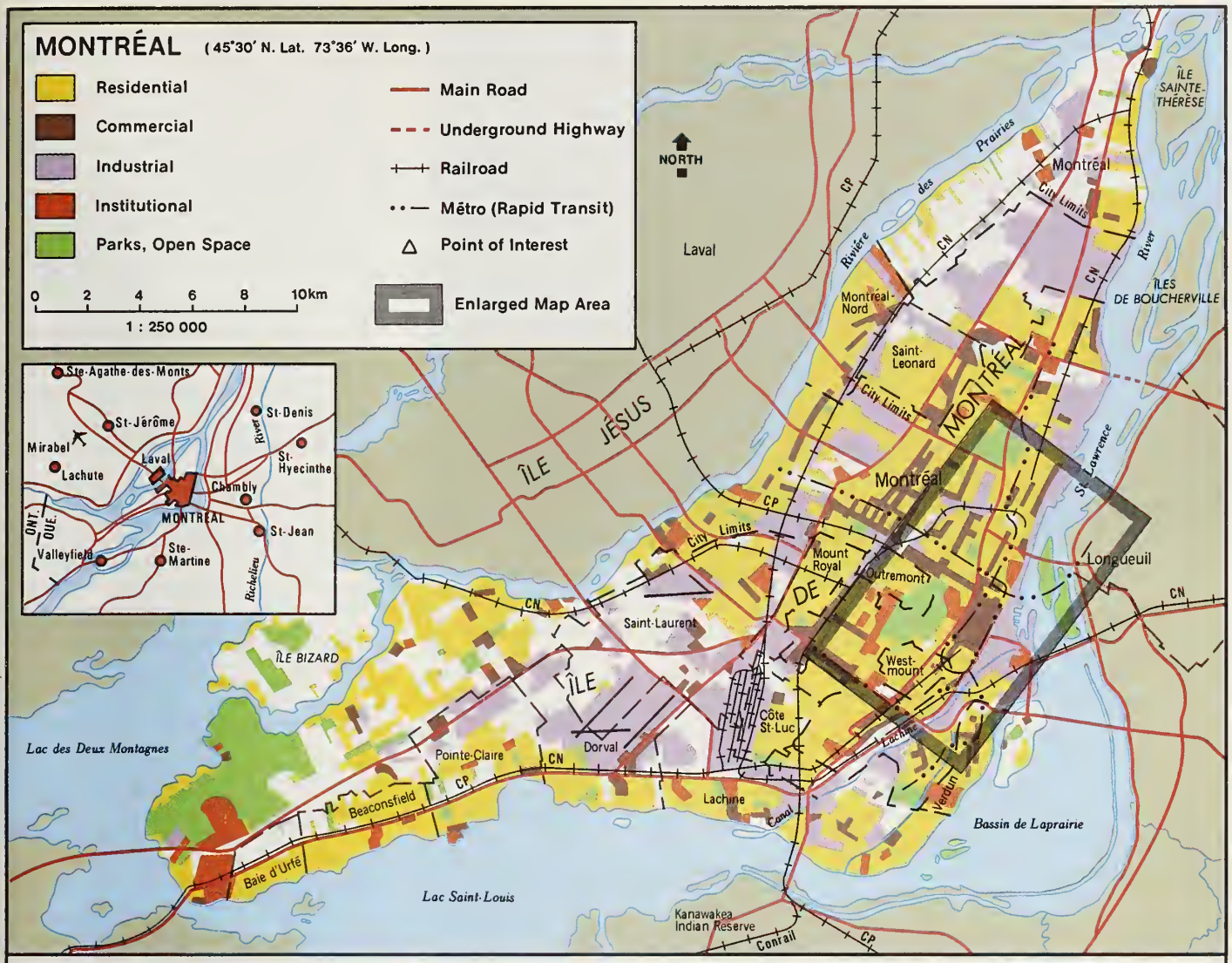
Population: 980 354 (1981c); 2 828 349 (CMA)
Rate of Increase (1971-81): (City) -19.3%; (CMA) 3.1%
Rank in Canada: Second (by CMA)
Date of Incorporation: 1832
Land Area: City 158 km²; 2814 km² (CMA)
Elevation: 200 m (Mount Royal)
Climate: Average daily temp, July 21.6°C, Jan -8.9°C; Yearly precip 999 mm; Hours of sunshine 1959 per year

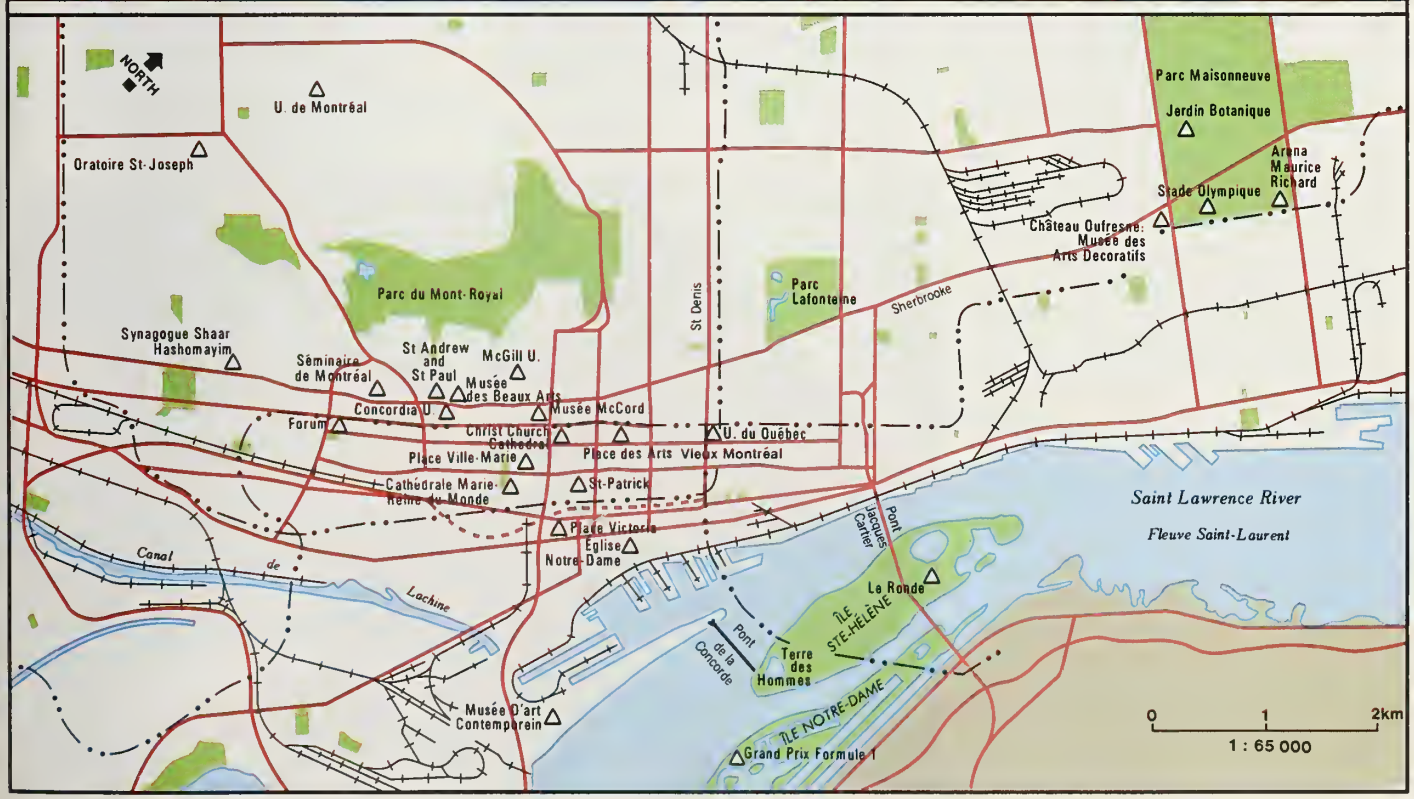
Since 1870 the urbanized area has been steadily overflowing the limits of the city proper, despite numerous annexations of suburban municipalities. In 1981 the census metropolitan area included approximately 100 different municipalities, the largest being Montréal-Nord (94 914); Saint-Léonard (79 429); La Salle (76 299) and Saint-Laurent (65 900) on Île de Montréal; Laval (268 335) and Repentigny (34 419) N of Île de Montréal; and Longueuil (124 320) and Saint-Hubert (60 573) on the S shore.

Settlement Montréal had difficult beginnings. The initial objective of evangelizing and settling the Indians proved utopian and had to be abandoned. In settling on Île de Montréal, Maisonneuve and his tiny group of colonists were caught in a storm of conflict between Indian tribes for control of the fur supply. A permanent state of war with the Iroquois marked the early decades of the colony's existence (*see* IROQUOIS WARS). The French military intervention of 1665-66 eased tensions in Montréal somewhat, but it was not until the conclusion of the peace treaty with the Iroquois in 1701 that the climate became more relaxed.

Development While QUÉBEC CITY was the administrative capital and the main port where exchanges took place with France, Montréal was a city of the interior, soon to become the great centre of the FUR TRADE, from which the COUREURS DE BOIS and the famous explorers, such as LA SALLE, DULHUT, D'IBERVILLE and LA VÉRENDRYE, set out. They established a network of trading posts to secure furs for Montréal and methodically explored the N American continent from the Gulf of Mexico to the Rockies. Relying upon the labour of the Indians, the fur trade did not provide much employment in Montréal itself. Strong dependence on this single activity and the weakness of the region's agriculture explain why population growth in Montréal was slow. At the end of the 17th century, the city had just over 1000 inhabitants, rising to approximately 5500 in 1789. In addition to the merchants and the coureurs de bois, religious institutions made their presence felt in the life of the community. Among these was the Seminary of Saint-Sulpice, which held Île de Montréal *en seigneury* for close to 200 years, providing it with priests for the parish church (*see* SEIGNEURIAL SYSTEM).

After the British conquest (the city surrendered 1760), Montréal's economy continued to depend entirely on the fur trade for several decades. Scottish merchants — Alexander MACKENZIE, the FROBISHER brothers, Simon MCTAVISH, Duncan, Simon and William MCGILLIVRAY, to name only the best known — took the place of francophone merchants. They combined their interests to create the NORTH WEST CO to compete more effectively with the HUDSON'S BAY CO for control of the fur trade of the Northwest. Despite the disadvantage of distance, the Montréal-based firm prospered until it was assimilated by its rival in 1821. The fur trade had played an important role in establishing Montréal's hegemony over the interior. From the end of the 18th century, the city's growth depended increasingly on the settlement of the rural hinterland, both on the plain outside Montréal and in Ontario. The large influx of immigrants from the British Isles, which began in 1815, accelerated the settlement process. By the 1820s its popu-


MONTRÉAL (45°30′ N. Lat. 73°36′ W. Long.)
Residential
Commercial
Industrial
Institutional
Parks, Open Space
Main Road
Underground Highway
Railroad
Métro (Rapid Transit)
Point of Interest
Enlarged Map Area
0 2 4 6 8 10km
1 : 250 000
NORTH
Laval
Montréal
City Limits
ÎLE SAINTE-THÉRÈSE
ÎLES DE BOUCHERVILLE
Prairies
Rivière des
River
CP
CN
Montréal-Nord
Saint-Léonard
ÎLE JÉSUS
MONTRÉAL
Mount Royal
Outremont
Longueuil
St Lawrence
Saint-Laurent
ÎLE BIZARD
ÎLE DE
Westmount
Côte St-Luc
Dorval
Pointe-Claire
Beaconsfield
Lachine
Canal
Verdun
Bassin de Laprairie
Lac des Deux Montagnes
Lac Saint-Louis
Baie d'Urfé
Kanawakea Indian Reserve
Conrail
Ste-Agathe-des-Monts
St-Jérôme
Mirabel
Lachute
St-Denis
St-Hyacinthe
Chambly
MONTREAL
St-Jean
Valleyfield
Ste-Martine
ONT.
QUE.
Richelieu


NORTH
U. de Montréal
Oratoire St-Joseph
Parc du Mont-Royal
Synagogue Shaar Hashomayim
Séminaire de Montréal
St Andrew and St Paul
McGill U.
Musée des Beaux Arts
Musée McCord
Concordia U.
Forum
Christ Church Cathedral
U. du Québec
Place Ville-Marie
Place des Arts
Vieux Montréal
Cathédrale Marie-Reine du Monde
St-Patrick
Place Victoria
Église Notre-Dame
St Denis
Parc Lafontaine
Sherbrooke
Parc Maisonneuve
Jardin Botanique
Arena Maurice Richard
Stade Olympique
Château Dufresne: Musée des Arts Décoratifs
Saint Lawrence River
Fleuve Saint-Laurent
Pont Jacques Cartier
Le Ronde
ÎLE STE-HÉLÈNE
Pont de la Concorde
Terre des Hommes
ÎLE NOTRE-DAME
Grand Prix Formule 1
Canal de Lachine
Musée d'art Contemporain
0 1 2km
1 : 65 000



Montréal skyline seen from Mount Royal (*photo by G.J. Harris*).

lation outnumbered that of Québec City and it had clearly asserted itself as the metropolis. In 1825 Montréal already had 22 540 inhabitants; there were 44 591 in 1844. A dynamic merchant class, engaged in the import and export trade, succeeded the fur-trade magnates. This group created the BANK OF MONTREAL in 1817 and the Committee of Trade in 1822, invested in maritime shipping and, in 1836, began to invest in railways.

Large-scale immigration enabled the residents of British origin to become the majority in the city. Conflict between French and English and struggles for political power marked the 1830s and resulted in the REBELLIONS OF 1837. The defeat of the PATRIOTES gave a political victory to the new anglophone middle class, and after 1840 the francophone leaders had no choice but to agree to co-operate with them. During the following years, fundamental changes took place in transportation and industry. Expansion of the St Lawrence canal system and deepening of the channel to Québec City made Montréal the principal seaport. Railway construction, particularly of the GRAND TRUNK RY, made the city the hub of the railway system. Finally the process of INDUSTRIALIZATION, begun around the middle of the century, was to alter completely the city's face. After depending for generations on trade and commerce for its livelihood, Montréal was becoming a major industrial centre.

Montréal grew rapidly 1850-1914. The population increased to 467 986 in 1911 (828 397 including the suburbs). The city proper overflowed its boundaries and quickly reached the cities in the suburbs, annexing 22 between 1883 and 1918. Industrial growth attracted those in search of employment. French Canadians living in rural areas poured into the city to join the urban proletariat and from 1867 Francophones were again in the majority. Immigration increased dramatically at the turn of the century and Montréal became a more cosmopolitan city. The settlement of the Canadian West was also important for the city's development. The CANADIAN PACIFIC RY established its head office here in the 1880s. Much western grain was shipped through the port of Montréal, considerably enlarged at the beginning of the 20th century. Montréal was then indisputably the metropolis of Canada, and St-Jacques Street was the country's financial centre. Toronto, however, was a powerful rival, and in the long run benefitted more from western settlement; eventually (around 1970) it took Montréal's place as Canada's centre of economic activity.

After WWI, Montréal saw another period of growth, based on industry, trade, finance and transportation. In 1931 the population of the city and suburbs reached over one million. But the GREAT DEPRESSION brought this period of expansion to a halt and caused grave social hardship. At the Depression's height, in Feb 1934, there were 62 000 unemployed in the city, with 240 000 receiving government assistance. The city administration could no longer pay its expenses and Montréal was placed under trusteeship.

WWII stimulated production and employment and helped restore prosperity. The 1950s and 1960s saw strong growth, supported by a new wave of immigrants and a large exodus of inhabitants from rural areas. This growth was especially apparent in the suburbs, where many new cities sprang up. The downtown area was completely transformed, and in the process the working classes, longtime residents of the area, had to move elsewhere. Under the leadership of Mayor Jean DRAPEAU, Montréal embarked upon great projects, several on an international scale: the Métro (inaugurated 1966), the International World Exposition (EXPO 67), the 1976 Summer Olympic Games and the Floralies Internationales (1980). These projects were undertaken during a period of relative economic decline, which became more pronounced in the 1970s. Slow growth, combined with the decision of many large firms to move their corporate headquarters to Toronto, caused the city to lose its prominent position, and it was relegated to the level of a regional metropolis. Montréal is nevertheless a great city and its vitality remains as strong as ever.

Cityscape Mount Royal, a small mountain of volcanic origin (elev about 200 m), dominates Montréal's landscape. Its graduated terraces mark the city's elevations and also determined its settlement pattern for many years. After a trial period at Point-à-Callière, Montréal's founder, Maisonneuve, moved to the elevated site (25 m) he had chosen along the river on the slopes of the Saint-Louis hill. This was to be the site of Vieux ("Old") Montréal, enclosed for many years by a stockade erected at the beginning of the 18th century. Few visible traces of the early French settlement remain. With few exceptions, the old buildings still in existence date from the 19th century; the area's middle-class residents have made way for warehouses, stores and office buildings. For a long time, downtown Montréal was confined to this area, centered around Notre-Dame and St-Jacques streets. Since 1960, however, the downtown has expanded considerably, and a second pole of activity, to the NW, has grown up along Dorchester St, which is lined with skyscrapers. The most famous is the cruciform Place Ville-Marie (43 stories), inaugurated 1962. This expansion led to the destruction of the city as it had been known. Buildings with great historical value were demolished, ancient residential areas were radically altered and thousands of low-income residents were displaced.

Around this downtown core are residential districts with the highest density of dwellings in the city, dating from the beginning of the century. The houses, built in rows, generally have 2 or 3 stories and much-celebrated outdoor stairways, a trademark of Montréal architecture of this period. On the higher slopes of Mount Royal nestle the well-to-do areas, the cities of Westmount and Outremont in particular. At the

Characteristic outside stairs on houses, Montréal (*photo by Harold V. Green/Valan*).



mountain's summit are a park and 2 cemeteries. Farther away are the newer districts built just after the war, such as Ahuntsic on the Rivière des Prairies. The density of dwellings is not as high here as in the older sectors. Finally, the vast suburban areas developed in the late 1950s are characterized by the N American-style single-family residence. They cover the western and eastern ends of the island and overflow northward on to the Ile Jésus (Laval) and the N shore, as well as southward onto the vast S shore, the home of over half a million people.

The Montréal landscape is circumscribed by the majestic St Lawrence to the S and the Rivière des Prairies, skirting the N side of the island. Numerous bridges connect the different areas; 15 have been built for automobiles and 5 for railways. In the middle of the St Lawrence is Ile Ste-Hélèn, a park for many years, which was enlarged as the site for Expo 67, where the annual exhibition Man and His World is now held. Farther east the imposing shape of the Olympic Stadium (1976) dominates the district of Maisonneuve.

Population Since the mid-19th century, Montréal has had 3 distinct decades of rapid growth: 1851-61, 1901-11 and 1951-61. Since 1966 the number of city inhabitants has declined while the population in the suburbs has increased. In 1931, 80% of the metropolitan area population lived in Montréal proper; in 1976 this figure was 39%. The early city limits, established 1792, remained the same for almost a century. After 1883 the annexation of suburban municipalities began. From 1883 to 1918, 22 were annexed; since 1963, 4 more have been added.

Demographic growth has stemmed largely from an influx of people rather than natural growth. The periods of most rapid growth coincided with the arrival of large numbers of immigrants. The most significant growth, however, was a result of internal migration. British living in Québec rural areas returned to the city, as did an even more significant number of French Canadians. After the war, natural growth was also a major contributing factor. In 1971 natives of other countries accounted for less than 19% of the city's population and only 15% of the metropolitan area population. Most Montréalers are natives of the province (77% born in the city itself). After Paris, Montréal is the largest French-speaking city in the world.

During the greater part of the 19th century, 98% of Montréal's population was of French or British descent. The British were in the majority 1831-67; the French Canadians then regained first place and have since held this position. At the turn of the century, contingents of JEWS from eastern Europe began to arrive, commencing the process of ethnic diversification which accelerated during the 20th century. In 1971 French Canadians formed 64% of the population (city and CMA); the British formed 11% (16% in the CMA); and ethnic groups formed 25 and 20%, respectively. Half this category consisted of ITALIAN or Jewish groups; the remainder was formed of many different ethnic groups. Some of them (GERMANS, POLES, UKRAINIANS, DUTCH) have been in Montréal longer than others. Groups from Southern Europe (GREEKS and PORTUGUESE), Asia and the West Indies arrived afterwards.

Economy and Labour After being a city whose economy was based on the fur trade for 150 years, Montréal evolved into a diversified commercial metropolis, focusing on both international trade in basic products and the distribution of manufactured goods. From the mid-19th century, industry played a growing role, and in the 20th century the services sector expanded with the rise of financial institutions, universities, engineering firms, etc. Today, trade, industry and services constitute the main poles of economic activity.

During the last 2 decades, some industrial decentralization has helped a few cities in the suburbs, but the industrial sector remains largely concentrated in Montréal. The principal manufacturing industries include food and beverages, clothing, metal products, transportation materials and equipment, and chemical products. Automation brought a drop in manufacturing employment. In 1971 only 15.7% of employable workers in the metropolitan area were directly involved in manufacturing. Administrative work and management functions employed almost 26%, the services sector almost 24%.

Transportation Montréal has long been a key seaport in eastern N America. Before the opening of the ST LAWRENCE SEAWAY in 1958, all goods destined for or coming from the Great Lakes had to be transshipped at Montréal. The improvement of navigation above and below the city became a constant preoccupation, beginning with the construction of the Lachine Canal (1825) and the deepening of the channel between Montréal and Québec (1851). Port facilities now extend over 24 km and include 117 berths, which accommodated 4479 ships in 1980. Long a major Canadian grain-exporting centre, Montréal's port has 4 grain elevators with a total capacity of 550 000 t. In recent years the handling of containers has played an increasing role, and 5 terminals have been equipped for this purpose.

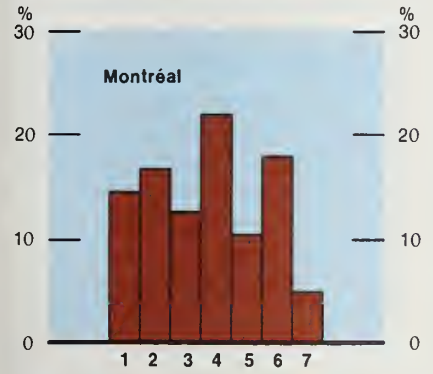
Montréal is also closely associated with the history of Canadian railways. The hub of the great transcontinental systems, it is at the head of major lines running S into the US. Canada's main railway companies, CN and CP, have their headquarters here, as does Air Canada. Montréal's 2 international airports are Dorval for Canadian and American domestic flights, and Mirabel for international flights. Saint-Hubert airport is used mainly by private aircraft. Interconnecting expressways, built mostly in the 1960s, crisscross the city and connect with numerous intercity highways. The public bus and subway systems are under the jurisdiction of the Commission de transport de la communauté urbaine de Montréal. The Montréal Métro, inaugurated in 1966, glides quietly underground on rubber tires. Successive extensions brought its length in 1980 to 45.3 km and the number of stations to 52. Another 21.5 km and 22 stations will be added by 1985.

Government and Politics Montréal was first granted its charter in 1832. From 1796 municipal affairs had been administered by magistrates not accountable to citizens for their actions. In 1836, with the provincial legislature out of session because of political unrest in



View of Montréal harbour from the Customs House, 1878-80 (*courtesy Notman Photographic Archives*).

Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



Industry groupings

1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figura II, Catalogua 31-209, Statistics Canada.

Lower Canada, the city charter was not renewed, and the magistrates resumed their role. The city was granted a new charter in 1840. In 1851 election of the mayor was extended to the people, though only property owners and certain tenants had this privilege. In its first decades the council resembled a private club for important Montréal businessmen. After Confederation, 1867, members of the liberal professions (doctors, notaries, etc) settled in the city in increasing numbers.

In the late 19th century, poor administration and corruption at city hall led some businessmen to form reformist groups. After a public inquiry, the provincial government created the "Bureau des commissaires" (4 elected members), limiting councilors' responsibilities to general administration. Financial difficulties led the Québec government to set up a 5-member administrative commission, with full powers to put the city back on its feet. In 1921 city council regained its powers, and in 1940 it was reformed along corporate lines: one-third of the 33 councilors were elected by property owners, another one-third by property owners and tenants, and one-third were appointed by organizations such as the Chamber of Commerce and the universities. The last category was abolished in 1960, and it was not until 1970 that the councilors and mayor were elected by universal suffrage.

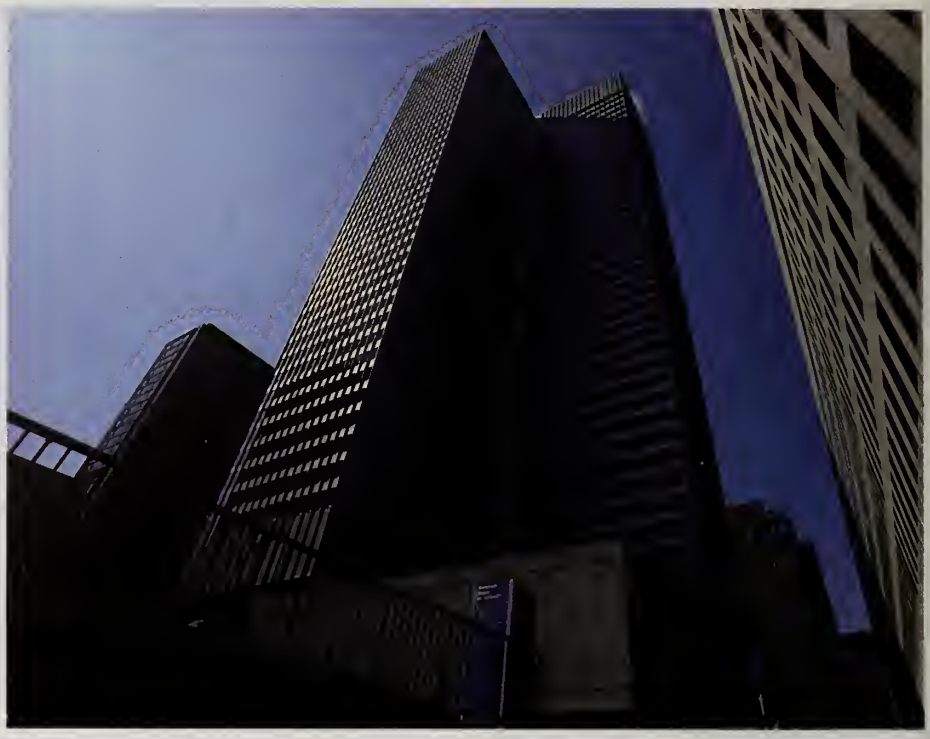
In the 20th century, Montréal politics has been dominated by populist mayors who have held office for several terms: Médéric Martin (1914-24, 1926-28); Camilien HOUDE (1928-32, 1934-36, 1938-40, 1944-54), nicknamed "Mr Montréal," and Jean Drapeau (1954-57 and 1960 to the present). Drapeau's Parti civique de Montréal (fd 1960) transformed civic political customs, until then practised by somewhat lax interest groups and numerous independent councilors. Since 1960 the Parti civique has held the majority of seats on council, lending cohesion and continuity to the city administration. During the 1970s citizens' committees, trade-union militants and progressive associations combined forces in opposition, winning their greatest number of seats in the 1974 election.

Mayor Drapeau is known for his grandiose projects. A veritable commercial traveller, he promotes the image of Montréal throughout the world. The soaring cost of the 1976 Olympic facilities tarnished his image and brought a halt to lavish spending. During the last few years, the city administration has concentrated more on the quality of urban life and the environment.

Montréal and the suburban cities have long disputed the sharing of costs and responsibilities for urban development. Since 1970 all municipalities on the island have been represented in the Montréal Urban Community, an association with island-wide responsibilities, including police protection, water and sewage services, and antipollution activities. Representatives of Montréal proper have a majority of seats on council and on the Urban Community executive.

Cultural Life The presence of a strong francophone population gives Montréal a distinctive character among large N American cities. It is the main centre of expression and diffusion of the French Canadian culture, as well as the meeting place between the French and American cultures. The anglophone minority also has its particular cultural institutions here.

Montréal is an important university centre, with 2 French-speaking universities — UNIVERSITÉ DE MONTRÉAL and UNIVERSITÉ DU QUÉBEC À Montréal — and 2 English-speaking universities — MCGILL and CONCORDIA. The Québec National Library, located here, has copies of all works published in the province. The municipal library has an important collection of Canadiana (Salle Gagnon). The Montreal Musée des Beaux Arts, established over a century ago, contains a general collection; the Musée d'Art Contemporain collects the works of 20th-century artists. The McCord Museum specializes in ethnology and the history of Canada. The centre for performing arts is Place des Arts (with 3 concert halls), where the Montreal Symphony Orchestra performs. There are also a number of theatre companies in the city.



Place Ville Marie, Montréal *(photo by Michel Gagné/Reflexion)*

Montréal has teams in numerous professional sports. The MONTREAL CANADIENS have won the STANLEY CUP more often than any other team and were one of sport's most enduring dynasties. The MONTREAL EXPOS play in the National Baseball League and the MONTREAL CONCORDES in the CFL. The city hosts the annual Canadian Grand Prix, Formula 1, automobile race. Montréal is also a centre for international competitions in amateur sports, the most famous held so far being the 1976 Summer Olympics. The Île de Montréal International Marathon is run annually in Sept.

PAUL-ANDRÉ LINTEAU

Montreal and Lachine Railroad began operations 19 Nov 1847 between Bonaventure Station in Montréal and the St Lawrence R. Built to bypass the LACHINE rapids, it was 12 km long. The railway merged with the Lake St Louis and Province Railway in 1850, taking the name Montreal and New York Railroad. In 1857 it amalgamated with the CHAMPLAIN AND ST LAWRENCE RAILROAD under the name Montréal and Champlain Railroad. It was eventually absorbed by the GRAND TRUNK RAILWAY.

JAMES MARSH

Montreal Canadiens, one of the 4 teams that formed the NATIONAL HOCKEY LEAGUE in 1917. The original franchise was granted to J. Ambrose O'Brien in 1909 and the team played its first game 5 Jan 1910. The team was officially named Le Club athlétique Canadien in 1911 and was composed entirely of French-speaking players until the 1912-13 season. Led by Newsy LALONDE, Jack Laviolette and goalie Georges VEZINA the Canadians won their first STANLEY CUP 1915-16. The team early on established its reputation for flair, speed and offensive power; in addition to Joe MALONE and Aurèl Joliat, it had in Howie MORENZ the most exciting player of the 1920s and 1930s. The Canadiens won the Stanley Cup 1923-24, 1929-30 and 1930-31, but not again until 1943-44 and 1945-46 when the explosive Maurice RICHARD, goalie Bill DURNAN, Toe BLAKE and Elmer Lach joined the team. The victory in 1952-53 marked the seventh in the Canadiens history to that point, but in 1955-56 the team initiated an era of success unmatched, perhaps, in the history of professional sports. The team won 5 straight Stanley Cups to 1959-60, 4 out of 5 from 1964-65 to 1968-69, again in 1970-71 and 1972-73, and another 4 straight 1975-76 to 1978-79 — an amazing record of 14 Stanley Cups in 24 years. In the same 24-year span, the team finished first in its division 17 times. Individual stars of the period, including Jacques PLANTE, Doug HARVEY, Jean BELIVEAU, Bernie GEOFFRION, Ken Dryden, Larry ROBINSON, Jacques Lemaire, Guy Lapointe, Serge Savard and Guy LAFLEUR, amassed an impressive array of individual awards, including the VEZINA TROPHY (14 times), JAMES NORRIS TROPHY (9 times), ART ROSS TROPHY (8 times) and HART TROPHY (6 times).

The Canadiens moved into the Montreal Forum in 1924 (rebuilt in 1968 at a cost of $10 million) and are currently owned by Brasserie Molson du Canada Ltée. Throughout its history the Canadiens have been a symbol of pride and excellence for the sporting public of Québec, although they have had less success since their last Stanley Cup in 1979-80 and now share the avid hockey fans of Québec with QUEBEC NORDIQUES.

JAMES MARSH

Montreal Concordes, FOOTBALL team. Founded in 1868, the Montreal Football Club was Canada's first organized football team. A later merger with the Montreal Amateur Athletic Association produced the MAAA Winged Wheelers, who competed in the Big Four (Interprovincial Rugby Union) until 1936 — defeating Regina in the 1931 GREY CUP. In 1946 Lew Hayman established the Montreal Alouettes. They won the 1949 Grey Cup (defeating the CALGARY STAMPEDERS) and, led by quarterback Sam Etcheverry, made 3 successive Grey Cup appearances (all losses to the EDMONTON ESKIMOS) from 1954 to 1956. Etcheverry finally won his Grey Cup in the 1970 game, coaching the Alouettes to victory over Calgary. They faced Edmonton in the final in 1974, 1975 and 1977-1979, winning Grey Cups in 1974 and 1977 under Marv Levy. In 1977 the Alouettes moved

into Montréal's Olympic Stadium (58 367 seats) and, through change of ownership, they were renamed the Concordes in 1982. DEREK DRAGER

Montreal Expos The first Canadian team admitted to BASEBALL's National League, the Expos began play in 1969 at Jarry Park in Montréal's north end. The team's principal owner, Charles Bronfman, hired John McHale to oversee the club's operation. The Expos moved to Olympic Stadium in 1977, and in 1979 achieved their first winning season with a record of 96-65, finishing 2 games behind the Pittsburgh Pirates. Memorable moments in the team's history include Bill Stoneman's "no-hitters" in 1969 and 1972, the Expos winning the National League's Eastern division pennant in 1981, and the selection of Gary Carter, Andre Dawson, Al Oliver, Tim Raines and Steve Rogers to play in both the 1982 and 1983 All-Star games. Between 1979 and 1983 the Expos attracted over 2 million fans annually, except for the strike-shortened 1981 season, and in that 5-year period earned the best overall winning percentage (.548) in the National League. WILLIAM HUMBER

Montréal Riots, the most spectacular moment of which was the burning of the Parliament building on 25 Apr 1849, occurred during a serious economic and political crisis in the PROVINCE OF CANADA. After 1848 the Reformers had formed the government; relegated to the Opposition, the Tories, who were largely anglophone and supported British rule and economic links with Britain, felt threatened by the French Canadian influence in government. Resentment was felt most keenly in Montréal, the capital city, where the population was half English speaking, half French speaking.

In Feb and Mar 1849 when the LaFontaine-Baldwin ministry passed the REBELLION LOSSES BILL, the opposition violently denounced the Act. On Apr 25, at the Tories' instigation, crowds of protesters opposed Gov Elgin's sanction of this law; they threw stones and rotten eggs at his carriage. That evening, public protest turned into a riot: the mob invaded Parliament and set fire to the building. The riots involved thousands of people, lasted 2 days and included attacks on the private property of several Reform leaders, including LAFONTAINE and Hincks. But Gov Elgin's endorsement of the majority decision in Parliament — in effect an affirmation of RESPONSIBLE GOVERNMENT — won the approval of most of the people and of the British government. Less than a month after the riots, however, it was decided that the seat of government should no longer be Montréal, which was considered too susceptible to ethnic tensions. JEAN-PAUL BERNARD

Montreal Standard began as a Saturday newspaper in 1905, an attempt to create a Canadian version of the *London Illustrated News*. The initial object was to provide a serious yet lively look at the week's events through photographs and news stories. During WWI, in particular, and to a lesser extent during WWII, this format was both popular and successful. Over time, the *Standard* became less news-oriented and more a feature-filled weekly with comics, recipes and fiction jostling for space with advertising and illustrations. The original broadsheet format changed to tabloid size, but, by the beginning of the 1950s, *Montreal Standard* seemed out of date. In 1951 its publishers conceived the idea of WEEKEND MAGAZINE, and the *Standard's* staff was absorbed into the new periodical. *See also* MAGAZINES; NEWSPAPERS. J.L. GRANATSTEIN

Montreal International Competition/Concours international de Montréal, annual MUSIC COMPETITION held in Montréal for outstanding young musicians from around the world. The organization was incorporated in 1963 with Wilfrid PELLETIER as honorary president and the first competition was held in 1965. Alternating among piano, violin and voice, each competition is restricted to performers 16-30 years of age (piano and violin) and 20-35 (voice). There are 2 preliminary rounds and a final round in which the ORCHESTRE SYMPHONIQUE DE MONTRÉAL often takes part. The rigourous admission standards and the high quality of its juries have made the competition one of the most prestigious in the world. The prize money ($10 000 first prize) and opportunities for performances with leading Canadian orchestras have attracted superb young musicians. Among contestants who have gone on to highly successful careers are Ghidón Kremer (2nd, violin, 1969) and Ivo Pogorelic (1st, piano, 1980). A special prize is awarded to the best interpreter of a new work by a Canadian composer, especially commissioned for the competition.

Monts, Pierre Du Gua de, explorer, trader, colonizer (b at Saintonge, France *c*1558; d in France 1628). A founder of the earliest permanent French settlements in N America and a close associate of Samuel de CHAMPLAIN, de Monts exerted great influence during the first 2 decades of the 17th century. His first visit to Canada was probably made in 1600 with Pierre Chauvin de Tonnetuit, and in 1603 he received royal patents for the colonization, commercial exploitation and government of Acadia. In 1604 he established a settlement on the Île Ste-Croix (Dochet I). Forced by climate and disease to move to PORT-ROYAL in 1605, the colony survived and prospered until the revocation of de Monts's fur-trading monopoly in 1607 forced its temporary abandonment. By then de Monts had returned to France and turned his attention to the St Lawrence Valley. Although he never visited N America again, he sent Champlain to found a trading post at Québec in 1608, thus playing a leading role in establishing it as a continuing French settlement. De Monts pursued his commercial interests in Canada until 1617, when he retired to the Ardennes. JOHN G. REID

Moodie, Susanna, née Strickland, author, settler (b at Bungay, Eng 6 Dec 1803; d at Toronto 8 Apr 1885). Susanna was the youngest in a literary family of whom Catharine Parr TRAILL and Samuel Strickland are best known in Canada. Her struggles as a settler, progressive ideas, attachment to the "best" of contemporary British values, suspicion of "yankee" influence in Canada, and her increasingly highly regarded book, ROUGHING IT IN THE BUSH, have made her a legendary figure in Canada.



Susanna Moodie (*courtesy Public Archives of Canada/C-7043*).

From comfortable beginnings Susanna and her sisters became precociously engaged in writing, partly for economic reasons, after their father's death in 1818. They produced work for children, for gift books and for ladies' periodicals. Susanna wrote sketches of Suffolk life for *La Belle Assemblée* 1827-28, prefiguring the style and method of her later, best-known book. She moved to London in 1831, where she continued an association begun earlier with the Anti-Slavery Soc, meeting her future husband, John Wedderburn Dunbar Moodie, at the home of the society's secretary. For the society she wrote 2 antislavery tracts, *The History of Mary Prince, a West Indian Slave* (1831) and *Negro Slavery Described by a Negro* (1831), establishing her humanitarianism and sensitivity to the range of character and moral outlook among "respect-



The Burning of Parliament (1849), painting attributed to Joseph Légaré. It is thought that rioters, furious at the passing of the Rebellion Losses Bill, broke the gas mains and that the resulting leak led to the flames (*courtesy McCord Museum/McGill University*).

able" people. *Enthusiasm: and Other Poems* (1831) also reveals a writer engaged in serious ideas.

After her marriage in 1831, she and her husband emigrated with their first child (of 6) in July 1832 largely for financial reasons — Dunbar Moodie being a half-pay officer and Mrs Moodie being without wealth. Arriving in the Cobourg area of Upper Canada, they attempted to farm in 2 different locations over the next 7 years. Unsuccessful, they removed to Belleville in 1840 after Dunbar was appointed sheriff of Victoria Dist. Emigration and the pioneering years, however, provided Mrs Moodie with material for the *Literary Garland* (Montréal) — material later incorporated in *Roughing It* and drawn upon for her novel *Flora Lyndsay*.

In Belleville Mrs Moodie wrote and published a good deal, much of her output romantic fiction set outside Canada. During 1847-48 she and her husband edited and wrote for the *Victoria Magazine*, intending to supply good literature for the mechanic class — skilled and semiskilled workers. She published *Roughing It in the Bush* in 1852, *Life in the Clearings* in 1853 and *Flora Lyndsay* in 1854 — all 3 concerned with Canada. It is often (incorrectly) remarked that she wrote documentary realism for the British market and romantic adventure for the Canadian market. In fact, she published both in both countries and in the US, but England provided her with more opportunity to publish than Canada did.

Roughing It in the Bush is her best-known and best work. It combines her steadfast moral vision, her fascination with differences in character, a willingness to reveal personal weakness and inexperience, considerable psychological insight and a generous measure of wit and playfulness. Together with its sequel, *Life in the Clearings*, it has formed the basis of her reputation.

Mrs Moodie lived in or near Belleville until the death of her husband in 1869, from which time she lived chiefly in Toronto until her own death. R.D. MATHEWS

Moon, natural satellite of Earth, with a mean diameter of 3476 km and a mass of 7.28×10^{22} kg (1.23% of Earth's mass). Three moons of Jupiter and one of Saturn are larger; the planet Pluto is smaller. The moon's mean distance from Earth is 384 500 km in an orbit that requires 29.5306 days from one New Moon to the next. The moon shines only by reflected sunlight, appearing as a crescent when it is within 90° of the sun. Except near New Moon, it is second only to the sun in brightness. Tidal effects of Earth have forced the moon's rotation to match Earth's orbital period; hence, one side of the moon always faces Earth and only 59% of its surface is visible. Because it is so close, the moon's influence exceeds the sun's as the cause of TIDES on Earth. The moon has been important in religion and art from earliest times and was the basis of the lunar calendar (*see* TIME).

The dark grey lunar surface reflects only 7% of the sunlight it receives (comparable to the reflectivity of black soil). The moon is dominated by thousands of craters, ranging from microscopic pits to gigantic Clavius, diameter 230 km. Water appears to be absent from the moon and the maria (lunar seas) are large lava-flooded craters. Maria, large craters, and almost all small craters are now known to have been formed by the impact of meteorites (or COMETS) and the mountain chains surrounding some maria are parts of the craters' rim structures. Other surface features include rilles, long cracks or valleys which are typically 100 km long, 1-3 km wide and several hundred metres deep. Rilles are interpreted as tension cracks resulting from the cooling of surface layers. Crater chains consist of small craters (normally along a rille) caused by venting of gas from the interior.

For most people the highlight of the space program was the landing of Apollo 11 ASTRONAUTS on the moon on 20 July 1969. The landing followed a series of unmanned missions by the US and the USSR which provided close-ups of the moon's surface, including pictures of the far side, which is also covered with craters but is deficient in maria. Six American landings and several Soviet probes returned lunar soil and rocks for intensive study. The landings confirmed the absence of both a lunar atmosphere and a magnetic field; chemical studies of the rocks showed that the moon contains less metal than Earth and is deficient in volatile material. The formation ages of the ROCKS are between 3.1 and 4.42 billion years, which accord with current estimates of the age of the solar system (nearly 4.6 billion years). The maria were flooded 3.1-3.8 billion years ago, filling preexisting impact basins with younger rocks. Records from seismic instruments left on the moon indicate a small core with an outer fluid layer, surrounded by a mantle and crust.

There are 3 main theories of the moon's origin: it was split off from Earth, shortly after Earth's formation (fission theory); it resulted from the capture by Earth of one or more bodies that had formed elsewhere in the solar system; Earth and moon were assembled in the same region as a double planet. Moon rocks have not resolved the question of origin, although explanations have tended towards some version of the double-planet theory.

Although lunar research has not been a major activity of Canadian scientists, several important contributions have occurred. An extensive program of impact-crater studies initiated by C.S. BEALS at the Dominion Observatory, Ottawa, involved analysis of both lunar and terrestrial craters. In his later years, Beals studied the relative ages of some lava surfaces by counting the frequencies of small craters on photographs obtained from lunar orbit. Geological studies of moon rocks were conducted in government laboratories in Ottawa and the evidence for ancient lunar magnetic fields was found by David W. Strangway (currently at University of Toronto) while working in the US. Lunar craters are normally named after deceased scientists and 10 Canadians are among those honoured in this fashion: Oswald T. Avery, Sir Frederick BANTING, C.S. Beals, C.A. CHANT, Reginald Alworth Daly, J.S. FOSTER, F.S. HOGG, Andrew MCKELLAR, R.M. PETRIE and J.S. PLASKETT. IAN HALLIDAY

Moore, Brian, writer, journalist (b at Belfast, N Ire 25 Aug 1921). Twice winner of the Gov Gen's Award for fiction, he is one of the most accomplished and innovative of 20th-century novelists, giving a painstaking, ironically humorous portrayal of characters at the point of change. In the earlier, "Irish" novels, eg, *The Lonely Passion of Judith Hearne* (1955) and *The Feast of Lupercal* (1957), his forlorn characters struggle in vain to break from their environments. Each of his novels explores the confrontation of past and present on different terms and from the perspective of individually realized characters and examines the consciousness of characters who conjure into fictional reality apparitions from the past. His later works include *The Luck of Ginger Coffey* (1960), *Catholics* (1972), *The Great Victorian Collection* (1975) and *The Mangan Inheritance* (1979). He also wrote *The Revolution Script* (on the kidnapping of James Cross by the FLQ in Oct 1970) and the film script of Alfred Hitchcock's *Torn Curtain*. He lived in Canada 1948-58 and now resides in California, maintaining his Canadian citizenship. GERALD LYNCH

Moore, Dora Mavor, actress, teacher (b at Glasgow, Scot 8 Apr 1888; d at Toronto 15 May 1979). After studying elocution at Toronto's Margaret Eaton School of Expression, she became the first Canadian to graduate from London's Royal Academy of Dramatic Art. She made her professional debut in 1912 in Ottawa, with the Colonial Stock Co, and then joined Ben Greet's Pastoral Players in New York, performing Shakespeare on their CHAUTAUQUA tours. She was with Greet again in 1918, playing Viola in *Twelfth Night* at London's "Old Vic." Returning to Toronto to raise 3 sons, she plunged into teaching and directing amateurs. In 1938 she founded the Village Players which toured Shakespeare to schools. It was the prototype for her nonprofit, professional New Play Society which played 10 seasons (1946-56) and produced 72 plays, 47 of which were original. As well as its annual satiric revue *Spring Thaw*, which delighted audiences for 25 years (1948-73), the NPS ran a theatre school (1950-68) which survived the demise of the producing company. Moore was instrumental in bringing Tyrone Guthrie to the STRATFORD FESTIVAL. Toronto's annual theatre awards have been named in her honour. DAVID GARDNER

Moore, Keith Leon, anatomist (b at Brantford, Ont 5 Oct 1925). Educated at Western (PhD, 1954), he joined the staff at U of Man in 1956. In 1965 he became professor of anatomy and head of the department there and in 1976 assumed the same positions at U of T. Internationally recognized for his research in genetics, embryology and teratology, he has served as president of the Canadian Assn of Anatomists and as chairman of the board of the Canadian Federation of Biological Societies. Among the textbooks he has written are *The Developing Human* (1973, rev 1982), *Before We Are Born* (1974) and *Clinically Oriented Anatomy* (1980). A fellow of the International Academy of Cytology and of the Royal Soc of Medicine, he has received awards both for his publications and teaching. T.V.N. PERSAUD

Moore, Mavor, actor, playwright, producer, professor, public servant (b at Toronto 8 Mar 1919), son of Dora Mavor MOORE. An artistic polymath, Mavor Moore was born into a distinguished academic and theatrical family. Educated at the U of T Schools and U of T, he served in intelligence during WWII and for the CBC's International Service. After the war, he worked for the UN and UNESCO and in 1950 became chief producer of television for the CBC, a post he held until 1954, all the while continuing his own theatrical writing and composing. He is perhaps best known for the annual revue *Spring Thaw* (est 1948), which he produced to 1966, and for collaborating on Harry SOMERS's opera *Louis Riel*. Moore began to teach at York in 1970 and served the Canada Council as chairman through difficult financial and political times from 1979 to 1983, when he was succeeded by Maureen FORRESTER. J.L. GRANATSTEIN

Moore, Thomas Albert, Methodist minister, moderator of United Church of Canada (b at Acton, Canada W 29 June 1860; d at Toronto 31 Mar 1940). After his ordination in 1884, Moore served several Ontario congregations before becoming secretary of the General Conference of the Methodist Church 1906-25 and secretary of the General Council of the United Church 1925-36. A member of the Methodist Church's union committee, he was elected moderator of the UNITED CHURCH OF CANADA in 1932. Moore's managerial skills and evangelistic enthusiasm made him a leader in the fight for social improvement. An honoured and respected spokesman for religious and secular institutions, he toured and preached for religious renewal and moral reform. NEIL SEMPLE

Moore, Tom, carpenter, trade-union leader (b at Leeds, Eng 1878; d at Ottawa 6 July 1943). Arriving in Canada in 1909, Moore practised his trade in Niagara Falls, Ont, and served in the carpenters' union as both local official and general organizer for eastern Canada 1911-18. In 1918 he was elected president of the Trades and



Moose (*photo by Stephen J. Krasemann/DRK Photo*)

Labor Congress of Canada at the head of a slate that opposed radical tendencies in the Canadian labour movement, especially those in western Canada that would form the ONE BIG UNION the next year. He held that office until 1935 and again 1938-43. He served on royal commissions on industrial relations in 1919 and on employment and social insurance in the 1930s. His position also won him a seat at the Int Labour Organization in the 1920s and at other international labour conferences. CRAIG HERON

Moores, Frank Duff, merchant, politician, 2nd premier of Newfoundland 1972-79 (b at Carbonear, Nfld 18 Feb 1933). In 1968 Moores won the federal seat of Bonavista-Trinity-Conception for the Progressive Conservative Party and in 1970 became the leader of the Newfoundland PC Party. The Oct 1971 election ended in a near tie between the Liberals and Conservatives. In Jan 1972, when Liberal Prem SMALLWOOD resigned, Moores was asked to form a new government. He went on to win the 1972 and 1975 elections. In contrast to Premier Smallwood, who followed policies of centralization and industrialization, Moores emphasized rural development and resource control. In 1979 he retired from politics to re-enter private business. In 1983 he was a prominent organizer of the successful PC leadership campaign of Brian MULRONEY. MELVIN BAKER

Moose (*Alces alces*), largest living member of the DEER family (Cervidae). Cows may weigh up to 490 kg and, in Alaska, bulls may reach 600 kg. More commonly, females weigh about 350 kg, bulls about 400 kg. Moose have a black coat; long, stiltlike legs, for wading through deep snow; a humped back; a long face with an overhanging upper lip, large ears and a dewlap of skin (bell) hanging from the throat. Their distribution extends from Nfld (introduced), through NS and NB, W to BC and N to Alaska. Called elk in Europe, they range across the USSR and Scandinavia. Bulls have long, horizontally spreading, palmate antlers, which begin to grow in Apr. Antlers, which remain velvet-covered until Aug and early Sept when they are used for fighting during the breeding season, Sept-Oct, are shed Dec-Feb. In breeding season, cows are vocal; hunters can attract bulls by imitating the female call. Females can breed at 16-18 months and reproduce until 18-20 years old. Calves, often twins, are born in late May and early June. Newborns are an unspotted, light red to reddish brown colour. Cows will defend young calves against both wolves and humans. Moose inhabit deciduous-coniferous forests across Canada; recently, they have extended their range beyond the TREELINE. In winter moose occupy forests where snow levels are reduced. They browse birch, aspen and willow twigs and, in summer, frequent lakes to eat aquatic vegetation, at times submerging completely. After forest fires moose seek new deciduous growth in regenerating forests. They may damage young conifers by trampling saplings and browsing the growing ends. The moose population is limited by wolf predation, HUNTING and starvation of calves in deep-snow winters. Moose are considered worthy prizes by hunters and naturalist photographers. A.T. BERGERUD

Moose Factory, Ont, UP, pop 1452 (1981c), located on an island in the Moose R, 24 km from JAMES BAY and opposite MOOSONEE. Founded (1672-73) by Charles Bayly, it was the HBC's second post and the first English settlement in what is now Ontario. Originally called Moose Fort, it was captured (1686) by the French in a daring overland attack led by de TROYES. It was returned to the HBC 1713 and trading activities resumed 1730. Among the restored buildings at this historic site is the blacksmith's shop (1740), likely the oldest wooden building in Ontario. The altar cloth and liturgical vestments at St Thomas's Anglican Church (1864) are of moosehide. The island is home to a Cree band. JAMES MARSH

Moose Jaw, Sask, City, pop 33 941 (1981c), inc 1903, is located 160 km N of the US border. The city lies in a sheltered valley at the confluence of the Moose Jaw R and Thunder Cr. The city's colourful name is likely based on Indian sources and was first applied to a local creek that supposedly resembled the outline of a moose's jawbone. An agricultural service centre, it is the province's third-largest city. Moose Jaw is governed by a mayor and 10 aldermen elected at large. A provincial agency, the Local Government Board, oversees municipal financing. The city's growth was closely tied to the expansion of cereal agriculture. Though it became an important retail, wholesale and industrial centre, Moose Jaw never rivalled nearby REGINA (65 km to the E), which shared the same tributary area. Its greatest periods of growth were from 1911 to 1921 when the population increased 40%, the 1940s with an increase of 17%, and the 1950s with an increase of 36%. For decades the sprawling CPR shops and marshalling yards dominated the urban landscape and remained the lifeblood of Moose Jaw's economy. The conversion to diesel locomotives in the mid-1950s diminished the CPR's presence, however. CFB Moose Jaw, first established as a training facility in 1941, now holds the distinction of being the city's largest employer. The majority of the population is native-born and British in origin. People of German, Scandinavian and Ukrainian origin form the largest non-British elements. The 5 largest religious denominations are United Church, Roman Catholic, Anglican, Lutheran and Presbyterian.



CFB Moose Jaw, the largest jet-training base in Canada, has a military population of 5000, including dependents, and 350 civilian personnel. Moose Jaw is located on the Trans-Canada Hwy, the CPR main line and a branch line of the CNR, and is served by 2 bus lines. Crescent Park, in the heart of the city, is 11 ha in extent and includes the Public Library, the Art Museum and a swimming pool and other recreational facilities. Moose Jaw's educational facilities include the Saskatchewan Technical Institute. The city is served by one English-language TV station, a radio station and a daily newspaper, the Moose Jaw *Times-Herald*. J. WILLIAM BRENNAN

Moose River, 80 km long, is formed by the confluence of the Mattagami and the Missinaibi rivers. About 55 km downstream, it is joined by the Abitibi R, then by the N French R, and flows NE to discharge into the bottom of JAMES BAY in northern Ontario. With its tributaries it drains most of the northeastern part of the province. Once well travelled by fur traders, the river valley today is the site of mining, pulp and paper, and hydroelectric developments. MOOSE FACTORY, Ontario's oldest trading post (est 1673), is located on an island in the river's mouth, opposite the mainland village of MOOSONEE, Ontario's only saltwater port. The Ontario Northland Ry links these settlements to the S. DANIEL FRANCIS

Moosonee, Ont, UP, pop 1433 (1981c), located on the Moose R, 25 km from JAMES BAY. The old fur-trade post, MOOSE FACTORY, lies on an island nearby. The site was chosen as the N terminus of the Ontario Northland, Ry, which follows an old Indian canoe route along the Abitibi and Moose rivers. The name was derived from the Cree *moosoneek*, "at the Moose." Moosonee is Ontario's only saltwater port, but high hopes for its prosperity were never realized. Many of the local Indian population are employed as guides for the tourists and hunters who ride the "Polar Bear Express" from COCHRANE. JAMES MARSH

Moraine, landform composed of an accumulation of sediment deposited by or from a GLACIER and possessing a form independent of the terrain beneath it. Moraines are composed primarily of till, an unsorted mixture of clay, silt, sand, pebbles, cobbles and boulders deposited directly from a glacier. Moraines are classified according to their form, origin and position (*see* GLACIATION). End (terminal), lateral, medial and recessional moraines, composed of ridges of till, are commonly associated with valley glaciers in mountainous areas. Well-developed examples are present on or near the Athabasca Glacier in JASPER NATIONAL PARK. The ice sheets that covered much of Canada during the ICE AGE produced end, recessional, interlobate, hummocky (knob

and kettle) and cross-valley moraines in many parts of the country. Interlobate moraines, such as the Oak Ridges moraine N of Toronto, form between 2 advancing tongues of an ice sheet. Hummocky moraines, composed of irregularly spaced knobs and mounds of till formed by melting glaciers, cover much of the Canadian prairie. Cross-valley moraines form at or very near the margin of a glacier terminating in a lake or ocean. Good examples are present along the shores of Hudson Bay and in Labrador.

N.W. RUTTER

Moraviantown, Ont, a small UP on the Thames R, 75 km SW of London. It was established in the spring of 1792 by a group of Moravian missionaries leading about 150 Delaware Indian converts from the US. Also known as Fairfield, this mission in the backwoods developed peacefully until the WAR OF 1812 when it was destroyed during the Battle of Moraviantown (5 Oct 1813), in which the famous Indian leader TECUMSEH was killed. The Indians returned to the site in 1815 and reestablished their village, calling it New Fairfield. During the 19th century, Moravian influence waned and in 1903 the Methodist Church took over the mission; it remains today, carried on by the United Church. DANIEL FRANCIS

Morawetz, Oskar, composer (b at Svetla, Czechoslovakia 17 Jan 1917). Recognized as a leading composer from the mid-1940s when his *String Quartet No. 1* (1944) and *Sonata Tragica* (piano, 1945) won national awards, Morawetz remains one of Canada's most frequently performed composers. He came to Canada in 1940 and studied at U of T; in composition, however, he is self-taught. Romantic by temperament, he has always avoided writing music that "cannot be felt but needs explanation consisting of mathematical formulas." Lyrical melody, lively rhythm, secure polyphony and innovative exploitation of instrumental colour are hallmarks of his style. Graceful works in a happy vein, such as *Carnival Overture* (1946) and *Overture to a Fairy Tale* (1956), are typical of Morawetz's early music. More serious emotional content, as in *Memorial to Martin Luther King* (cello and orchestra, 1968) and *From the Diary of Anne Frank* (soprano and orchestra, 1970), is characteristic of his later work. BARCLAY MCMILLAN

Morden, Man, Town, pop 4579 (1981c), inc 1903, is located 105 km SW of Winnipeg and 20 km N of the international boundary. The area contains fossils of prehistoric wildlife and the ancient sites of Mound Builders, and has received European and Métis explorers, traders and buffalo hunters. Ontarians homesteaded here 1874; Jewish and Mennonite settlers followed. The Morden townsite — named for Alvey Morden, an early settler — was established by the CPR 1881-82, and by 1885 had a thriving business community. The region is well suited to agriculture. A federal research station at Morden is the main prairie centre for horticultural and special crops research. Morden is the major service centre for the region. It has several industries, including farm implement, clothing and kitchen products manufacturers and an epoxy plant. It is the only Canadian site of commercial production of bentonite clay (used in the clarification of vegetable and mineral oils).

D.M. LYON

Morel, François, composer, pianist, professor, conductor (b at Montréal 14 Mar 1926). He was one of the few composers to have received his education entirely in Québec, and studied with, among others, Claude CHAMPAGNE and Jean PAPINEAU-COUTURE. His composing career began with *Antiphonie* (1953). With other musicians, including Serge GARANT, he presented groundbreaking concerts of contemporary music during the mid-1950s. He worked for several years for Radio-Canada as a composer of scores for plays, musical adviser, researcher and program host. In all his work he paid particular attention to rhythmic pulse and orchestration. In 1980 the Concours international de musique de Montréal commissioned *Melisma* from him. His other works include *L'Étoile noire, Radiance, Aux marges du silence* and *L'Oiseau-demain.* In the early 1980s he stopped writing musical scores to devote himself increasingly to conducting. He is chairman of Éditions Québec-musique and founder and artistic director of the group Bois et cuivres du Québec. HÉLÈNE PLOUFFE

Morenz, Howarth William, Howie, hockey player (b at Mitchell, Ont 21 Sept 1902; d at Montréal, Qué 8 Mar 1937). He played junior hockey in Stratford, Ont, and joined MONTREAL CANADIENS in 1923. A swift skater, deft stickhandler and prolific scorer, he was a popular idol in Montréal. He helped stir interest in hockey in the US and was traded to Chicago Black Hawks (1934) and then New York Rangers before returning to Montréal (1936). He died as a result of injuries suffered in a game on 28 Jan 1937. His death was mourned across Canada, and thousands filed past his bier, placed dramatically at centre ice in the Montréal Forum. Morenz scored 270 goals and 467 points in 14 seasons, led the National Hockey League in scoring in 1928 and 1931 and was judged most valuable player in 1928, 1931 and 1932.

JAMES MARSH

Morgan, Henry, merchant, founder of Canada's oldest department store (b at Saline, Scot 1819; d at Montréal 12 Dec 1893). After apprenticing in a Scottish wholesale house, Morgan came to Canada 1845 and opened a dry-goods store with David Starke Smith on St Joseph Street (now Notre Dame) in Montréal. When Smith retired in 1852 Morgan was joined by his brother James and the firm became Henry Morgan & Co. By 1874 the store employed 150 clerks with each department responsible for its own management, buying and overhead expenses. The business moved several times until in 1891 it found its final location in a large new building at the top of Beaver Hall Hill on St Catherine Street — a move regarded by the Montréal mercantile community as a commercial catastrophe and an unwelcome invasion of a select residential neighbourhood. Convinced that Montréal would expand northward from the waterfront, Morgan was vindicated when his competitors followed him to what would become Montréal's main shopping area. In the 1950s branches of Morgan & Co were opened in many large centres in Ontario and Québec, and a Morgan continued to head the company until it merged with the HBC in 1960. JOY L. SANTINK

Reading: J.W. Ferry, *A History of the Department Store* (1960).

Morgentaler, Henry, physician, abortion advocate (b at Lodz, Poland 19 Mar 1923). The son of Jewish socialist activists killed in the Holocaust, Morgentaler survived Auschwitz and Dachau, arriving in Canada in 1950. He began a general practice in medicine in Montréal in 1955 but by 1969 was devoting all his energies to family planning. He was one of the first Canadian doctors to perform vasectomies, insert IUDs and provide contraceptive pills to the unmarried. As president of the Montréal Humanist Fellowship he urged the Commons Health and Welfare Committee in 1967 to repeal the law against ABORTION.

To draw attention to the safety and efficacy of clinical abortions, Morgentaler in 1973 publicized the fact that he had successfully carried out over 5000 abortions. When a jury nevertheless found him not guilty of violating article 251 of the Criminal Code the Québec Court of Appeal (in Feb 1974) in an unprecedented action squashed the jury finding and ordered Morgentaler imprisoned. Though this ruling was upheld by the Supreme Court a second jury acquittal led Ron Basford, minister of justice, to have passed a Criminal Code amendment taking away the power of appellate judges to strike down acquittals and order imprisonments. After a third jury trial led to yet another acquittal all further charges were dropped. In Nov 1984 Morgentaler and 2 associates were acquitted of conspiring to procure a miscarriage at the Toronto clinic. A month later the Ontario government announced its intention to appeal the decision made by a Supreme Court of Ontario jury. The treatment of Morgentaler has focused attention on legal procedures as well as the issue of abortion. ANGUS MCLAREN

Morin, Augustin-Norbert, lawyer, politician, judge (b at St-Michel-de-Bellechasse, LC 13 Oct 1803; d at Ste-Adèle, Canada E 27 July 1865). Morin was without oratorical talent, and seemed dimmed by his associates, the brilliant speakers L.J. PAPINEAU and L.H. LAFONTAINE, but it was he who assured the continuity of French Canadian political claims for a quarter century as a member of the Assembly of Lower Canada from 1830 and of the Province of Canada in 1841 and 1842-55. He formed a ministry with Francis HINCKS 1851-54 and with Sir Allan MACNAB in 1855. Morin drafted the 92 Resolutions adopted in 1834 by the Assembly, presenting the members' grievances and arguing for an elected Legislative Council (achieved in 1856) and RESPONSIBLE GOVERNMENT (achieved 1848). In 1852 Morin became the first dean of the faculty of law of the new UNIVERSITÉ LAVAL, which he had helped found. In 1854 he managed to achieve abolition of the seigneurial regime. He sat as judge of the Superior Court 1855-59 when he became a member of the commission that drafted the first CIVIL CODE of Lower Canada. Morin also founded the newspaper *La Minerve* in 1826 and contributed to it for 10 years. He acquired land N of Montréal where he experimented with several crops, notably potatoes.

JEAN-MARC PARADIS

Morin, Claude, professor, politician (b at Montmorency, Qué 16 May 1929). A Laval professor 1956-63, he became after 1960 one of the most influential advisers to Jean LESAGE's administration. He was considered one of the prime thinkers behind the QUIET REVOLUTION and held the positions of economic adviser (1960-63), deputy minister of federal-provincial affairs (1963-67) and deputy minister of intergovernmental affairs (1967-71). He resigned after political disagreements with Robert BOURASSA's government to become professor at the Ecole nationale d'administration publique, UQ, and in 1972 joined the Parti Québécois. He was defeated in the riding of Louis-Hébert in 1973 but elected in 1976. As minister of intergovernmental affairs for the PQ government (Nov 1976 to Jan 1982) Morin was a principal architect of the electoral strategy that brought the party to power and of its strategy for the referendum on SOVEREIGNTY-ASSOCIATION and for constitutional negotiations with the federal government (1976-81). He resigned in Jan 1982, returning to his academic career. DANIEL LATOUCHE

Morin, Léo-Pol, pianist, music critic, teacher, composer (as James Callihou) (b at Cap-St-Ignace, Qué 13 July 1892; d in an accident near Lac Marois, N of Montréal 29 May 1941). An ambassador for the French music of his era, he also contributed to the growth of Canadian music. After studying in Québec C and Montréal, he won the Prix d'Europe (1912) and continued his training in Paris. He returned to Canada in 1914 and devoted himself to teaching and concert performances. In 1918 he was one of the founders of Le NIGOG, a music, literature and

fine-arts review. During a second stay in Europe (1919-25) he toured with Ravel (1923); in 1928 he played in a concert given by Ravel in Montréal. Morin first wrote on music for *La Patrie* (1926-29), then made weekly contributions to *La Presse* (1929-31) and *Le Canada* (1933-41). He wrote several harmonizations for folk songs.

HÉLÈNE PLOUFFE

Morin, Paul, lawyer, poet and translator (b at Montréal 6 Apr 1889; d at Beloeil, Qué Sept 1963). Admitted to the Québec Bar in 1910, Morin decided to study COMPARATIVE LITERATURE at the Sorbonne, Paris. His doctoral thesis on Henry Wadsworth Longfellow was published in 1913. After briefly teaching literature at McGill (1914-15) and in the US (1915-18) Morin went on to become secretary at the École des beaux-arts, Montréal (1922-30) and, after 1930, a court translator. His translation of Longfellow's *Evangeline* appeared in 1924. In Morin's first collection of poems, *Le Paon d'émail* (1911), he most closely followed the Parnassian school, emphasizing the description of scenes and works of art, full of mythological and literary allusions. In his second collection, *Poèmes de cendre et d'or* (1922), for which he won the Prix David, he achieved greater technical perfection and displayed a more personal style. He brought out a last collection, *Gêronte et son miroir*, in 1960. His poetry, in sparkling images, was witness to his great concern for form and his lasting fascination with other places, real or imaginary.

NICOLE BOURBONNAIS

Morine, Sir Alfred Bishop, lawyer, public figure (b at Port Medway, NS 31 Mar 1857; d at Toronto 18 Dec 1944). Morine's first career was editing newspapers, first in NS and after 1883 at St John's. Journalism launched him into Newfoundland politics, and politics into law. Beginning in 1886, he represented Bonavista in the Assembly for 20 years; he held several portfolios in the late 1890s and became a paid advocate for the Reid Newfoundland Co. In 1898 he was publicly embarrassed and forced to resign because of blatant conflict of interest. From 1906 to 1912 Morine established a Toronto law practice, lost his second mainland bid for election, and chaired the Public Service Commission of Canada (1911-12). He again became MHA for Bonavista 1914-19 and was also minister of justice 1919 and government leader in the legislative council 1924-28. From 1928 he resided in Toronto, writing on Newfoundland affairs and occasionally giving causes such as Confederation his elder statesman's support. He was a leading spokesman for Newfoundland on the FRENCH SHORE question, exemplified the toleration that the public showed to corrupt politicians and wielded great talents with equal persistence. He was knighted in 1928. M. MACLEOD

Moriyama, Raymond, architect, planner (b at Vancouver 11 Oct 1929). Educated at U of T and McGill, Moriyama began to practise architecture in Toronto in 1958; in 1969 he went into partnership with Ted Teshima. Moriyama is noted as a designer of monumental civic buildings in which the space pleases the public for whom the buildings are intended, an achievement not always realized in architecture today. His buildings include the ONTARIO SCIENCE CENTRE (1969), Scarborough Civic Centre (1973) and the Metropolitan Toronto Library (1977). His projects, however, have ranged from the design of a Japanese ceremonial bell, the Goh Ohn bell (awarded the Gov Gen's Medal for Architecture, 1982), to a vast planning project in Saskatchewan's Meewasin Valley. SUSAN FORD

Scarborough Civic Centre (1973) designed by Raymond Moriyama (*courtesy Moriyama & Teshima/Lenscape Inc*).



Mormon Church, fd 1830 in upstate New York. The Church of Jesus Christ of Latter-day Saints, by far the largest Mormon denomination, is the only one of significance in Canada. Its members regard it as the ancient church of Christ, destroyed through apostasy but restored by divine revelation. Unlike Catholics and Protestants, Latter-day Saints accord sacred value to a continuing record of revelations received through church leaders, as well as to the Bible; and they accept the *Book of Mormon* as the inspired translation of accounts concerning immigrant descendants of the House of Israel in America. They reject the notion of original sin and see men as gods in potential. Within their temples are performed rituals for the living and, by proxy, for the dead. In their concern for relations between the living and the dead, they have developed an immense collection of genealogical records.

Growing rapidly, the original Mormon religious community moved westward. After the 1844 assassination of founder Joseph Smith Jr, its main body was forced by religious persecution to make an arduous journey from Illinois to Utah under Brigham Young. In Utah the doctrine of polygamy, openly adopted, brought Mormons into conflict with American authorities until the practice was officially abandoned in 1890.

From its earliest years the LDS Church had sought converts in British North America. Smith undertook his only foreign missionary work in Upper Canada, and Young was among the first missionaries to go there. Most Canadian converts journeyed S and W to join other Mormons in Illinois, and then in Utah. By the 1880s, church leaders had come to see the Canadian West as suitable for colonization and as a refuge, at least for fugitive polygamists. In 1887 the first Mormon settlers, led by Charles Ora Card, arrived in the North-West Territories [Alberta] and established Cardston. After polygamy ceased to be an issue, the LDS Church sent other immigrants to southern Alberta. They developed the region's first major irrigation system and established the sugar beet industry there. By 1910, when Mormon immigration to Canada had almost ceased, Latter-day Saints formed a majority of the rural population S and SW of Lethbridge, as they do now. Today, while the greater number of Canada's 90 000 Mormons (1981c) reside in cities, CARDSTON retains its significance as the site of Canada's only Mormon temple, although plans were announced in 1984 for a new temple to be built in the Toronto area. KEITH PARRY

Reading: A History of the Mormon Church in Canada (1968); Thomas F. O'Dea, *The Mormons* (1957).

Morning Glory family (Convolvulaceae), containing 1200 species of herbaceous PLANTS, is represented in Canada by cultivated common morning glory (*Ipomoea purpurea*) and 3 related species; 11 species of climbing, parasitic dodders (genus *Cuscuta*); and 5 species of bindweed (*Convolvulus*). Common morning glory, less popular as a garden ORNAMENTAL than formerly, persists as a WEED or in waste places. Native to tropical America, it is closely related to the sweet potato. Dodders are leafless, vinelike annuals without chlorophyll. They have orange or reddish threadlike stems that encircle stems of herbs and shrubs and attach themselves by suckers that tap the host plant for water and nutrients. Once suckers are operational, dodders' roots disappear. Two bindweeds are important weeds in Canada. Field bindweed (*C. arvensis*), a European perennial found across Canada (except possibly Newfoundland and PEI), twines counterclockwise around crop and other plants, and spreads by seeds and underground roots. The white or slightly pink flowers are about 2.5 cm across. Hedge bindweed (*C. sepium*), similar in appearance, has flowers up to 5 cm across.

PAUL B. CAVERS

Moroni, David Lee, dancer, teacher, director (b at Ottawa 14 Mar 1938). As founding principal of the Royal Winnipeg Ballet School's professional division, Moroni has made a significant contribution to the quality of dance education in Canada and has helped raise the technical standard of the company itself, into which many of his students have graduated. Moroni trained in Ottawa with Nesta Toumine and danced in her local company before joining the ROYAL WINNIPEG BALLET in 1964 where he became a principal dancer in 1966 and associate artistic director in 1976. In 1970 he retired from dancing to head the company school's newly established professional program. Under the particular tutelage of the great Russian teacher Vera Volkova, Moroni was able to develop a successful academic regime of which celebrated ballerina Evelyn HART is the most distinguished product. MICHAEL CRABB

Morrice, James Wilson, painter (b at Montréal, 10 Aug 1865; d at Tunis, Tunisia 23 Jan 1924). Morrice was one of the earliest Canadian modernist painters and the first Canadian to achieve widespread acceptance abroad. Born of a wealthy and strictly Presbyterian merchant family, he showed an early interest in painting. His father wanted him to enter law and, after studying at U of T and Osgoode Hall, he was called to the Ontario bar in 1889, but never practised. Montréal dealer William Stewart advised him to study abroad and Sir William VAN HORNE, recognizing his talent, persuaded his father to finance his art studies in Europe. He began his studies at the Académie Julian in Paris in 1890 but soon sought individual masters, first the Barbizon painter Henri Harpignies, then the American painter James McNeill Whistler. But it was in Venice, which he visited with Maurice CULLEN in 1896, that the peculiar light effects changed his perception and set him on his course as a painter.

Morrice never returned to live in Canada but each year until his father died in 1914 he visited and painted the extraordinary winter sketches and pictures of Québec City and its environs that represent the Canadian side of his work. Paris remained for many years the centre of his world. He became one of the Left Bank expatriate painters and writers, and frequented cafés such as the Chat Blanc in Montparnasse, where he associated with Whistler and Charles Conder and English writers Arnold Bennett and Somerset Maugham, who portrayed him as a minor character in their books. They record his wit, his bibulous geniality, and his habit of making quick oil studies on small wood panels. These sketches were always the start of Morrice's paintings. He made hundreds, some later worked up into canvases. At first he was influenced by the late Impressionists, notably Bonnard and Vuillard, but from about 1909, when he met Henri Matisse, he moved towards the Fauves, with their more violent colouring and their stronger and more rhythmical composition. At the same time he visited N Africa. There, and in the Caribbean, to which he first travelled in 1915, he encountered the clear, strong tones of his later palette. Yet even at its most opulent, his painting was never strident in



J.W. Morrice, *The Ferry, Québec* (*c*1909), oil on canvas. Morrice's winter paintings of Québec are distinctively Canadian in their cold light and stark forms (*courtesy National Gallery of Canada*).

colour; it never lost his special delicacy and translucency.

The years of WWI were particularly disruptive. The Paris café life dwindled away; he went to London but found the climate difficult. He spent a period as a Canadian war artist and in this role painted a most uncharacteristic work — a mural of an endless line of soldiers marching through the mud of a battlefield. When the war ended, he spent more of his time in countries where the warmth was kind to his health and the colours and light inspired him as a painter. He was critically ill at Montreux, Switzerland, in 1922; when he went on to N Africa the rumour reached Paris that he was dead, and in 1923 some friends organized a retrospective exhibition. He died in reality a few months later.

Morrice's fame in his native country was almost entirely posthumous. Though he was a member of the short-lived Canadian Art Club, 1907-15, and was elected to the Royal Canadian Academy in 1913, he was mainly appreciated by a few fellow painters, and it was not until after his death that the first major exhibitions of his work were held in Canada. In Europe, however, he began to gain recognition in the early 1900s. In Paris, he exhibited regularly at the modernist Salon d'Automne, of which he became a vice-president. The more advanced French painters accepted him, and before Canadian galleries were acquiring his paintings on any scale, his work was moving into the great European public collections.

Morrice was a painter who bestrode 2 worlds. His work finds a place in the European modernist tradition and his tropical paintings have an exoticism of colour and spirit that few Canadian painters paralleled until recently. Yet his winter paintings of Québec, which include some of his most famous canvases, such as *The Ferry, Québec*, and *The Ice Bridge*, are so distinctive in their cold light and stark forms that one cannot think of them as anything but Canadian. They are among the first truly great Canadian paintings. GEORGE WOODCOCK

Morris, Man, Town, pop 1570 (1981c), inc 1883, is located at the confluence of the Red and Morris rivers, 55 km S of Winnipeg. First called Scratching River and later named after Alexander, Morris, Manitoba's second lieutenant-governor, it was the site of fur-trade rivalries in the early 1800s and later a landmark for cart brigades moving between St Paul, Minn, and the RED RIVER COLONY. By the early 1870s Ontarians were homesteading in the area. Morris soon became a busy stagecoach stop between Fargo, N Dak, and Fort Garry. Like other Manitoba towns, it was caught up in the competition for a rail line, offering a substantial bonus to attract the CPR 1882-83. By 1884-85 the town had collapsed under its debt load; it only recovered in the mid-1890s.

The Red and Morris rivers have greatly affected the town, especially during floods in 1950, 1966 and 1979. Morris is a trade centre for a prosperous grain-growing region and has several industries (manufacture of buses, agricultural implements and grain storage bins). Tourism has become important with development of the "Big M" — the Manitoba Stampede and Agricultural Exhibition held in July. D.M. LYON

Morris, Alwyn, canoeist (b at Montréal 22 Nov 1957). He won the K-1 1000 m and K-1 500 m junior national championships in 1977 and was the 1977 recipient of the Tom Longboat Award for top N American Indian athlete. With Hugh FISHER he won a gold medal in the K-2 1000 m (time 3:24.22) and bronze in the K-2 500 m (1:35.41) at the 1984 Los Angeles Olympics. He was in 1984 an outdoor recreation management student at Capilano Coll, N Vancouver. JAMES MARSH

Morris, Clara, stage name of Clara Morrison, née La Montagne, actress, author (b at Toronto 17 Mar *c*1848; d at New Canaan, Conn 20 Nov 1925), dubbed "the Queen of Melodrama" for her ability to move an audience to tears. Taken to Cleveland as a child, she was a "ballet-girl" in 1860. By 1869 she was a leading lady in Cincinnati and she played Halifax in 1870 before being discovered that Sept in New York by Augustin Daly. She was an overnight triumph in Wilkie Collins's *Man and Wife* and a sensational success as Camille and mad Cora in *L'Article 47*. Eventually ill-health curtailed her appearances. She wrote 3 vols of reminiscences, *Life on the Stage* (1901), *Stage Confidences* (1902) and *Life of a Star* (1906), as well as several novels and volumes of stories. DAVID GARDNER

Morris, Edward Patrick, 1st Baron Morris, politician (b at St John's 8 May 1859; d in London, Eng 24 Oct 1935). Morris was elected to the Newfoundland Assembly in 1885. In 1889 he joined Sir William WHITEWAY's Liberal Cabinet. He was especially important to the party as a senior Roman Catholic politician with immense influence in St John's. His relationship with Robert BOND, who succeeded to the Liberal leadership in 1897, was uneasy. They split in 1898 but united in 1900 to take power from the Tories. Morris became minister of justice in Bond's Cabinet but, urged on by Bond's opponents, resigned in 1907 and in 1908 formed the People's Party, which won the 1909 election. Morris had no clear policy other than to keep himself in power, and his government was tainted by accusations of conflict of interest. His popularity waned during WWI as the Opposition capitalized on discontent caused by profiteering and mismanagement. Having formed the first National Government in 1917, Morris retired early 1918 to England, where he was raised to the peerage. J.K. HILLER

Morris, Joseph, labour organizer (b in Lancashire, Eng 14 June 1913). He immigrated to Vancouver I where he worked as a woodcutter. He organized for the International Woodworkers of America and rose through the ranks to become president of Local 1-80 (1948) and regional president (1953-62). He was then elected executive VP of the CANADIAN LABOUR CONGRESS until in 1974 he became the congress's president. Morris viewed work in the labour movement as a battle for small gains. Under his leadership, the CLC in 1976 issued a "manifesto" favouring tripartite decision making, and opposed wage controls in a "national day of protest" — the largest organized demonstration in Canadian history. In 1977 Morris was elected chairman of the International Labor Organization. He retired from the congress presidency in 1978. LAUREL SEFTON MACDOWELL

Morrison, Donald, outlaw (b near Megantic [Lac-Mégantic], Canada E *c*1858; *d* at Montréal 19 June 1894). He was the son of Scottish settlers, grew up near Lk Mégantic and spent several years working as a cowboy in western Canada and the US. In 1886 he became involved in a financial dispute which resulted in the loss of the family farm to Maj Malcolm McAulay. Believing he had been cheated by the wealthy and influential McAulay, he harassed the new owners, and a special constable, Lucius (Jack) Warren, was engaged to arrest him. On 22 June 1888 Morrison shot and killed Warren in Megantic. After evading capture for some months, largely through the assistance of sympathetic Scottish farmers, he was apprehended on 21 Apr 1889, tried and sentenced to 18 years hard labour. Broken by prison life, he refused food and medication, and died of consumption within 5 years. He became a legendary figure in the Scottish settlements of eastern Québec. His story is romanticized in a poem by Oscar Dhu [Angus Mackay], *Donald Morrison, the Canadian Outlaw* (1892), and is the subject of fictional account by Bernard Epps, *The Outlaw of Megantic* (1973). EDWARD BUTTS

Reading: M. Robin, *The Bad and the Lonely* (1976); C. Wallace, *Wanted: Donald Morrison* (1977).

Morrison, James, "J.J.," salesman, farmer, farm leader (b near Arthur, Canada W, 25 July 1861; d at Toronto 17 Mar 1936). He attended business college in Toronto during 1885 and worked as a salesman until 1900 when he returned to the family farm. He became active in

local educational and farm issues, as a member of the Patrons of Industry and joined the Ontario Grange in 1907. In 1914 he helped plan the development of the United Farmers of Ontario (secretary 1914-33) and the United Farmers Co-operative Company (secretary 1914-35). Morrison organized the delegation of 3000 Ontario farmers that marched on Ottawa in 1918 to protest the government's CONSCRIPTION policy. He also played a crucial role in the Progressive victory in Ontario in 1919, although he declined the premiership in favour of E.C. DRURY. Because he thought the Progressive movement should remain exclusively a farmers' movement, Morrison soon disagreed vigorously with Drury's approach; his obstructionism contributed significantly to the Drury government's defeat in 1923. IAN MACPHERSON

Morrison, Mary Louise, soprano (b at Winnipeg 9 Nov 1926). Studies at the Royal Conservatory of Music brought Morrison to Toronto, where she began her career as an opera singer, appearing with the Canadian Opera Co and on the CBC. She also appeared frequently as soloist with choirs and orchestras in works of the standard repertoire. Morrison is best known, however, as a dedicated interpreter of 20th-century music. She has sung in numerous premieres of Canadian works, many of which, in recognition of her exceptional ability to make avant-garde music enjoyable to audiences, have been specially written for her. Much of her contemporary music performance in Canada and abroad has been undertaken as a member of the Lyric Arts Trio. BARCLAY MCMILLAN

Morrisseau, Norval, artist (b at Sand Point Reserve, near Beardmore, Ont 14 Mar 1932). He is a self-taught artist of Ojibwa ancestry (his Ojibwa name means "Copper Thunderbird") and he originated the pictographic style, or what is referred as "Woodland Indian art," "legend painting" or "x-ray art." This style is a fusion of European easel painting with Ojibwa Midewiwin Society scrolls and pictography of rock paintings. Introduced to the Canadian public at the Pollock Gallery, Toronto, in 1962, Morrisseau was the first Indian to break through the Canadian professional white-art barrier. Throughout the 1960s Morrisseau's pictographic style grew in popularity and was often perceived by other Cree, Ojibwa and Ottawa artists as a tribal style, to be adapted for their own cultural needs. By the 1970s younger artists painted exclusively in his genre. For Morrisseau, the 1970s saw him struggling to reconcile native and Christian religions in his art and personal life. The period did enrich his colour palette and saw the introduction of his "stained-glass" icons, variations of his earlier works. It was not until his mid-1970s discovery of the religion Eckankar, which has Eastern and Christian elements, that Morrisseau ceased trying to Christianize his imagery. He created instead a world of nonsectarian, universal consciousness. Morrisseau's brillance lies in his ability to move away from his own conventions to renew his artistic vision. He constantly returned to his Ojibwa heritage, instilled in him by his maternal grandfather, Moses Nanakonagos. TOM HILL

Reading: Elizabeth McLuhan and Tom Hill, *Norval Morrisseau and the Emergence of the Image Makers* (1984).



Norval Morrisseau, *Indian Vision, Man* (nd), tempera on paper. He was the first Indian artist to break the professional white-art barrier *(courtesy Glenbow Museum).*

Mortality, *see* POPULATION.

Mortgage, a legal paper in which borrowers agree to surrender their property to a lender if they do not pay back the money they owe, with INTEREST. If the property is easily movable, eg, a car or a boat, the deal is called a chattel mortgage, but most mortgages involve real estate and are called collateral mortgages. The ordinary way to buy a house in Canada is to raise most of the money by a mortgage loan on the house itself because if the borrowers fail to make their mortgage payments the lender can foreclose the mortgage and take the house and sell it (*see* BANKING). Lenders try not to write a mortgage for more than the property will bring when sold. Sometimes there is more than one mortgage on the same property, in which case, if the borrower fails to repay, the holder of the first mortgage recovers all his money before the holder of a second mortgage recovers any. As a result, interest rates on second and third mortgages are high. Under the National Housing Act, first passed in 1938 and much amended since, the federal government insures mortgages on moderately priced new houses, cutting the risk and so lowering the interest rate. Mortgages not guaranteed under the NHA — which includes most mortgages on the resale of older homes — are called conventional mortgages. In the 1950s and 1960s, most mortgages lasted 20 or 30 years. Lenders ceased offering such long-term mortgages in the 1970s when interest rates rose rapidly. Most mortgages are now due in one, 3 or 5 years, although even the 5-year mortgages were rare in the early 1980s when interest rates climbed to more than 21%. Banks, forbidden to lend mortgage money before 1954, had written about 33% of the more than $100 billion worth of mortgages that were outstanding in the mid-1980s. DON MCGILLIVRAY

Morton, William Lewis, historian, professor (b at Gladstone, Man 13 Dec 1908; d at Medicine Hat, Alta 7 Dec 1980). Educated at U of Man and Oxford, Morton combined a lengthy career as a professor of history at U of Man and Trent U with a record of distinguished publications. By the 1950s he had become one of Canada's best-known and most accomplished historians. In his writings he consistently sought to combine his commitment to regional distinctiveness with his concern for elucidating the nature of the Canadian identity, particularly as it was shaped and structured by imperial links with France and England. Among his many books, conservative in tone and interpretation, are *The Progressive Party in Canada* (1950), winner of the Gov Gen's Award for nonfiction; *Manitoba: A History* (1957) and *The Canadian Identity* (1961). *The Critical Years* (1964) was one volume in the Canadian Centenary Series, of which Morton was executive editor. "History is not an academic mystery," he once wrote. "It's what the community thinks about itself, how it sorts out ideas." A.B. MCKILLOP

Mosaic (1967-), a quarterly magazine devoted to "the comparative study of literature and ideas," founded at U of Manitoba under the editorship of Kenneth McRobbie. It publishes only critical and interpretive essays. Each issue is now devoted to a single scholarly theme, eg, "From an Ancient to a Modern Theatre"; "The Novel and Its Changing Forms"; "The Eastern European Imagination in Literature." An unusual feature of *Mosaic* is that many issues are republished in book form. GEORGE WOODCOCK

Mosher, Aaron Roland, trade unionist (b in Halifax County, NS 10 May 1881; d at Ottawa 26 Sept 1959). In 1907 Mosher led Halifax freightshed employees on strike. In 1908, when the Canadian Brotherhood of Railway Employees (CBRE) was founded, Mosher was elected its first president, a position he held until 1952. Under his leadership CBRE became the largest Canadian transport-workers' union. As a national industrial union, it embraced employees who were outside the jurisdiction of the craft railway brotherhoods. CBRE briefly affiliated with the Trades and Labor Congress but was expelled at the insistence of a competing international union. Mosher became Canada's foremost exponent of national unionism. In 1927 he became president of the new All-Canadian Congress of Labour. When it was succeeded by the CANADIAN CONGRESS OF LABOUR (1940), Mosher retained the presidency. During WWII, as a labour representative on several government committees, he favoured collective-bargaining legislation and opposed wartime wage controls. LAUREL SEFTON MACDOWELL

Mosquito [Sp, "little fly"], long-legged, fragile FLY of order Diptera, family Culicidae. About 3000 species are known worldwide, at least 74 in Canada. Only females seek blood meals; both sexes feed on nectar. All mosquitoes have a long, slender proboscis (beak), a pair of slender, fifteen-segmented antennae, and densely scaled wing veins. The female proboscis has 6 long, pointed stylets that enter the victim's skin in rapid succession. The female may take 3 times her own weight in blood, using it for egg production. Eggs are laid on water or moist soil. Those laid on soil may hatch after flooding or



About 3000 species of mosquito are known worldwide, at least 74 are found in Canada *(artwork by Shirley Stacey).*

remain dormant until the next spring. Eggs deposited in water habitats subject to drying, eg, shallow pools or water-filled containers, can resist desiccation for weeks or months. All larvae are aquatic and, except for a few predaceous species, feed on detritus and microorganisms. Pupae are active, but nonfeeding. Adult life averages 3 weeks in summer, but Canadian species that overwinter as adults in protected places may live 8-9 months. One species may overwinter as larvae in water-filled leaves of purple PITCHER PLANT. In some areas of Canada, these larvae may be ice-bound for 6-7 months. Most species are tropical. They are feared as transmitters of malaria, filariasis and dengue fever (affecting about 0.5 billion people annually). In Canada, mosquitoes transmit human and equine encephalitis viruses and the NEMATODE causing dog heartworm. In northern boreal forests, mosquitoes are serious INSECT PESTS of people and animals. Their bites cause considerable irritation and result in significant blood loss. Mosquitoes present a barrier to northern development by reducing hours spent outdoors for industrial and recreational purposes. R.A. BRUST

Reading: J.D. Gillett, *Mosquitos* (1971).

Moss, small terrestrial PLANT, usually less than 10 cm tall, that lacks true conducting tissues (xylem, phloem) and has a dominant gametophyte (sexual) generation. Mosses are the largest and most highly developed group of division Bryophyta (which also includes LIVERWORTS and hornworts). Bryophytes are sometimes known as the "amphibians of the plant world" because of their dependence on water for sexual reproduction. Mosses show alternation of generations, ie, have 2 phases in the life cycle. These are the free-living, perennial gametophyte (the typical green moss plant), and the short-lived sporophyte (asexual generation), which remains dependent on the gametophyte. The sporophyte produces spores that are wind-dispersed. Some spores germinate into new gametophyte plants. Gametophyte plants produce sex cells (eggs, sperm) that undergo fertilization to produce another sporophyte. The gametophyte has rhizoids (rootlike structures that attach the plant to its substrate), a simple or branched stem, and small leaves (mostly only one cell thick). The sporophyte has a foot embedding it into the gametophyte and a spore capsule usually borne on a stalk (seta). Some mosses reproduce asexually by gemmae (small groups of cells produced on the gametophyte tissues) or by bulbils (small, deciduous shoots) found in leaf axils. Most mosses can also reproduce by fragmentation, ie, the breaking off of almost any plant part, which then grows into a new plant. Lacking true conducting tissues, mosses mostly absorb water directly through the stem and leaves. Many botanists believe that mosses evolved from primitive vascular plants (ie, those having true conducting tissues). Others argue that they developed from some green algal ancestor. Mosses are thought to be a reduced group, which lost much evolutionary potential by having a dominant gametophyte generation and by lacking specialized conducting tissues (a factor limiting size).

Mosses occur in several growth forms, the more common being turfs, cushions, mats and wefts. Individual plants are usually closely associated and several hundreds may be found in a single turf or cushion. Mosses grow in many places but prefer moist, shady habitats. A few are aquatic (especially water mosses, genus *Fontinalis*); some grow in very dry places (especially granite mosses, *Andreaea*). Common growth surfaces include rocks, trees, rotten wood, humus and soil. The presence of copper mosses may indicate high levels of heavy metals in the substrates. Dung mosses grow only on dung or other nitrogen-rich substrates. PEAT mosses (genus *sphagnum*) accumulate into deposits that may be several hundred metres thick. Peat is used in horticulture and as fuel. Mosses, an important part of the ground cover in the boreal coniferous forests, are also a conspicuous part of arctic TUNDRA or mountain vegetation. Some mosses are good pioneer colonizers and quickly invade bare or disturbed soil, consolidating it by their dense, turflike growth. There are over 10 000 species worldwide of which about 1250 occur in N America. Individual parts of Canada have fewer species (eg, 466 species in Alberta, 445 in Newfoundland, 430 in Ontario). Mosses thrive in humid climates, and coastal parts of Canada have a greater diversity than do the interior parts. GUY R. BRASSARD

Moth, common name for INSECTS that, with BUTTERFLIES, constitute the order Lepidoptera. Probably over 100 000 species of moths exist worldwide, several thousand in Canada. Moths are distinguished from butterflies by having threadlike or feathery antennae. Most are nocturnal. They vary in size from adults of some leaf miners, with wings spreading little more than 3 mm, to the Asian atlas moth, spreading 20 cm. The related cecropia moth, spreading 12 cm, is Canada's largest. Most moths have mouthparts modified into a coiled proboscis (tongue) for extracting nectar from blossoms.

Moths have 4 developmental stages: egg, larva, pupa and adult. Moth larvae, called caterpillars, are usually plant feeders. Most consume leaves; others feed on roots (eg, ghost moth larvae), bore into tree trunks (carpenter worms), feed beneath surface of leaves, stems or bark thus forming tunnels (leaf, stem or bark miners), or bore into fruits or seeds (codling moth larvae). In many species, larvae live in shelters formed by rolling and tying leaves together (leaf rollers); others build portable cases in which to live (bagworms). Pupae are usually contained in a cocoon, or in a cell in the soil. Although most moth larvae are solitary, some live in colonies, eg, webworms and tent caterpillars. The American tent caterpillar is a periodic pest in fruit-growing areas of eastern Canada. Larvae spin a silken nest in which they congregate when not feeding. Forest tent caterpillars, which feed on broad-leafed trees, do not form an actual nest, but gather in a mass in crotches of tree branches. In some years, forest tent caterpillars are numerous enough to damage large tracts of broad-leafed trees.

One family (Sphingidae) of large moths attracts popular interest. It includes hawk or sphinx moths, distinguished by long, narrow wings and rapid flight. Although primarily nocturnal, they often fly at dusk and greatly resemble hummingbirds as they hover, feeding. Larvae of 2 species, tobacco and tomato hornworms, are occasional crop pests. Another family (Tortricidae) of much smaller moths includes economically important species. The codling moth, a pest of apples, bores into fruit, making it inedible. Spruce budworm, the primary problem of Canada's FOREST industry, sometimes destroys vast acreages of conifers. One of the largest families (Noctuidae) includes the owlet moths (millers) and many economically important larvae (eg, cutworms). Cutworms hide in the surface layer of soil in daytime and feed on young plants at night, often severing stems at the surface. Several pest species occur in Canada, pale western, red-backed and black cutworms being among the most important. The armyworm, another chronic pest, derives its name from larvae that march en masse from one stand of grain to another. Another group of Noctuidae contains species that bore into flowers and fruits (eg, corn earworm, tobacco budworm). Larvae of another large family (Geometridae) are called geometers or inchworms, from their form of locomotion. This family includes pest species responsible for defoliation of trees (eg, spring and fall cankerworms). Clothes moths, which occur worldwide, are carried from house to house on clothing or other articles of animal origin. Their natural food is hair, wool, feathers, etc.

D.F. HARDWICK

Motherwell, William Richard, agrarian activist, politician (b at Perth, Canada W 6 Jan 1860; d at Regina 23 May 1943). An early homesteader in Saskatchewan, he was a cofounder in 1901 of the Territorial Grain Growers' Assn, which under his leadership exacted legislation to curb monopolistic practices by line elevator companies and the CPR. Appointed Saskatchewan's first minister of agriculture in 1905, he was a tireless advocate of techniques that enabled the dry belt to be cultivated effectively; he also helped establish the College of Agriculture. A LAURIER Liberal, he resigned in 1918, largely in opposition to the provincial party's



The cecropia moth, Canada's largest, has a wingspan of 12 cm (*photo by Mary W. Ferguson*).



Motherwell Homestead, near Abernethy, Sask, for 60 years the home of William Motherwell, agrarian activist and politician (*photo by John deVisser*).

support of CONSCRIPTION. Between 1921 and 1930 he served twice as federal minister of agriculture under Mackenzie KING and initiated important national measures to increase farm production. *See* MOTHERWELL HOMESTEAD. LYLE DICK

Motherwell Homestead, near Abernethy, Sask, for over 60 years the residence of William MOTHERWELL. He homesteaded in what is now Saskatchewan in 1882. The HOMESTEAD is an excellent example of the Ontario settlers' approach to farmstead design and scientific agriculture in the PRAIRIE WEST. To separate the principal functional elements, Motherwell divided the farmstead into 4 quadrants — domestic, garden, water supply and barnyard. To provide protection from the elements, an attractive landscape and a means for trapping snow for spring meltwater, he designed an elaborate shelterbelt system. By building an Ontario-style house and barn, and landscaping a lawn-tennis court and ornamental plantings, Motherwell recreated the feeling of a rural Ontario estate. In 1966 the Canadian government designated the homestead a national HISTORIC SITE, and by 1983 had restored it to commemorate Motherwell's career and the history of scientific agriculture in western Canada. LYLE DICK



Motorcycle Racing takes a variety of forms, each with its own rules and specialized equipment. The best known is road racing, in which cyclists race in categories, usually related to engine size, over special circuits or on public highways closed for the occasion. Motocross is conducted on a closed circuit over rough, cross-country terrains and natural obstacles. Dirt-track races are run at speedway tracks. Other forms include time trials, hill climbing, sprints, endurance runs and ice racing. The Canadian Motorcycle Assn was formed in 1946 to organize competition when motorcycling became a popular competitive sport. In 1967 Canada hosted a World Championship Road Race for the first time and a Canadian team participated in the international Six-Day Trials, the "Olympics of Motorcycling." Mike Duff was world-champion Grand Prix driver in the 1960s. In 1972 John Williams, of Markham, Ont, won the World B Division Hill-Climbing Championship. BARBARA SCHRODT

Mount Alllson University, Sackville, NB, was established in 1839 by a local merchant, Charles Frederick Allison. Mount Allison was a boys' academy owned and operated by the METHODIST Church but open to all denominations. It opened in 1843, and a branch institution for girls was added in 1854. Teaching at the college level began in 1862. In 1875 the university conferred on Grace Annie Lockhart a bachelor's degree in science and English literature, the first baccalaureate awarded to a woman in the British Empire. In 1882 Mount Allison granted to Harriet Starr Stewart the first bachelor of arts degree awarded to a woman in Canada.

Mount Allison is primarily an undergraduate university, awarding degrees in arts, science, music, fine arts, commerce and education, and certificates in engineering and secretarial studies. Although the university is no longer church controlled, it retains close ties with the UNITED CHURCH. Over the years it has preserved the character of a compact scholarly community: by combining a manageable size with excellent facilities (many of the buildings have been constructed since 1960) Mount Allison seeks to provide the best in undergraduate instruction to a largely residential student body. Forty Rhodes Scholars have graduated from Mount Allison since 1900. Admission is highly selective, since the university receives some 2500 applications annually for an average of 500 openings.

Enrolment: Mount Allison University, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
1 604	3	69	—

Mount Assiniboine Provincial Park (est 1922, 386 km^2), area of mountain peaks, alpine meadows and lakes dominated by 3561 m Mt ASSINIBOINE (about 25 km S of BANFF, Alta). Geologically, the area consists mainly of folded limestone rocks sculpted by GLACIATION. The park, which is mainly above 1500 m, has a score of peaks exceeding 2700 m, numerous small lakes (notably Lk Magog), and some underground streams in KARST areas. Climate and vegetation vary with altitude and aspect: near peaks, summer is short and cool and vegetation sparse (eg, mountain avens, saxifrage, arctic willows); lower down, alpine meadows feature numerous wildflowers; between 2100 m and 2400 m, alpine larch, alpine fir and Engelmann spruce occur; below 2000 m, spruce, alpine fir and lodgepole pine are dominant, and open areas feature berries, rhododendron and false azalea. Mammals include wapiti, moose, mule deer, mountain goats, bighorn sheep, bear, wolf, ground squirrel, coyote, porcupine; 66 bird species have been observed (eg, Canada jay, ptarmigan, waterfowl, golden eagles). The area was explored in the early 1800s and brought to public attention in the 1880s by G.M. DAWSON, who named Mt Assiniboine after the Indians who had hunted the area for generations. The Alpine Club of Canada promoted recreation in the area and was instrumental in establishing the park, which was expanded in 1973. Today the park is used mainly for hiking, climbing, horseback riding and cross-country skiing. There are few facilities other than a lodge and cabins at Lk Magog, primitive campsites and trails. Access is mainly on foot or horseback from the Sunshine Village ski area, Spray Reservoir or Highway 93. JOHN S. MARSH

Mount Carleton Provincial Park (est 1962, 174 km^2), comprising part of the Central Highlands of NB, is located 43 km by road ESE of St Quentin. The highlands are complex geologically. Mt Carleton, focus of the park and the highest peak (820 m) in the Atlantic provinces, is a monadnock of resistant rock left after EROSION (including GLACIATION) produced the surrounding valleys and lakes. The varied habitat is dominated by conifers and deciduous species (eg, beech, maple, birch, ash). Mammals include moose, deer and beaver; fish are abundant. Canoe routes of the Indians and French missionaries traversed the area, which was initially exploited for lumber. Tourists subsequently established fish and game clubs. The area has continued to be popular for canoeing, fishing, camping, hiking and, in winter, cross-country skiing and snowmobiling. Two roads provide access but are sometimes impassable because of adverse weather conditions. JOHN S. MARSH

Mount Edziza Provincial Park (est 1972, 2300 km^2) comprises part of the Tahltan Highlands, between the Stikine and Iskut rivers in BC. The nearest community is Telegraph Creek, 20 km NW of the PARK. The area is a volcanic wilderness that, according to Indian legend and scientific research, has been geologically active within the last few hundred years. Some 30 cinder cones dominate the park landscape, the highest of which, Mt Edziza, rises to 2787 m. Around it is a 640 km^2 lava plateau. To the S are the older, brilliantly coloured and glacially eroded Spectrum Mts. The area experiences great temperature variations, and snow may persist on the peaks throughout summer. Wildlife includes mountain goats, stone sheep and, at lower elevations, mountain caribou, grizzly bear and moose. In the late 1800s, a trail was built across the southern part of what is now the park, through Raspberry Pass, to allow construction of a telegraph line that would link N America, Asia and Europe. Abandoned poles and derelict cabins can still be found along this route. All access to this wilderness is by rough trails that require visitors to be experienced and fully self-sufficient. JOHN S. MARSH

Mount Everest Expedition The highest mountain in the world at 8848 m, Mt Everest lies on the border between Nepal and Tibet. It was first climbed in 1953 by New Zealander Edmund Hillary and Sherpa Tenzing Norgay. Since that time, Everest has been attempted by mountaineers from many nations. In 1982 the Canadian Mt Everest Expedition took up the challenge, under the sponsorship of Air Canada. The team consisted of 20 Canadians and 39 Nepalese Sherpas.

Preparations for the climb took 5 years and involved over 100 Canadian companies, who provided nearly 20 tonnes of equipment and food. Special equipment had to be designed and manufactured, including tents made of "bullet-proof" nylon. Over 6000 man-days of food was packed in Canada into daily ration boxes for carrying up the mountain. In addition, preparations were made to send TV signals back to Canada using 3 satellites. (This was the first "live" TV coverage of an Everest expedition.) After a 240 km hike from Katmandu, capital city of Nepal, the expedition arrived at the base of Everest on 15 Aug 1982. Over the next 2 weeks rapid progress was made through the terrifying Icefall and into the Western Cwm ("valley"). By the end of Aug the route had been pioneered to Camp 2 at 6545 m. However, on Aug 31 tragedy struck when a huge avalanche fell across the route in the Icefall, killing 3 Sherpas. Two days later a collapsing ice tower killed cameraman Blair Griffiths.

This double blow stopped the expedition and it was 2 weeks before the climb could proceed. On Sept 22 the climbers established Camp 2 and started work on the upper mountain. Camp 3 was established at 7155 m, and on 4 Oct the final Camp 4 was occupied on the South Col at 7980 m. On Oct 5 the first summit team of 32-year-old Laurie Skreslet of Calgary and Sherpas Sungdare and Lhakpa Dorje left the South Col camp at 4 AM and reached the summit at 9:15 AM after a rapid ascent. Two days later, the summit was reached a second time by 30-year-old Pat Morrow of Kimberley, BC, and Sherpas Pema Dorje and Lhakpa Tshering. The Canadian expedition thus placed 2 Canadians and 4 Sherpas on the summit of Everest on its first attempt in a year marked by very bad weather. JOHN AMATT

Mount Orford Park, Qué, est 1938, is a provincial park located near MAGOG. The 57 km² park runs along the base of Mounts Orford (881 m) and Chauve (599 m), which lie on the lower Appalachian plateau and are separated from each other by the Rivière-aux-Cerises as it cuts diagonally across the park. The escarpments of the 2 main massifs have made possible the development of a celebrated downhill ski area and the park's huge hydrographic network is ideal for water sports, especially on Stukely and Fraser lakes. The abundant and varied vegetation is part of the Laurentian maple groves. The fauna include a major deer ground and an impressive beaver colony. The Jeunesses musicales du Canada established the Orford Art Centre, a music camp and cultural centre, in 1951. The centre's concert hall, a 500-seat amphitheatre, opened in 1960, and 2 modern residences were added in 1970. The ORFORD STRING QUARTET was formed by 4 students in 1965. CLAUDINE PIERRE-DESCHÊNES

Mount Pearl, Nfld, Town, pop 11 543 (1981c), inc 1955, is situated just SW of ST JOHN'S. Originally known as Mount Cochrane, it was an estate awarded to British naval officer James Pearl in 1834 by Gov Cochrane. The estate was subdivided at Pearl's death in 1840. In this century Mount Pearl was the site of Marconi's first experiment in transoceanic wireless telegraphy. Glendenning's Farm, part of the original estate and a government demonstration farm in the 1930s, was the site of an airfield used by aviation pioneers. A popular summer resort in the 1930s, Mount Pearl was developed as an urban centre by the 1950s. A number of large subdivisions were built in the 1960s and the town grew as a dormitory community, which eventually included in its boundaries Newtown and Donovans, a large industrial park. Apart from local services, Mount Pearl depends on the industrial park and the neighbouring city of St John's for most of its commerce and employment.

JANET E.M. PITT AND ROBERT D. PITT

Mount Revelstoke National Park (est 1914) is a place of contrasting landscape, varying from rain forests and lush alpine meadows to barren, rocky ridges and GLACIERS. The jagged spires of the Selkirk Range are the backdrop for this 263 km² PARK. Grizzly bear and caribou range throughout, while mountain goats frequent the rocky bluffs. Alpine meadows feature pika, hoary marmot and golden-mantled ground squirrel, often under the gaze of the golden eagle. Between Oct and June the park is covered in a thick blanket of snow, but in the brief summer, meadows glow with the blossoms of lupine, aster and Indian paintbrush. The park offers primitive backcountry campsites. Private campgrounds are located nearby on the TRANS-CANADA HIGHWAY. LILLIAN STEWART

Mount Saint Vincent University, Halifax, was founded in 1873 as a women's academy. After 1914 post-secondary education was provided by affiliation with DALHOUSIE UNIVERSITY. Mount St Vincent achieved degree-granting status in 1925, becoming the first independent college for women in the Commonwealth. It was totally burnt in 1951, but reconstruction was immediate. It is now a coeducational liberal arts and science facility directed by the Sisters of Charity. Emphasis is on preparing women for decision-making careers through a personalized education within the Roman CATHOLIC tradition. Specialized disciplines include public relations, business administration and child study.

LOIS KERNAGHAN

Mount Tremblant Provincial Park, the first in Québec, was established in 1894 and occupies 1248 km² of the LAURENTIAN HIGHLANDS about 125 km NW of Montréal. Geologically, the park includes the very old IGNEOUS ROCKS of the Canadian SHIELD and, in the S, the younger SEDIMENTARY ROCKS of the ST LAWRENCE LOWLANDS, all of which have been glaciated. Two regions can be identified, the massif in the S, rising to Mt Tremblant (968 m), and the northern Great Lakes area, averaging 500 m in elevation. The park includes the watersheds of the rivers St Maurice, Matawin and L'Assomption. The rich vegetation varies with altitude but includes maples, birches and conifers. The abundant fauna includes moose, bear, fox, hare, beaver, many amphibians, 193 species of birds and 36 species of fish (notably trout). The area was used for logging and gradually became popular for summer and winter recreation. The park was reorganized in 1981 into 4 recreation zones accessible by highway, and 3 roadless nature preservation zones. Mount Tremblant is noted for its ski resort but there are other activities in the park.

JOHN S. MARSH

Mount Uniacke, UP, pop 1145 (1981c), is located in central NS 35 km W of HALIFAX, on the highest point between YARMOUTH and Halifax. Rivers flow from here S to the Atlantic and N into MINAS BASIN. In 1784 Richard John UNIACKE, attorney general of NS, 1797-1830, was granted 400 ha on the Windsor road. He named the home that he built on that land Uniacke House after the home of his Irish grandfather. It was frequented by Halifax high society and visited by the elite of England, such as Edward, duke of Kent, father of Queen Victoria. Now owned by the NS government, it is considered perhaps the most interesting example of colonial architecture in Canada. In 1865 gold was discovered at Mount Uniacke and from 1866 to 1910 the mines were worked. Other industries of this village are lumbering and limited farming. In the past 20 years its population has grown considerably owing to its low tax base and easy commuting distance to Halifax. JEANNIE PETERSON

Mountain, native group living on the Mackenzie Mt slopes down to the MACKENZIE R. Historically, various small groups using the eastern slopes of the mountain range have been called Mountain Indians and have traded at all the posts between Ft Liard and Ft Good Hope. Those Mountain trading into Ft Norman since the 1820s have maintained their identity while most others have gradually merged with the native populations using other trading posts along the Mackenzie R. The Mountain are Athapaskan speakers and their language is closely related to HARE and BEARLAKE. Historically, the name was probably appropriate for all natives in this region, including the Goat and NAHANI. Most information comes from those who continue to trade and live at Ft Norman.

Although the Mountain have exploited a large expanse of the Mackenzie Mts, from the Redstone R north to the Mountain R, their estimated population (1827-1971) has been less than 150. During the 19th century and aboriginally (according to their own accounts), the Mountain were fearful of and sometimes hostile to all native groups on the western slopes of the mountains. After the KLONDIKE GOLD RUSH (1898), increased contact with Yukon natives gradually reduced apprehensions and some settled and married into Yukon native groups. There is no evidence in oral tradition of hostile encounters with the Indians of the eastern region although contact was infrequent before the FUR TRADE.

The Mountain were almost totally dependent on moose, woodland caribou, mountain goats and Dall sheep. Population cycles or variations in migratory routes sometimes made it necessary to survive on the previous season's caches. This environment was often abundant, but during a bad winter, entire family bands could starve. The area is not rich in fur-bearing animals valuable in the fur trade. Most trade was in dried meat, grease and hides. In the late 19th century the Mountain developed the mooseskin boat — framed with green spruce wood and covered with raw moosehides sewn together. The boats were usually 12-18 m long and greatly increased the amount of trade goods that could be transported, although they were only functional for the trip down the rivers; people and dogs had to ascend the mountains by foot. This was often done in both spring and fall until the 1940s when dry meat and grease were no longer acceptable trade items. By mid-20th century the Mountain had made Ft Norman their permanent location. They now share their hunting, trapping and fishing areas with other native peoples in the Ft Norman area. BERYL C. GILLESPIE

Reading: Handbook of North American Indians, vol 6; Subarctic (1981).

Mountain, landform with steep sides and narrow summit area that rises prominently above adjacent land. A mountain is higher than a hill and smaller in area than a plateau, but the distinction is relative, depending more on relief (vertical distance from summits to valleys) than on size or elevation (vertical distance above mean sea level). Volcanic mountains or VOLCANOES are built by the accumulation of lava and solid ejecta from a volcanic vent. Erosional mountains are remnants of once larger uplands that have been dissected by streams or glaciers (*see* GLACIATION). Tectonic mountains have been elevated by crustal disturbances such as folding, faulting or plutonic activity (*see* PLATE TECTONICS). Most mountains are the product of several processes and their form depends on age, rock type and climate, which influence the type, extent and rate of EROSION. Mt Everest (elevation 8847.7 m), in the Himalayas, is the highest point on the Earth. The highest mountain in Canada is Mt LOGAN (elevation 5949.7 m) in the ST ELIAS MOUNTAINS of the YT. The mountains having the greatest relief on the Earth are the volcanoes of oceanic islands, which rise from the deep ocean floor, eg, Mauna Kea, the highest mountain in Hawaii, which extends 9752 m from the ocean floor. *See* GEOLOGICAL REGIONS. J.G. SOUTHER

Mountain, Jacob, first Anglican bishop of Québec (b at Thwaite Hall, Norfolk, Eng 1 Dec 1749; d at Québec City 16 June 1825). After graduation from Cambridge and 7 years of parish work, Mountain was appointed bishop of the new diocese of Québec in 1793. His episcopate coincided with the Napoleonic struggle and, largely because of the British government's preoccupation with it, Mountain was unable either to persuade those in authority to organize an effective church establishment in Québec or to subject the Roman Catholic Church to a form of government control, policies that he understood had been formulated and pursued after the cession of 1763. Yet Mountain accomplished much. In his episcopate 60 churches were built, including a stone cathedral in Québec City. He defended vigorously his church's claim to the clergy reserves. Between 1815 and 1825, a period of heavy immigration, he opened 35 missions. His clergy increased from 9 to 60, and he was able to augment their scanty stipends. He encouraged a new school system in Lower Canada and obtained a charter for McGill. Under pioneer conditions he made 8 laborious tours of the Canadas, going as far as Sandwich [Windsor].

A splendid preacher, Mountain was respected by colleagues in the Executive and Legislative councils of Lower Canada, with whom he was not always in agreement. He was not without his critics. The Roman Catholic hierarchy was apprehensive of his efforts to elevate the status of his church. Several governors and British colonial secretaries found his repeated demands difficult and even some of his clergy considered him more fitted for an English rather than a colonial see. But, aided by clergy and laity and with assistance from government and especially from the Society for the Propagation of the Gos-

pel, he laid strong church foundations on which his successors, including his son George, later bishop of Montréal and third bishop of Québec, were able to build. T.R. MILLMAN

Reading: T.R. Millman, *Jacob Mountain, First Lord Bishop of Québec* (1947).

Mountain Ash (*Sorbus*), genus of small TREES or shrubs of the rose family (Rosaceae), consisting of perhaps 100 species distributed in temperate Eurasia and N America. Plants are deciduous, lack thorns, and have simple or pinnate (feather-like) leaves with 9-11 leaflets. Creamy white flowers form large, flat-topped clusters. Small, red, applelike fruits are much sought after by birds. There are 4 species native to Canada, usually found in moist woods: 2 eastern (*S. americana, S. decora*) and 2 western (*S. scopulina, S. sitchensis*). The introduced European mountain ash or rowan (*S. aucuparia*) is grown as an ORNAMENTAL from the Queen Charlotte Is to Newfoundland, and often escapes, appearing native. In some reference works, *Sorbus* is included in the genus *Pyrus* (pear). Berries and bark were used as medicine by N American Indians. The wood is easily bent and was used for CANOE frames and snowshoes. Mountain ash is not a true ASH.



Showy mountain ash (*Sorbus decora*), with flowers and fruit. The small red fruits are much sought after by birds (*artwork by Claire Tremblay*).

Mountain Avens, common name for dwarf, trailing or mat-forming shrubs in genus *Dryas* of the rose family (Rosaceae). The genus includes about 4 species found mainly in higher altitudes of the Northern Hemisphere. Three are native to Canada. Furry, evergreen leaves, single, decorative flower and mat-forming ability make mountain avens popular for rock gardens. They may be grown from cuttings, tuft division and from seed, particularly in sandy soil. The very hardy species *D. integrifolia* was chosen (1957) as the floral emblem of the NWT, where it is abundant and blooms June-July. It grows on rocky, barren slopes in the mountains of BC and Alberta, and throughout the Territories and the Arctic Archipelago. This species has a corolla of white petals with a yellow centre. *See* PROVINCIAL FLORAL EMBLEMS. CÉLINE ARSENEAULT



Three species of mountain avens are found in Canada, including the hardy species *Dryas integrifolia*, the floral emblem of the NWT (*photo by Mary W. Ferguson*).

Mountain Beaver (*Aplodontia rufa*), most primitive living member of order RODENTIA. Unlike true BEAVER, mountain beaver has no close living relative. It resembles a tailless muskrat and has a thick-set, heavy body, small ears and eyes, forefeet equipped with long, strong, curved claws for digging, and dense, short, grizzled brown fur. Adult males average 850 g in weight, females 775 g. Mountain beavers breed once annually (Feb-Mar), have a gestation period of 28-30 days and bear 2-3 young. They inhabit moist coniferous forests of the Cascade Mts from southwestern BC to central California. The mountain beaver digs a burrow system in damp, porous soil near streams. Burrow tunnels are 10-25 cm in diameter and 25-150 cm underground. Although several burrow systems may be adjacent, giving the appearance of a colony, the animals are by nature solitary. They do not hibernate and, in winter, eat conifer needles, leaves, tender twigs and bark, often climbing 2.5 m up shrubs and trees to clip branches. In summer they prefer sword ferns, bracken, leaves and various herbaceous plants. They can cause extensive damage by girdling young conifers and shrubs and by eating vegetable crops in gardens. R. BOONSTRA

Mountain Goat (*Oreamnos americanus*), even-toed, hoofed MAMMAL of the cattle family (Bovidae), derived during the ICE AGES from the primitive Asiatic goat-antelopes. It is not a true goat but belongs to a tribe ancestral to sheep and goats. The mountain goat, largest and most cold-hardy species of its tribe, is widely distributed in the Canadian western mountains. Adapted to life on steep cliffs where footholds are often covered by snow or ice, it is a slow, methodical climber and compensates for a narrow habitat with wide food habits. Males may exceed 125 kg; females weigh about 15% less. Adult females with kids dominate all other goats, including the largest males. In hard winters such females evict other goats from choice habitat; in mild winters goats remain gregarious. Both sexes have short, curved horns that can inflict severe damage in rare but vicious fights. Male goats are protected by an exceptionally thick hide that, during mating season, swells on the haunches to a thickness exceeding 2 cm. Goats have thin, fragile skulls and do not clash head on. Adult males avoid combat if possible, relying on elaborate dominance displays. They normally withdraw from aggressive females. Males are dominant only at the peak of the mating season. Afterwards, they leave the female ranges or are evicted. One, rarely 2, kids are born in June and are carefully guarded by females. Mountain goats are adversely affected by disturbances and can be easily over hunted, but are rarely preyed on by natural predators. VALERIUS GEIST

Mountain Range, a linear arrangement of mountain peaks and ridges surrounded by adjacent lower land or clearly separated from adjacent ranges by intervening valleys. The mountains of a range are commonly related to a single geological structure or ROCK formation. A group of related peaks with a circular rather than linear arrangement is called a massif. An array of mountain ranges, massifs and other topographic elements of related origin comprise a mountain system, and several systems a CORDILLERA. The Cordillera of western N America extends from Mexico to Alaska and includes about 20 mountain systems each composed of many mountain ranges. The Earth's major



Mountain goat (*Oreamnos americanus*), the largest and most cold-hardy species of its tribe, is widely distributed in the mountains of western Canada (*photo by Wayne Lankinen/DRK Photo*).

mountain systems lie along the margins of crustal plates where concentrated tectonic forces have caused uplift, deformation and igneous activity (*see* PLATE TECTONICS). Individual mountain ranges may be formed by volcanic eruptions or, more commonly, by differential EROSION of an uplifted terrane. When rapid uplift is accompanied by slow erosion, a plateau results. If erosion keeps pace with uplift, streams and GLACIERS erode away less competent rock, leaving more resistant rock standing as mountain ranges between the valleys. The long, narrow ranges of the ROCKY MOUNTAIN system of western Canada reflect the structure of resistant beds of folded and faulted sedimentary strata; the broader ranges and massifs of the Coast Range of BC were etched by water and glacier ice from an uplifted, granitic terrane of more uniform resistance to erosion. The relief and ruggedness of a mountain range depends on its age. The precipitous, very young ranges of the ST ELIAS MOUNTAINS in the southwestern YT, where rapid uplift is still proceeding, include the highest individual peaks in Canada. Uplift of the somewhat less rugged Rocky Mts began to decline after an episode of deformation about 70 million years ago. The subdued topography of the ancient Appalachian Mts is the result of erosion during the 150 million years since the last major uplift and deformation in eastern Canada. Submarine mountain ranges, which rise from the ocean floor along mid-ocean ridges, such as the mid-Atlantic Ridge and East Pacific Rise, are of



Marmolata, Pigeon and Snowpatch spires, left to right, in the Purcell Mts, BC (*photo by Pat Morrow*).

volcanic origin. On the moon and planets that have little atmosphere, such as Mercury and Mars, circular or crescent-shaped mountain ranges around impact craters have survived for hundreds of millions of years without being destroyed by erosion. *See* GEOLOGICAL REGIONS; VOLCANO.

J.G. SOUTHER

Mountain Sheep, highly successful, medium-sized, even-toed MAMMALS of the cattle family (Bovidae), genus *Ovis,* comprising some 37 races in Eurasia and southern N America. SHEEP colonized N America during the last GLACIATION but remained rare until after the extinction of many large American mammals, about 11 000 years ago. In Canada, 2 species, each with 2 races, are recognized. Bighorns (*O. canadensis*) include the California bighorn in the arid ranges of south-central BC and the larger Rocky Mountain bighorn in the Canadian Rockies. Thinhorn or Dall sheep (*O. dalli*) occur in the territories and northern BC. One race, black Stone sheep (*O. d. stonei*), is confined to Canada. Many sheep are glacier followers, doing best in cool, dry, sunny mountains within sight of snowfields. They vary greatly in size, reflecting the quality of their habitat. Large bighorn males (6 years or older) weigh about 110-120 kg in autumn; large females, 60-70 kg. Thinhorns weigh about 20% less. Fully grown males carry the largest horns relative to body size of horned mammals. These may measure over 115 cm, and weigh 10-12 kg. Horns are used like sledge hammers in fighting, as shields, and as symbols of rank among older males. A single lamb is born in late May or early June. In Canada, sheep are not endangered and respond well to wildlife management.

VALERIUS GEIST



The thinhorn, or Dall, sheep (*Ovis dalli*), found in the territories and northern BC (*photo by Stephen J. Krasemann/DRK Photo*).

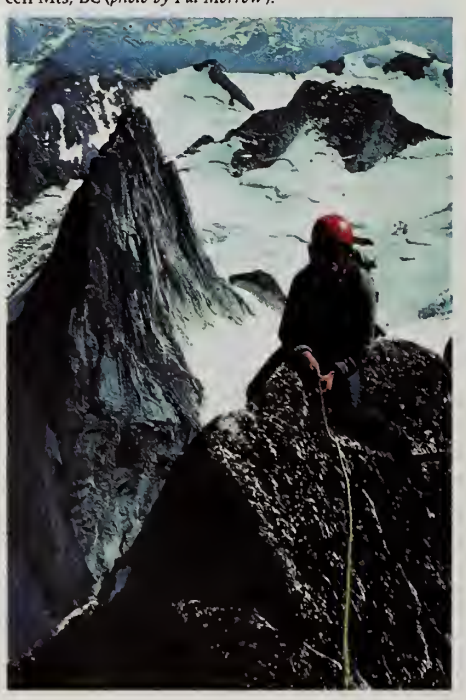
Mountaineering is the practice of climbing in mountainous terrain for pleasure or research. Although it is usually associated with dangerous assaults of formidable summits, there are several elements to the activity, each often pursued for its own sake. Many people restrict their mountaineering to hikes in the lower regions of the mountains; others specialize in steep rock climbing, whether it be a 5 m boulder or a 1000 m cliff; others prefer climbing snow and ice; and yet others combine all 3 elements to stand atop the great alpine peaks of the world.

People have climbed mountains for centuries, either for religious reasons or simply to see better the surrounding land, but mountaineering as recreation is less than 150 years old. Towards the middle of the 18th century, European naturalists turned their attention to the glaciers of the Chamonix Valley of France, and their studies, combined with the Victorian era's interest in natural phenomena, gave birth to a general fascination with mountains. The earliest climbs in the mid-European Alps, such as Mont Blanc in 1786, were undertaken in the name of science, but by the early decades of the 19th century the Germans, French and Swiss were pursuing summits simply for pleasure. It remained for the British, however, to popularize the sport. During mountaineering's golden age — the years between 1854, when Alfred Wills climbed Switzerland's Wetterhorn, and 1865, when the combined teams of Edward Whymper and Rev Charles Hudson conquered the Matterhorn — more than 60 of the most difficult, spectacular climbs in the Alps were made for the first time, primarily by British climbers.

Within 15 years of the Matterhorn ascent, all the Alps of consequence had been scaled, and moutaineers began to look for new challenges. Some tackled more difficult routes up mountains previously ascended, and others explored new mountain ranges — the Andes of S America, the Caucasus of Russia, the Himalayas, the mountains of Africa and the western mountains of N America. The completion of the CPR in 1885 opened the SELKIRK MTS and the ROCKY MTS of Canada, and they became the first ranges on the continent to be systematically explored for their mountaineering potential. Glacier House, below ROGERS PASS in the Selkirks, was an internationally recognized meeting place for climbers in the late 1880s and early 1890s, but its popularity was soon overshadowed by Lk LOUISE in the Rockies. To promote mountaineering in the western ranges, the CPR employed Swiss climbing guides for its clientele from 1899 to 1912. The Alpine Club of Canada, modeled after Britain's prestigious Alpine Club (1850), was formed 1906 and published its first journal the next year.

Most of the early climbing in the Selkirks and Rockies was done by British members of the Alpine Club or by American members of the Appalachian Mountaineering Club of Boston. Phillop Abbot, a young lawyer, was climbing with a party from the AMC in 1895 when he fell from the icy flanks of Mt Lefroy above Lk Louise to become N America's first mountaineering casualty. Landmark climbs of the early years include Mt Sir Donald in 1890, Mt Temple in 1894, Mt Lefroy in 1897 and Mt ASSINIBOINE in 1901. Mt ROBSON, at 3954 m the loftiest of the Rockies, was not successfully climbed until 1913, after attempts by 5 separate parties dating from 1908.

Towards the summit of the Bugaboo Spire in the Purcell Mts, BC (*photo by Pat Morrow*).



Although the Rockies have remained internationally popular with climbers to the present day, the quest for new terrain carried climbers throughout Canada's North and West in the 1920s. In 1924, inspired by a daring British attempt on Mt Everest, the Alpine Club of Canada sponsored a climb of 5949.7 m Mt LOGAN, the highest elevation of Canada and second highest of the continent. In May 1925 a team of climbers under Albert McCarthy entered the ST ELIAS MTS on the boundary between Alaska and the Yukon Territory. After 2 months among the highest, most glaciated mountains in N America, the men emerged to say they had reached the summit on the afternoon of June 23. Two years later, a first attempt was made on Mt WADDINGTON, at 3994 m the most impressive peak of the COAST MTS of BC. Despite repeated assaults, however, the summit remained untouched until 1936, when 2 Americans inched their way up the S face, at that time the hardest rock climb in N America.

Although Canada's mountains have been internationally famous for decades, Canada has produced few international mountaineers. During the late 1950s and early 1960s, however, many fine British- and European-born climbers settled in Canada, and under their tutelage a core of excellent Canadian climbers has emerged. Using refined climbing techniques and modern technological aids, the new generation has been quick to attempt increasingly difficult climbs on well-known mountains — winter ascents of the great N walls of the Rockies, or the knife-edge ridges and soaring buttresses of Mt Logan, for example — or untried peaks in places as far-flung as BAFFIN and ELLESMERE islands. Canadian centres of mountaineering activity include Montréal, Calgary, Banff and Vancouver, and climbers from those locations are rapidly extending the limits of both rock and waterfall ice climbing.

Canadians are also beginning to make their presence felt abroad. In 1977 the First Canadian Himalayan Expedition successfully negotiated Mt Pumori (7131 m), and in 1981 another team struggled to the summit of Dhaulagiri to become the first Canadians to stand atop an 8000 m peak. The most ambitious undertaking of the early 1980s, however, came in late Aug 1982, when a team of 16 climbers, under Bill March of Calgary, left Katmandu, Nepal, bound for Mt Everest. More than a month later, on Oct 5, Laurie Skreslet of Calgary became the first Canadian to stand on top of the world's highest mountain, followed 2 days later by Pat Morrow of Kimberley, BC. *See* MOUNT EVEREST EXPEDITION.

BART ROBINSON

Reading: R.W. Clark, *Men, Myths and Mountains* (1976); Chris Jones, *Climbing in North America* (1976).

Mouse, common name for several RODENTS of suborder Myomorpha, 11 species of which are found in Canada. Six are New World mice of the Cricetidae family: western harvest mouse, *Reithrodontomys megalotis;* DEER MOUSE, *Peromyscus maniculatus;* Cascade deer mouse, *P. oreas;* Sitka mouse, *P. sitkensis;* white-footed mouse, *P. leucopus;* and northern grasshopper mouse, *Onychomys leucogaster.* Four belong to the Dipodidae family: Pacific, western, meadow and wood-

land jumping mice (*Zapus trinotatus, Z. princeps, Z. hudsonius,* and *Napaeozapus insignis,* respectively). One species of the Old World Muridae family, the house mouse (*Mus musculus*), was introduced by the first colonists. The familiar field mouse is actually the meadow VOLE. The western harvest mouse is the smallest, only 13 cm long including the tail. The largest, the western jumping mouse, measures 25 cm. Meadow jumping mice, deer mice and house mice are common throughout Canada. Sitka mice occur on the smaller Queen Charlotte Is. Cascade deer mice are limited to southern interior BC. Other species inhabit larger areas but are also limited to specific regions. Mice occur in forest and field but habitat varies with species. Most mice are primarily granivorous; in contrast, northern grasshopper mice are insectivorous. All mice are nocturnal. Some species remain active throughout winter, while others hibernate. House mice reproduce throughout the year, but most species are sexually active only from spring to autumn, generally producing several litters during the period. Mice are prey for various birds, mammals and snakes. Although certain species do not affect the economy, other granivorous species damage crops and reforestation projects. JEAN FERRON

Mousseau, Jean-Paul-Armand, artist (b at Montréal 1 Jan 1927). After studying painting and interior decoration (1941-46), he studied under Paul-Émile BORDUAS (1946-51). In 1946 he joined Borduas and 5 students in the first group exhibition of abstract art held in Montréal. He was one of 16 to sign the REFUS GLOBAL (1948) and participated in all AUTOMATISTE exhibitions. During the mid-1950s he became interested in experimental work having elements in common with what the PLASTICIEN group was doing. By the mid-1960s, however, he had abandoned painting. His long-held belief that art must not be isolated from daily life led him into designing costumes, jewellery and posters, as well as into theatrical and interior design, sculpture and mural designs. In his 1961-62 murals for Hydro-Québec (Montréal) he used such nontraditional media as fibreglass, plastic resin and neon lighting, Mousseau being one of the most daring exploiters of new media and techniques during the early 1960s. He has concentrated on collaborating with architects, and his courses at the École des beaux-arts in Montréal and at Laval have explored the integration of colours, textures, materials and lighting into architecture.
BRIAN FOSS

Mousseau, Joseph-Alfred, lawyer, journalist, writer, politician, judge (b at Berthier-en-haut, LC 18 July 1838; d at Montréal 30 Mar 1886). Mousseau was admitted to the bar in 1860 and practised civil and criminal law for 20 years, becoming QC in 1873. Co-founder of both *Le Colonisateur* in 1867 and *L'Opinion publique* in 1870 and a supporter of CONFEDERATION in 1867, he won the federal riding of Bagot for the Conservative Party in 1874. He was re-elected in 1878 and became head of the Executive Council on 8 Nov 1880 and, on May 20, secretary of state. In July 1882 he agreed to exchange positions with J.A. CHAPLEAU, thus becoming premier of Québec. After 2 years of division and strife within the Conservative Party, he resigned at the request of the federal leaders and became a puisne judge of the superior court for the district of Rimouski. ANDRÉE DÉSILETS

Mowat, Farley, author (b at Belleville, Ont 12 May 1921). Mowat's controversial first book, *People of the Deer* (1952) — a denunciation of Canada's treatment of the Inuit — made him an instant celebrity. By the time his twenty-fifth book appeared in 1979, he was reputedly Canada's most widely read author: he is translated into 23 languages and published in over 40 countries. Many of his books are designed to attract popular support for a cause. Mowat defines his approach as "subjective nonfiction," countering critics who point to factual errors and biases with the rejoinder that he "will never let facts interfere with truth." His influence has been enormous: his books on the Arctic and N Atlantic regions have dispelled myths about native peoples, animals and survival under hostile conditions; he has raised public awareness of the hazards of upsetting natural ecosystems with technology.



By the time his 25th book appeared in 1979, Farley Mowat was reputedly Canada's most widely read author (*photo by Ron Watts/First Light*).

Mowat is praised as "a natural storyteller" but his work displays more stylistic variety than the epithet implies. His fast-paced narratives and anecdotes are framed by prose that is graceful, personal, near conversational. His commitments to causes inspire verbal fireworks: enthusiasms produce poetic descriptions and images; antipathies evoke ridicule, lampoons, and, at times, evangelical condemnation. Although he has never written a novel, his books are essentially autobiographical or dominated by his authorial presence. His best children's books, *The Dog Who Wouldn't Be* (1957) and *Owls in the Family* (1961), recall his youth in Saskatoon; *The Regiment* (1955) and his acclaimed *And No Birds Sang* (1979) recount his WWII military experiences. His range is perhaps best epitomized in his 3 books related to his 8-year residency in Burgeo, Nfld. *The Rock Within the Sea* (1968) presents his seafaring neighbours as exemplars of uncorrupted (by technology) modern man; his comic *The Boat Who Wouldn't Float* (1969) transforms his disillusion at Burgeo into laughter; *A Whale for the Killing* (1972) views the wanton shooting of a trapped whale as a symbolic tragedy. *Sea of Slaughter* (1984), Mowat's first book after a 5-year hiatus, chronicles the destruction of endangered species. GERALD J. RUBIO

Mowat, Sir Oliver, politician, premier of Ontario (b at Kingston, Upper Canada 22 July 1820; d at Toronto 19 Apr 1903). Mowat was privately educated in Kingston before becoming John A. MACDONALD's first articled law student. He was admitted to the bar in 1841 and quickly became a successful equity lawyer in Toronto. Mowat was brought up a Conservative, but as an adult opted for the Reform Party. After a brief interlude in Toronto municipal politics he sat in the Assembly of the Province of Canada 1858-64 where he was a prominent Reform leader. He served as provincial secretary in the brief administration of George BROWN and A.A. DORION in 1858, was postmaster general in the Sandfield MACDONALD-Dorion regime in 1863-64, and returned to that portfolio during the GREAT COALITION of 1864. Mowat, as an active participant in the QUEBEC CONFERENCE, was a FATHER OF CONFEDERATION. In Nov 1864 he was appointed chancellor of Ontario, a post he held until 1872 when he succeeded Edward BLAKE as premier. He served as premier and attorney general until 1896 when he was appointed to the Senate and became federal minister of justice. Knighted in 1892, he left Ottawa in 1897 to become lt-gov of Ontario.

Mowat's greatest contribution was made as premier. A skilful electoral politician, he built a pragmatic and moderate Liberal Party, representative of all Ontario — Protestant and Catholic, rural and urban. Under Mowat's leadership, Ontario came of age economically, socially and politically. Agriculture was modernized, the importance of industry recognized, educational and scientific areas cultivated, urban problems addressed and trade unions accepted as part of the society. Substantial government regulation became part of Ontario life and numerous social programs were introduced. Mowat and his government also contributed to the definition of Canadian FEDERALISM. He was Canada's first important provincial-rights advocate and, through a series of successful legal and political battles with John A. Macdonald and the federal Conservative government, altered Macdonald's concept of Canada as a highly centralized state with the provinces weak and dependent. Moreover, Mowat and his colleagues established Ontario as the dominant province within Confederation. Ontario's resources were increased by expansion into northern territories and its boundaries substantially enlarged after a protracted dispute with the federal government. Good management of the key economic sectors of agriculture, industry and resources made it the richest province and it is fair to describe Mowat's tenure of office as the era of the emergence of modern Ontario.
DONALD SWAINSON

Reading: Donald Swainson, ed, *Oliver Mowat's Ontario* (1972).

MP, *see* MEMBER OF PARLIAMENT.



Oliver Mowat, shown in 1869, was Ontario's premier (1872-96) during the emergence of modern Ontario. He was an early advocate of provincial rights (*courtesy Public Archives of Canada/PA-28973*).

Mufferaw, Joe, the traditional strong man of the Ottawa Valley, was based on the early 19th-century French Canadian, Joseph MONTFERRAND, a noted and natural pugilist. People in the lumbering woods tell tales, often like Paul BUNYAN yarns, of his great feats of power and skill, yet emphasize his gentleness and kindness. Anonymous assistance or inexplicable events are often attributed to "Who else but Joe Mufferaw?"

CAROLE H. CARPENTER

Muhlstock, Louis, painter (b at Narajow, Poland 23 Apr 1904), best known as a painter of the Depression. Muhlstock came to Montréal in 1911 and worked for his family's fruit-importing firm. He took art lessons at night and from 1928 to 1931 studied in France. After 1931 he taught drawing at his Montréal studio and also drew unemployed men in nearby Fletcher's Field, capturing the spirit of the times in sensitive drawings in chalk or charcoal often done on wrapping paper. He evoked his east-end neighbourhood in vibrant street scenes from the market on St Lawrence-Main or shadowed yards. During WWII he sketched riveters at the Montréal shipyards, shown as *War Workers, 1945*. Muhlstock received recognition in 1937 from Douglas DUNCAN of the Picture Loan Soc, Toronto, and has long ranked as one of Canada's finest and most widely collected draftsmen.

ANNE MCDOUGALL

Mukluk, a watertight boot of INUIT manufacture, suitable for walking on the TUNDRA. The sole is made of sealskin and is sewn to tops of caribou skin. The sealskin has to be scraped of all hair, stretched and dried, then chewed to make it pliable for use. Sinew thread, used in a blind stitch passing only halfway through the skin, makes watertight seams. A running stitch attaches the soles to the upper boot. In winter and in cold weather several pairs are worn simultaneously.

RENÉ R. GADACZ

Mullock, John Thomas, Roman Catholic bishop (b at Limerick, Ire 27 Sept 1807; d at St John's 29 Mar 1869). Consecrated bishop in 1847, Mullock came to Newfoundland as coadjutor in 1848. Two years later he became bishop of Newfoundland and directed the affairs of the church energetically for 20 years. He completed the cathedral, founded a new palace episcopal library, established St Bonaventure's College and 2 convents for the Presentation and Mercy Sisters, increased the number of priests and in 1856 divided the island into 2 dioceses. Involved in early attempts to develop steam, sail and cable communications in Newfoundland, he originated the idea of a transatlantic telegraph cable link from N America to Europe. His political support of the Liberals under P.F. LITTLE and John KENT was controversial, and his intervention in the 1861 election ultimately led to the decline of his influence. A scholar of wit and eloquence, he wrote many lectures and pamphlets.

J. ROGERS

Mulock, Sir William, lawyer, educator, Cabinet minister, provincial court justice (b at Bond Head, Canada W 19 Jan 1844; d at Toronto 1 Oct 1944). In Parliament from 1882 to 1905, Mulock was postmaster general (1896-1905) under LAURIER. He organized the federal Dept of Labour, becoming its first minister (1900-05) and bringing W.L. Mackenzie KING into public life as deputy minister. He negotiated an intergovernmental agreement to establish a telecommunications cable linking Canada, Australia and New Zealand and was instrumental in joining Canada and the UK through radio (1903). Advocating government ownership of Bell Telephone, he chaired the 1905 parliamentary inquiry into telephones until he was appointed chief justice of the Exchequer Division of the Supreme Court of Ontario (1905); he was chief justice of Ontario 1923-36. As vice-chancellor of U of T (1881-1900), he was the primary force in federating denominational and professional colleges into the expanded, co-operative university. He served as chancellor 1924-44.

ROBERT E. BABE

Reading: W.J. Loudon, *Sir William Mulock: A Short Biography* (1932).

Mulroney, Martin Brian, lawyer, politician, prime minister of Canada (b at Baie-Comeau, Qué 20 Mar 1939). The son of Irish immigrants, Mulroney's father was an electrician, anxious that his children escape the paper mill that dominated BAIE-COMEAU. Brian attended the private St Thomas High School in Chatham, NB, and then St Francis Xavier U in Antigonish, NS, where he studied political science, joined the campus Conservative club, and was Prime Minister in the Combined Atlantic Universities Parliament. He worked for John DIEFENBAKER in his successful leadership campaign in 1956. Smooth beyond his years, fluently bilingual and gregarious, Mulroney returned to Québec in 1961, receiving a law degree at Laval. He joined a major Montréal law firm (now Ogilvy-Renault) in 1964, soon specializing in labour negotiations for concerns such as Iron Ore Company of Canada and POWER CORPORATION. His father died in 1965, and Mulroney took on heavy family responsibilities. Later, in 1973, he married Mila Pivnicki. In 1974-75 he won public attention as an articulate and hard-hitting member of the Cliche Commission on violence and corruption in the construction industry in Québec. By now he was the leading Conservative organizer and fund raiser in the province. Despite never having run for office, he was a strong candidate for the leadership of the federal party in 1976, finally being eliminated on the third ballot. He became VP of Iron Ore Company in 1976; as president 1977-83 he emphasized management-labour relations and was able, at the end of his term, to close the company's operation in SCHEFFERVILLE, Qué, without serious political repercussions. Mulroney again ran for the PC leadership in 1983, a low-key effort in response to charges that his 1976 campaign had been too slick and showy. He beat Joe CLARK on the final ballot: 1584 votes to 1325. As leader of the Opposition and MP for Central Nova in 1983-84, he proved a skillful manager, concentrating on healing party wounds and building a solid electoral machine. Moderate and conciliatory by nature, he called for a strengthened private sector and less government intervention in the economy, minority French-language rights, and closer Canadian-American and federal-provincial relations. In the general election of 1984 he ran an almost flawless campaign against PM John TURNER's Liberals and won 211 seats, the largest number in Canadian history. Mulroney, who had always emphasized the importance of Québec to the Conservatives, captured the seat for Manicouagan, his home riding. The party took 58 of its seats in the province, the breakthrough that Mulroney had promised would take place under his leadership. He was sworn in as the 18th prime minister on 17 Sept 1984.

NORMAN HILLMER

Brian Mulroney, speaking at the 1983 Tory Convention, Ottawa (*photo by Ron Watts/First Light*).



Multiculturalism, as a term, first came into vogue in the 1960s to counter "biculturalism," a term popularized by the Royal Commission on BILINGUALISM AND BICULTURALISM. It has to a considerable extent replaced the term "cultural pluralism," although that term is still favoured in Québec. Its use has spread from Canada to many countries, notably Australia. The term is used in at least 3 senses: to refer to a society that is characterized by ethnic or cultural heterogeneity; to refer to an ideal of equality and mutual respect among a population's ethnic or cultural groups; and to refer to government policy proclaimed by the federal government in 1971 and subsequently by a number of provinces.

It was with the advent of the British in the 18th century, the gold rushes of the 19th century, and the settlement of the West in the late 19th and early 20th century that Canada became one of the world's main immigrant-receiving societies, a position it retained through the 1920s and after WWII (*see* IMMIGRATION; IMMIGRATION POLICY). Except in French Canada, ethnic and cultural groups were, ideally, to be assimilated by the English majority. This ideal was replaced first by the ideal of the "melting-pot," ie, the creation of a new ethnic or cultural group out of the combined elements in the population, and then by the ideal of the "mosaic," ie, the collaboration of all ethnic and cultural groups, which would nevertheless retain their distinctive characteristics. The mosaic was the precursor of multiculturalism.

It was only after the turbulent 1960s that the provincial and federal governments adopted explicit policies of multiculturalism, although, in the first decade, the federal goverment allotted these policies far less money that the policy of French-English bilingualism, which had been formalized 2 years earlier. Federally, there has been a minister responsible for multiculturalism since 1972, and since 1973 there has been a Canadian Consultative Council of Multiculturalism and a Multiculturalism Directorate within the Dept of the Secretary of State.

Government policies of multiculturalism have been viewed with hostility and suspicion by many. French Canadians and others have regarded them as injurious to the French Canadian position as one of the 2 linguistic communities of which Canada is composed; some scholars have decried them as a means of buttressing Anglo-Saxon dominance, by diverting the efforts of the non-French and the non-English from political and economic affairs into cultural activities and excluding other ethnic groups from power and influence; some spokesmen from ethnic groups have viewed government multiculturalism policies as unacceptable substitutes for substantial aid; many have considered them bribes for "the ethnic vote."

The hostility and suspicion against multiculturalism have resulted from ambiguities in policy statements and in the term multiculturalism (it has been pointed out that a curious presumption of "multiculturalism" is that ethnic groups are outside the mainstream of society, whereas they can be more accurately described as cultural fractions that integrate unequally to form Canadian society). Social scientists have not adequately classified and communicated to politicians, bureaucrats and the

public the subtle but necessary distinctions between cultural and structural assimilation, culture and ethnic group, etc.

Multicultural policies in the 1970s may not have met the needs of immigrants, especially the growing numbers belonging to "visible minorities," designed as they were for long-established ethnic groups of European background. Nonetheless, the introduction of the term and what has been called the multicultural movement have been important in calling attention to an important type of diversity within Canadian society and in engendering political recognition of it. JEAN BURNET

Reading: J. Dahlie and L. Fernando, eds, *Ethnicity, Power and Politics in Canada* (1981); H. Palmer, ed, *Immigration and the Rise of Multiculturalism* (1975).

Multinational Corporation, business entity under common ownership or management control that operates in different countries. The parent and each of the subsidiaries are established under the laws and practices of the countries where they are located. The corporations are multinational in their geographic scope, but not in the sense that there is some multinational authority which permits them to operate. Of the top 100 industrial multinationals in the world, almost half have US parent companies, and about a third are in the PETROLEUM INDUSTRY; 8 of the 10 largest are in the oil industry and 2 are in the AUTOMOBILE INDUSTRY. The largest Canadian multinational, ALCAN, would rank in the second 100 largest world firms.

Multinationals have come under scrutiny in Canada and elsewhere for their economic, political, social and cultural impact on host countries. Less developed countries argue that they have traded political independence for economic dependence. Politically, there is concern over the extent to which multinational corporations are used as intruments of foreign policy by the governments of countries where parent companies are located. Foreign multinationals have set up subsidiaries in Canada, but Canadian multinationals have also established subsidiaries abroad. The FOREIGN INVESTMENT REVIEW AGENCY was created by the Trudeau government to screen new foreign investments, but although government policies can alter the way multinational corporations behave, their presence will persist because of their flexibility in adapting to changing circumstances. (*See* FOREIGN OWNERSHIP). C.J. MAULE

Reading: I.A. Litvak and C.J. Maule, *The Canadian Multinationals* (1981).

Mumming, a performance by actors (mummers) in disguise, forms part of a worldwide cultural phenomenon of great complexity. The immediate origin of, and the closest analogies to, the principal Newfoundland mumming practices are found in Ireland and the UK. Many mummers' plays were in the hero-combat tradition of English folk plays and presented variations on a typical fourfold action: the presentation of the characters (eg, St George, the Doctor, Alexander, Sir Guy, the Turkish Knight and others); the combat between one or more antagonists; the cure or resurrection of a slain champion; and the collection of money by performers.

Two practices associated with mumming, the house visit with the performance of a play and the formal outdoor procession or parade, are richly documented from 19th-century sources. After WWI, however, these performances were discontinued, though not forgotten, until their revival by professional actors in the early 1970s, following scholarly research on the tradition. The parade had been a familiar event of the Christmas season as early as 1812, especially in St John's, with elaborately costumed and disguised figures making their way through the streets, flanked by agile fools and "ownshooks" ("female" fools) armed with inflated bladders with which to thrash spectators. A type of performance (a combat or dialogue) was sometimes included at some point in the procession. This public form of mumming, even the wearing of disguise outdoors, was banned under an Act of the Legislative Assembly in 1861 because of the occasional disturbance and violence, but the ban was not effective.

The house visit during the Twelve Days of Christmas by mummers, or "jannies," is particularly common in Newfoundland and is similar to activities by "guisers" in northern England and Scotland, "skaklers" in Shetland, "belsnickles" in the German tradition in both NS and Virginia, and "naluyuks" in Labrador. When small groups of people appear at neighbourhood houses and seek admission, there is a reversal of normal modes of behaviour: reversal of sex (through costume disguise); of speech (the mummers' characteristic ingressive speech); of social role (the host is on the defensive); and of behavioural norms (the visitors are boisterous, uninhibited). At the centre of this form of mumming is the attempt by the host(s) to identify the disguised figures; the unveiling of the identified visitors; and the offering of refreshment. This less formal mumming tradition is still widespread in Newfoundland; it has been documented by folklorists and studied by anthropologists. GEORGE M. STORY

Reading: H. Halpert and George M. Story, eds, *Christmas Mumming in Newfoundland* (1969).

Municipal Administration The activities of locally elected municipal councils are administered by officials and employees organized into municipal public-service departments (*see* MUNICIPAL GOVERNMENTS). The link between policymaking and administration is often supplied through committees of council, each of which reviews the activities of the department related to it and makes recommendations to council. Each department head is usually accountable to at least one committee. Other municipal administrative structures include boards of control, in some Ontario cities; boards of commissioners, in some western cities, under which each commissioner is responsible for a group of departments and all are collectively responsible to the municipal council for the entire municipal administration; and chief administrative officers accountable to the municipal council for the coordination of all municipal departments. Variations of these structures exist across Canada. Another structure is an executive committee selected by and from within the municipal council to exercise responsibilities similar to a board of control.

All Canadian municipalities elect, on an at-large basis, a mayor (or reeve in the case of some rural municipalities) who presides at council meetings and who can also make recommendations to council. In Canada, any leadership role that a mayor may exercise is dependent largely on the power of personality and not on powers assigned to this office.

Because most municipalities are organized departmentally by function (eg, public works, finance, personnel, parks) there may be a proliferation of 15 or more departments, which does not facilitate planning and co-ordination. Departments are therefore sometimes grouped together, ie, departments responsible for activities such as social services, parks, recreation, might constitute a community-services group, while those responsible for providing support services, eg, finance, personnel, information processing, might be grouped under management services. Where such groupings are established, each department reports to a general director or commissioner responsible for the group.

Municipal governments have a major responsibility in the area of collective bargaining, because most municipal employees are organized. Major bargaining units include white collar and technical employees, skilled and unskilled labour, police, fire and transit workers.

Municipal budget preparation differs from that of other governments in that a balanced budget must be prepared annually. A deficit budget is not permissible; while municipal governments may borrow for capital works, provision must be made annually for the repayment of capital and interest. When expenditure estimates have been determined all revenues other than those derived from property taxation are then calculated; the difference between this total and the expenditure estimates must then be made up by property TAXATION. The scale of expenditures therefore has a direct impact on the property-tax rate established annually.

The most difficult and controversial of municipal responsibilities involves the planning and regulation of land use. While most of this is undertaken by the municipal planning department, many other departments are also involved in the planning process, much of which must be conducted in accordance with procedures established in provincial planning legislation. T.J. PLUNKETT

Municipal Finance is concerned with the revenues and expenditures of municipalities. Revenues are secured from local taxes (*see* TAXATION) and other local revenues and from provincial and federal grants. Property taxes include taxes for both general municipal purposes and schools, which in some provinces are levied directly by SCHOOL BOARDS and in others by the municipalities. Likewise, government grants include grants for education as well as for general municipal purposes. Taxes levied on "real property" (land and buildings) are the traditional and principal source of municipal tax revenue. The accuracy of the assessment of the value of real property is of paramount importance, especially in ensuring the equitable treatment of taxpayers in each municipality and, because many provincial grants are related to assessment, in ensuring equitable treatment of citizens in different municipalities. The principal basis of assessment is market value of property. Because of the importance and difficulty of establishing accurate and uniform assessments, all provinces have in recent years either assumed complete responsibility for assessment or imposed careful supervision over municipal assessment.

Most provinces provide either for a "homestead" provincial rebate to property taxpayers or for a property tax credit linked to provincial personal income tax, the former to reduce the burden, the latter to reduce the regressiveness of the property tax. Property tax exemptions are commonly granted for churches and other char-

Estimated Local Government Tax Revenues, All Provinces 1980
(Source: Canadian Tax Foundation, *Provincial and Municipal Finances*)

Source	*Millions$*	*Percentage*
Real property taxes (residential and business)	8 280	33.3
Special assessment taxes	323	1.3
Business taxes	927	3.7
Other	101	0.4
Total taxes	9 631	38.7
Total grants in lieu of taxes (provincial and federal)	707	2.8
Total nontax revenue from own sources	3 116	12.5
Total transfers from other governments	11 393	45.9
Total gross general revenue	24 847	100.0

itable organizations and in some provinces partial exemptions are granted for widows and the aged. Special assessment taxes are levied as supplementary charges for local improvements, eg, sidewalks, usually based on frontage of lots. Business taxes, calculated on such bases as rental value, floor space and real property assessment, are levied on occupants of business properties. Provincial and federal grants in lieu of taxes are paid on provincial and federal real property. Local nontax revenue derives from sales of services, eg, water, and from licences and fees, fines and penalties. Taxes on personal property and poll taxes, once quite general, have been abolished in most provinces, although the poll tax is still used in Newfoundland and is authorized in Saskatchewan municipalities but not applied. Ninety percent of the transfers (grants) from provincial and federal governments are special purpose (conditional) grants for such activities as education and social services; the remaining 10% are general purpose (unconditional), although these proportions differ widely from province to province. These transfers are meant principally to ease the property tax burden and to equalize it among municipalities.

Borrowing is typically for capital assets and the debt is amortized approximately over the life of the asset. Municipalities are not generally allowed to run deficits in their operating budgets. Although many municipalities still borrow in their own right, there is a trend towards consolidated borrowing by a provincial agency on their behalf to ensure more favourable interest rates and better debt management. While elementary and secondary education is still the principal local expenditure, provincial governments are increasingly assuming these costs, either by grants or, as in NB and PEI, by accepting complete responsibility for education.

Municipalities have long agitated for access to income and sales tax bases to reduce their dependence on the property tax, but because of the difficulties of administering these other taxes at the local level, the uneven yields per capita they would produce for the municipalities and the reluctance of the provinces to add another layer of such levies, the provinces have preferred to share revenues from these sources by means of grants. Manitoba and BC, however, now earmark a small part of their receipts from personal and corporate income taxes for their municipalities.

JOHN F. GRAHAM

Estimated Gross General Expenditure of Municipal Governments, All Provinces 1980
(Source: Canadian Tax Foundation, *Provincial and Municipal Finance)*

	Millions$	*Percentage*
Education	11 043	40.8
Transportation and communications	3 252	12.0
Protection (police, fire, etc)	2 221	8.2
Environment	2 179	8.1
Debt charges	1 854	6.9
Transfers to reserves	299	1.1
Transfers to own enterprises	481	1.8
Recreation and culture	1 605	5.9
General government	1 351	5.0
Health	1 411	5.2
Welfare	783	2.9
Housing	41	0.2
Regional planning and development	272	1.0
Agriculture, trade, industry and tourism	192	0.7
Other	36	0.1
Total	27 020	100.0

Municipal Government, local government created by the provinces to provide services that can be more effectively handled under local control. It is responsible for the administration of CITIES, TOWNS and municipalities. Municipal governments make policy, raise revenue and ensure the implementation or administration of policy. The first 2 tasks are the responsibility of the municipal council, elected locally, which is expected to act as a local legislature. Under the CONSTITUTION ACT, 1982 the powers of municipal governments are determined by provincial governments, but their performance is assessed by the electorate in regular elections. The administration is handled by the municipal PUBLIC SERVICE, made up of officials and employees appointed by the council and organized into departments. The necessary link between policy-making and administration is supplied in most municipal governments by a council or committee system, in which a municipal council establishes a series of committees to direct and control the municipal public service. The number of committees created by municipal governments depends on local circumstances and priorities. Each committee, made up of a specified number of council members, reviews the activities of the departments related to it and makes recommendations to the municipal council. The head of each municipal department is usually accountable to one committee and perhaps several, depending upon departmental responsibilities. Committees can sometimes recommend actions in one area that might conflict with another area of municipal responsibility; they also tend to fragment municipal decision-making and administration. Many municipal governments, particularly in the larger cities, have either abandoned or modified this system. At least 4 other structures have evolved, for example the council-board of control and the council-executive committee co-ordinate arrangements at the political level, ie, the municipal council, while the council-chief administrative officer and the council-board of commissioners are responsible for similar arrangements at the administrative level. The board of control structure derived from experiments by US municipal reformers in the latter part of the 19th century. Adopted by the city of Toronto, it was made mandatory under The Municipal Act of Ontario for all cities in that province over 100 000 in population, although an amendment now permits municipal council to abandon it. Several large cities, notably Toronto, Ottawa, Hamilton and Windsor, have given up this structure after several decades. The board of control comprises the mayor as chairman and a number of controllers, elected city-wide, who are also full members of the municipal council. Other members of council are usually elected to represent wards. Under The Municipal Act a board of control is assigned executive powers, including preparation of the annual estimates, amendment of contracts, and nomination and dismissal of officials and employees. Boards of control have been criticized for their tendency to create 2 categories of council member: controllers elected at large and aldermen elected on a ward basis. Moreover, it was difficult for council to overturn a financial recommendation of the board except by a two-thirds majority vote of council. In the city of Toronto the board of control was eventually replaced by an executive committee selected from within the council. While this committee exercises powers similar to that of the former board of control, it is more directly accountable to the council, which controls its membership. Boards of control have existed in Ontario for most of this century but have not been adopted elsewhere in Canada. Council-executive committees have long existed in Montréal and Québec City, and a variant of them was established recently in Winnipeg.

The council-chief administrative officer (CAO) may also be known as city or municipal manager, city administrator or city commissioner. Largely a modified version of the council-manager system popular in the US, the CAO system is based on business organization. The municipal council, like a corporate board of directors, is concerned only with policy, while the city manager, appointed by the council, has exclusive responsibility for and is accountable to the council for administration. Although some municipal governments in Canada now have managers, many have appointed an official as CAO with general responsibility for directing and co-ordinating the work of the municipal public service. As a result, municipal councils have often abolished committees, or council acts as a committee of the whole to receive reports from the CAO and other officials. Alternatively, councils have reduced the number of committees to which the CAO reports.

The council-board of commissioners arrangement evolved in western Canada, particularly in Edmonton, Calgary and Winnipeg. Instead of a single chief administrator, a management group of commissioners is appointed, one of whom is the chief commissioner. Each commissioner is responsible for a broad range of interrelated responsibilities. Heads of departments are accountable to the commissioners who as a board are collectively responsible to the municipal council for the entire municipal public service. Variants of these structures and combinations of them also exist. Winnipeg has an executive committee with a board of commissioners responsible to it; Québec City has an executive committee with a city manager accountable to it; and London employs a board of control with a CAO responsible to it.

Municipal structures also include a number of special purpose bodies usually established as local boards or commissions by provincial governments, although the extent of their use varies considerably, including, among others, library boards, utility commissions, transit authorities, parks and police commissions. Provincial statutes outline the procedures for the appointment of members. Most of these groups enjoy varying degrees of independence from municipal jurisdiction, although municipalities must provide a considerable proportion of their funds. Because these bodies fall under the control of both the provincial and municipal governments, it is difficult for the public to know just who is responsible and for what.

In contrast to the practice in some US cities in which duties such as budget formation and appointment of certain administration officers are the responsibility of the mayor, the significance of this office in Canada stems more from its high profile, although a mayor with a forceful personality may also be a strong leader. Variously described as "the chief officer," "the chief executive officer" or "the head of council" in provincial statutes, the mayor has little power independent of the municipal council. All provinces provide that the mayor shall be elected at large, and Canadian mayors generally are expected to preside at all council meetings, are ex officio members of all committees and can make recommendations to the municipal council.

Intergovernmental Relations The relationship between a province and its municipalities is one of superior and subordinates. Provincial governments legislate the duties of municipal governments and are responsible for their well-being. Some of the responsibilities assigned to municipal governments, such as the exercise of planning powers and MUNICIPAL FINANCE, are regulated by the provinces. The relationship between municipalities and the federal government is relatively unimportant. Federal programs that affect municipalities are generally handled through federal-provincial agreements.

Annexation and Amalgamation The extension of municipal boundaries by the annexation of peripheral rural areas is usually justified on the grounds that urban physical services such as water, sewerage facilities and roads can be provided more readily by the urban municipality than the rural area. When a major city is encircled by several smaller municipalities, or when 2 municipalities have developed side by side and share a common boundary, separate municipal jurisdictions complicate the provision of necessary services over the entire area and the need to secure orderly and planned development. This problem is sometimes solved by amalgamation, the consolidation of municipalities into a single municipal entity. Decisions about annexation or amalgamation can only be made by the provincial government. Because both usually provoke controversy, most provinces have established a procedure of hearings held by ADMINISTRATIVE TRIBUNALS such as the Ont Municipal Board, the Local Authorities Board in Alta or the Municipal Commission in Qué. In some circumstances a province may establish a special investigating commission to study the matter and make a recommendation. In large metropolitan areas where several municipal governments operate and outright amalgamation is almost impossible, some provinces have established METROPOLITAN GOVERNMENTS or REGIONAL GOVERNMENTS or districts.

T.J. PLUNKETT

Municipal Loan Fund, Canada West, est 10 Nov 1852, created largely by Francis HINCKS, co-premier of the PROVINCE OF CANADA, whose government's central policy was railway development. Hincks permitted municipalities to borrow on the province's credit to invest in important works; the fund itself would be created by anticipated municipal repayments to the province. By 1855, encouraged by promoters who predicted that railway-inspired development would generate the extra wealth needed to repay loans, 47 communities in Canada W, some mere villages, had borrowed over $7 million, at least 80% for investment in local and branch line railways. Only a few railways proved economically viable. Laws passed late in 1854 cut off new borrowing, provided for repayment of some of the province's outlay from delinquent municipalities' shares in revenues from the secularized CLERGY RESERVES, and gave Lower Canadian municipalities access to a "fund" of equal value (of which only about $1.8 million had actually been borrowed when the whole scheme was terminated in 1859). Rates of repayment, never high, plummeted in the 1857-58 depression, and by 1862 arrears of interest had added another $3 million to the deficit. Thereafter the history of the fund merges with that of the Canadian PUBLIC DEBT.

DOUGLAS MCCALLA

Municipal-Provincial Relations Municipalities in Canada are similar to provincial governments in a number of important respects. Their governing bodies are democratically elected; they have the power to tax and to legislate (by-laws, ordinances); they provide a wide range of public services and facilities; and they make public policy (eg, land-use planning).

Municipalities are unlike provincial governments as far as important aspects of constitutional status are concerned. The provinces derive their powers from the Constitution and hence their permanence and autonomous jurisdiction are guaranteed. Municipalities, on the other hand, draw their powers from provincial law, which can be changed simply by a majority vote of the legislature. These powers are usually set out in a Municipal Act which applies to all municipalities within one province. Some cities (eg, Vancouver, Saint John, Halifax) have a city charter, which is a separate Act of the legislature applying only to one city and providing powers that may differ in some respects from those contained in a Municipal Act.

Municipalities can usually exercise only those powers delegated to them by a provincial government. The province retains the right to change municipal boundaries, to abolish individual municipalities (as New Brunswick and Ontario have done), to alter municipal financial resources and to withdraw old powers or grant new ones. The province makes some powers mandatory and some permissive.

The autonomy of municipalities is severely restricted. For example, many municipal by-laws require provincial approval to become effective; municipal borrowings for capital projects are strictly controlled by the province's Ministry of Municipal Affairs or by a provincially appointed municipal board; many local planning decisions can be appealed to a provincial agency; and many local powers apply only to a shared provincial-municipal jurisdiction (eg, the environment). The limited autonomy of municipal governments raises questions about the democratic accountability of LOCAL GOVERNMENTS. They are accountable both to their own electorates and to provincial authorities, but in degrees that vary among provinces and even within some of them.

The relationship between municipalities and their respective provincial governments is not an easy one. Many municipal politicians are resentful about their lack of autonomy, and many provincial ministers and bureaucrats think of municipalities as just another interest group seeking to pressure the province into particular policy decisions. The special status of municipalities as governments elected on a universal franchise is well understood by ministers and officials of Municipal Affairs departments, but their colleagues in other departments or in Cabinet have their own vested interests in budgetary and jurisdictional decisions, which lead them to minimize the importance of municipal affairs.

Municipalities have come together in voluntary associations in their attempt to support the municipal interest in provincial policy-making. There is one such association for BC, Nova Scotia, PEI, Newfoundland and, as of 1982, Ontario. Québec and the Prairie provinces each have 2 such associations. New Brunswick has one association for cities, one for towns and one for villages. A national association, the Federation of Canadian Municipalities, exists to relate to the federal government.

A major concern of these associations is to secure a better financial arrangement for municipalities. Local revenue is mainly derived from property taxes and grants from the provinces. These grants are on average 80% conditional. The conditions sometimes induce municipalities to make choices that meet provincial policy goals at the expense of local goals. The property tax, is generally seen as the most regressive of all the major tax fields in the country. Further it does not grow with the economy or inflation as do sales and income taxes. Hence municipal leaders resent being limited to this particular tax field.

In several provinces, regular consultative meetings are held between the responsible minister and representatives of municipal associations. However, although the minister often uses the language of partnership, it is a very unequal partnership indeed. Sometimes there are promises of consultation before any provincial action affecting municipalities is taken, but when an election looms or the economy declines, such promises may well be forgotten. Because of the inferior constitutional position of municipalities, their most important powers are those of organization and persuasion. The powers of law and money, however, are on the provincial side.

ALLAN O'BRIEN

Munitions and Supply, Department of, Canada's principal agency for co-ordinating domestic industry during WORLD WAR II. It was decided that a civilian department should control the production of munitions for Canada and its allies, and accordingly Parliament passed the Munitions and Supply Act in Sept 1939 and brought it into force on 9 Apr 1940. The department's only minister was C.D. HOWE, who furnished dynamic, aggressive leadership, as well as significant political clout. Besides producing ARMAMENTS (tanks, guns, ships) through its production branches, the department regulated scarce supplies held to be essential to war production, such as gasoline, most building materials and silk (used for parachutes). To regulate the economy without creating a big bureaucracy, the department established crown corporations such as Victory Aircraft (bombers), Polymer (artificial rubber) and Research Enterprises (high technology). The department was dissolved at the end of WWII with a highly successful record.

ROBERT BOTHWELL

Munk, Jens Eriksen, explorer (b at Barbo, Norway 3 June 1579; d at Copenhagen, Denmark 3 or 24 June 1628). Instructed by King Christian IV of Denmark to search for a NORTHWEST PASSAGE, he set out with 2 ships May 1619. After detours into Frobisher Bay and Ungava Bay he entered Hudson Bay 25 Aug. He was forced to winter at the estuary of the CHURCHILL R, and by spring 61 of his men had succumbed to scurvy. Munk and 2 other survivors struggled home, reaching Norway 21 Sept 1620. He published an account of his voyage in 1624. Relics of his stay have been found at Pt Churchill.

JAMES MARSH

Munro, Alice, short-story writer (b at Wingham, Ont 10 July 1931). Twice winner of the Governor General's Award, she is one of the most gifted writers of SHORT FICTION IN ENGLISH in Canada. The strength of her fiction arises partially from its vivid sense of regional focus, most of her stories being set in Huron County, Ont, as well as from her sense of the narrator as the intelligence through which the world is articulated. Her theme has often been the dilemmas of the adolescent girl coming to terms with family and small town. Her more recent work has addressed the problems of middle age, of women alone and of the elderly. Characteristic of her style is the search for some revelatory gesture by which an event is illuminated and given personal significance. In *Lives of Girls and Women* each story is organized around a metaphor whose function is to draw all the elements of the various fictional sequences into a radiant centre. Thus the death of the protagonist's Uncle Craig that occurs in "Heirs of the Living Body" is related to other deaths and envisioned as part of natural process, such that the protagonist's mother can announce that "'Uncle Craig doesn't have to be Uncle Craig! Uncle Craig is flowers!'" He, like all of Munro's characters, shares one living body, although the connections might not always be perfectly clear. The implicit connection that does not always lead to epiphanic discovery is more apparent in *The Moons of Jupiter*. Here relationships are suggested but the threads of attachment are not always unravelled.

It is sometimes remarked that Munro's fiction is nearer to autobiography than fiction. In defence of *Lives of Girls and Women*, which is most frequently identified as being modelled on the author's life, Munro has asserted it is "autobiographical in form but not in fact." The distinction is perhaps not persuasive, but the charge is difficult to evade, for Munro's ear for the local speech has an absolute pitch and her narrators as filters of past and present possess an intelligence that makes one feel that if it is not her life being told, then it is ours.

E.D. BLODGETT

Munsinger Affair Between 1958 and 1961 Pierre SÉVIGNY, John DIEFENBAKER's associate minister of national defence, had an affair with Gerda Munsinger, a German immigrant. Acting on information from American sources, the RCMP warned Justice Minister Davie FULTON that Munsinger was a prostitute and a security risk. Fulton told Diefenbaker, who reprimanded Sévigny. Munsinger returned to Germany while Sévigny remained in the Cabinet. The affair meant nothing to anyone except the principals until Liberal Justice Minister Lucien Cardin, angered by Conservative taunts about security leaks, raised Munsinger's name 4 Mar 1966 in the Commons. The press revelled in Canada's first major parliamentary sex scandal. A royal commission criticized Diefenbaker's leniency but found no security breach. JOHN ENGLISH

Murder and Manslaughter, *see* HOMICIDE.

Murdoch, James Young, lawyer, mining executive (b at Toronto 29 July 1890; d there 18 Apr 1962). A graduate of Osgoode Hall, Murdoch practised mining law in the Toronto firm Holden and Murdoch 1913-62; he was created KC in 1929. He drafted the incorporation of Noranda Mines Ltd and served as its first president 1923 to 1956, when he became chairman. Murdoch expanded and diversifed Noranda's original copper-mining interest in Québec through various investments. In WWII he held senior positions in 2 wartime crown corporations, was president of the National War Services Funds Advisory Board, chairman of the National War Services Committee of the YMCA and was awarded an OBE. Murdochville, Qué, was named after him in 1952, and for his contribution to the mining industry in Canada he received the Canadian Institute of Mining and Metallurgy's Blaylock Medal. JOSEPH LINDSEY

Murdoch Case, Supreme Court of Canada case (1975) involving matrimonial property law. Historically, wives could only own property by having it placed in their names or by providing all or part of its purchase price. No allowance was made for indirect contributions by them towards property acquisition or for their role in nurturing the family. In *Murdoch* the court decided that a wife who had helped run the family ranch had done "just about what the ordinary rancher's wife does" and had no right to a share in it. The outcry from women's groups produced reforms in provincial matrimonial property laws across Canada. Mrs Murdoch did obtain a lump sum of secured maintenance under the Federal Divorce Act. A. BISSETT-JOHNSON

Murdochville Strike On 10 Mar 1957 the 1000 workers of Gaspé Copper Mines, Murdochville, Qué, struck for the right to unionize. The conflict lasted 7 months and ended in defeat for the miners. Moreover, a 15-year judicial battle finally awarded the company $1.5 million in damages from the United Steelworkers of America ("Métallos" in Québec). Murdochville was a COMPANY TOWN belonging to Gaspé Copper Mines, a subsidiary of the Noranda Mines empire. The company refused to recognize the miners' union (Métallos were affiliated with the Québec Federation of Labour, est Feb 1957) and used strikebreakers, along with provincial police dispatched by Prem Maurice DUPLESSIS, to subdue the strikers. This intervention by the state precipitated considerable violence. The strike led to joint action by the QFL and the Canadian Catholic Federation of Labour (*see* CONFEDERATION OF NATIONAL TRADE UNIONS), yet this common front, despite its immense potential, was seriously hampered by dissent within the QFL. The strike has often been called a turning point in QFL history; in fact it was the most dramatic episode in 12 years of effort leading to the 1965 unionization of Murdochville miners. GUY BÉLANGER



Emily Murphy was prominent in the suffrage movement and in 1916 became the first woman magistrate in the British Empire (*courtesy Glenbow Archives*).

Murphy, Emily Gowan, née Ferguson, pen name Janey Canuck, writer, journalist, magistrate, political and legal reformer (b at Cookstown, Ont 14 Mar 1868; d at Edmonton 27 Oct 1933). Born into a prominent Ontario legal family, Murphy moved W in 1903 with her husband Arthur Murphy, an Anglican minister and entrepreneur, and their 2 daughters. A prolific contributor of book reviews and articles to Canadian magazines and newspapers, she adopted the pen name Janey Canuck and published 4 very popular books of personal sketches: *The Impressions of Janey Canuck Abroad* (1901), *Janey Canuck in the West* (1910), *Open Trails* (1912) and *Seeds of Pine* (1914).

First in Swan R, Man, and then in Edmonton, where she lived from 1907, Murphy combined family life, writing and a multitude of reform activities in the interests of women and children. In 1911, responding to persistent public pressure organized by Murphy, the Alberta legislature passed a Dower Act protecting a wife's right to a one-third share in her husband's property. Murphy was also prominent in the suffrage movement, as well as a longtime executive member of the Canadian Women's Press Club (president 1913-20), the National Council of Women, the Federated Women's Institutes (first national president) and over 20 other professional and volunteer organizations.

A self-taught legal expert, in 1916 she was appointed police magistrate for Edmonton and then Alberta, the first woman magistrate in the British Empire. Exposed to a succession of cases involving prostitution and juvenile offenders, she became an implacable enemy of narcotics, which she blamed for much organized crime and for victimizing the defenceless. *The Black Candle* (1922) by "Judge Murphy" was an expansion of articles published in *Maclean's* magazine describing in lurid detail the evils of the drug trade; her exposé led to laws governing narcotics that remained unaltered until the late 1960s.

Challenged on her first day on the bench by a lawyer who asserted that as a woman she was not a person in the eyes of British law, Murphy soon embarked on a decade-long campaign to have women declared legal "persons" and therefore eligible for appointive positions, including the Senate. With the support of 4 other Alberta women, Henrietta EDWARDS, Louise MCKINNEY, Nellie MCCLUNG and Irene PARLBY, she carried the PERSONS CASE to the Privy Council in Britain, which ruled in a celebrated judgement in 1929 that women were indeed persons under the BNA Act. The long-sought Senate appointment eluded Murphy, however, and she died in Edmonton of diabetes in 1933. SUSAN JACKEL

Murray, Alexander, geologist, explorer (b at Crieff, Scot 2 June 1810; d there 18 Dec 1884). Murray served in the Royal Navy 1824-35, and then in 1837 immigrated with his young bride to Woodstock, Upper Canada. Their arrival coincided with an economic depression and the 1837 Rebellion; he served in the naval brigade that destroyed US steamer CAROLINE. The Murrays returned to England in 1841, the same year the Canadian Parliament authorized a geological survey of the United Provinces. Learning of this, Murray studied geology. He received an appointment in 1842-43 to the Geological Survey of Great Britain. When William LOGAN was appointed director of the GEOLOGICAL SURVEY OF CANADA, he selected Murray as an assistant. In May 1843 the Murrays returned to Canada. In 1851 he discovered the petroleum seepages near Black Creek, Canada West, which later became the location of the world's first drilled oil well; in 1856 he identified the first known nickel mineralization in the Sudbury Basin. Murray practically single-handedly mapped the geology of Canada West as recorded in *Geology of Canada* (1863). In 1864 he became first director of the Geological Survey of Newfoundland, at a time when the Island was virtually unexplored. Despite being crippled by an injury, within 10 years Murray had completed a topographical and geological map of the Island and co-published a report entitled *Geological Survey of Newfoundland* (1881), which showed that mineral, timber and agricultural resources were present in the interior. RICHARD DAVID HUGHES

Murray, Anne, (married name Langstroth), pop singer (b at Springhill, NS 20 June 1945). Canada's most successful pop performer of the 1970s, Murray was noticed first for her recording "Snowbird" (1970) after minor exposure on CBC TV in Halifax. With her personable alto, wholesome presence and stylistic versatility, she enjoyed great record success ("Danny's Song," "You Needed Me," "I Just Fall in Love Again," etc) and expanded her concert and TV itinerary to include pop and country music audiences. She has received many Juno Awards and several (US) Grammy Awards. MARK MILLER

Murray, George Henry, lawyer, politician, premier of NS (b at Grand Narrows, NS 7 June 1861; d at Montréal 6 Jan 1929). Murray's unbroken 27 years in power (1896-1923) is a British Empire and Commonwealth record. Leadership of the NS Liberal Party fell to Murray when W.S. FIELDING entered the LAURIER Cabinet in 1896. Always cautious, Murray practised a form of brokerage politics, trying both to avoid controversy and to appeal to every constituency. His government continued Fielding's commitment to railway consolidation and road and bridge construction, encouraged agricultural and technical education, took some initial steps in improving the public health system, and co-operated with the federal government in prosecuting the war. His administration's more significant accomplishments included the introduction of worker's compensation in 1916, the extension of the vote to women in 1917, the development of the NS Power Commission in 1920, and the legislation of PROHIBITION in 1921. Faced with postwar economic dislocation, industrial collapse and the continuing mistrust of the province's working class, Murray retired in Jan 1923. COLIN D. HOWELL

Murray, James, military officer, colonial administrator, first British governor of Québec (b at Ballencrieff, Scot 21 Jan 1721/22; d at Beauport House, near Battle, Eng 18 June 1794). Murray commanded a battalion in the siege of LOUISBOURG in 1758, and was one of James WOLFE'S 3 brigadiers at Québec. After the BATTLE OF THE PLAINS OF ABRAHAM he remained in command of the city, facing undefeated French forces up the St Lawrence R. In Apr 1760 the Duc de LÉVIS advanced on Québec. Murray's garrison, weakened by disease, attacked near Ste-Foy, but was driven back into the city and besieged until British warships arrived (*see* BATTLE OF STE-FOY). In Oct 1760 Murray was appointed military governor of the District of Québec and in Nov 1763 civil governor of the province. A member of the landed gentry, he supported the agrarian, French-speaking inhabitants over the newly arrived, English-speaking merchants. He was reluctant to call a legislative assembly, promised in the PROCLAMATION OF 1763, because he feared that Canadians would be barred from it on religious grounds. His willingness to allow French law and custom in the courts further alienated the merchants and led to his recall in 1766. Nevertheless, his administrative arrangements for government were institutionalized in the QUEBEC ACT and were a factor in preventing Québec from becoming the 14th rebellious colony. From 1774 to 1782 Murray was lt-gov and later governor of Minorca, where he directed a spirited, though unsuccessful, defence against a Franco-Spanish besieging force. O.A. COOKE

Murray, James Alexander, businessman, politician, premier of NB (b at Moncton, NB 9 Nov 1864; d at Sussex, NB 16 Feb 1960). A respected politician and forceful speaker, Murray represented Kings County 1908-20. He was a member and president of the Executive Council of NB and minister of agriculture, before becoming premier in 1917 for the shortest term in provincial history. His government was defeated at the polls less than a month later. ARTHUR T. DOYLE

Murray, Sir John, oceanographer (b at Cobourg, Canada W 3 Mar 1841; d at Kirkliston, Scot 16 Mar 1914). At 17, Murray moved to Scotland, the ocean voyage inspiring him in his lifelong career. After attending U of Edinburgh, he became naturalist to the CHALLENGER EXPEDITION (1872-76), during which he mapped much of the ocean floor of the world and became expert at classifying sediments and determining their origins. Other expeditions included one to Spitzbergen in 1868 and a survey of freshwater lochs in Scotland, published in 6 vols. After the death of *Challenger* expedition leader C.W. Thompson, Murray edited most of the resulting 50 vols (1882-95), and wrote the 2-vol summary (1895). Other contributions included a theory on the origin of coral reefs, a textbook on OCEANOGRAPHY with Johan Hjort (1912) used for about 30 years, and a popular account (1913). His 1888 estimates of proportions of various depths of ocean floor still generally hold. He was knighted in 1898. MARTIN K. MCNICHOLL

Murray, John Clark, philosopher (b at Thread and Tannahill, Scot 19 Mar 1836; d at Montréal 20 Nov 1917). Murray's carreer as a philosopher began in 1862 at Queen's in Kingston, Ont. His commitment to the PHILOSOPHY of Sir William Hamilton shifted radically after a time in Canada, and his Hegelian inclinations resulted in 2 works on philosophical psychology: *A Handbook of Psychology* (1885) and *Introduction to Psychology* (1904). All things exhibited a rational unity for Murray and reason was the crucial factor in his theory of human nature. In 1887 he wrote a manuscript, unpublished until 1982, entitled *The Industrial Kingdom of God,* which made a plea for social and economic reform and proposed a co-operative society based on Christian principles of freedom, equality and justice for all people.

Murray was scholarly, but not a recluse. He fought a long battle for women's political and educational rights. His public lectures, newspaper articles and contributions to popular journals made him widely known. Murray's Scottish determination and sense of public duty had an impact, not only on his students, among whom were author and poet William D. LIGHTHALL and Stephen LEACOCK, but also on the developing Canadian culture. His books *A Handbook of Christian Ethics* (1908) and *An Introduction to Ethics* (1891) and his social-gospel novel *He That Had Received the Five Talents* (1904) spell out his moral theory. He was a fellow of the Royal Soc of Canada and a Canadian philosopher who truly practised what he preached.

ELIZABETH A. TROTT

Murray, Leonard Warren, naval officer (b at Granton, NS 22 June 1896; d at Derbyshire, Eng 25 Nov 1971). Murray joined the navy in 1911, served in WWI and by 1939 was deputy chief of the naval staff. In WWII he held a series of important operational commands culminating in that of commander in chief, Canadian Northwest Atlantic, in Apr 1943. The only Canadian to command a theatre of war, Murray was forced into early retirement (formally Mar 1946) by his supposed failure to curb the excesses of his sailors during the VE-Day riots in Halifax. In Sept 1945 he left for England, where he was called to the bar in 1949. MARC MILNER

Murray, Robert, sculptor (b at Vancouver 2 Mar 1936). His abstract metal SCULPTURE, constructed of simple geometric forms using industrial materials and methods, shares important stylistic characteristics with the work of British sculptor Anthony Caro, but it was influenced chiefly by N American artists David Smith and Barnett Newman. In 1959 Murray met Newman at U of Sask's summer school at Emma Lake, and in 1960 he moved to New York, having been offered an assistanceship by Newman. Beginning in the 1960s with a fountain sculpture for Saskatoon's city hall, Murray has produced public sculptures for sites throughout Canada and the US. His early work was noted for its clear, open relationships with characteristics of contemporary minimalism, but since the mid-1970s he has developed a more lyrical vocabulary of curved, folded and twisted forms. His sculptures are unified throughout by a smooth painted finish, often in saturated colours.

ROALD NASGAARD



Robert Murray, *Saginaw* (1979), aluminum painted red (*courtesy Gallery One*).

Murray, Walter Charles, educator (b at Studholm, NB 12 May 1866; d at Saskatoon, 24 Mar 1945). A philosophy professor at UNB and Dalhousie, Murray became president of UNIVERSITY OF SASKATCHEWAN in 1908, a position he held for 29 years. He advocated nondenominationalism and centralization in higher education, along with political neutrality and practical service to the community. At a time of controversy over agricultural education, Murray successfully steered U of Sask towards integrating agriculture with other fields of study. He encouraged the affiliation of religious and junior arts colleges with the provincial university, developed agriculture and extension departments, and established university control over instruction and examinations in the professional fields of law, pharmacy, engineering, accounting, education and medicine. Murray served on a number of government commissions on education.

MAUREEN AYTENFISU

Murre, medium-sized member of the AUK family. Murres weigh 900-1000 g and are up to 46 cm long. Plumage is dark brown to black above, pure white below. Like all auks, murres come to land only to breed. Murres occur in cooler waters of the N Pacific and N Atlantic oceans and adjacent parts of the Arctic Ocean. There are 2 species: common murre (*Uria aalge*) breeds primarily in boreal and low arctic waters; thick-billed murre (*U. lomvia*) breeds further N in arctic waters. Murres often breed in dense colonies on coastal cliffs and islands, laying a single, large egg on bare rock ledges on the cliff face or surface. They first breed when 5 years old. Incubation, shared by both parents, takes 32-34 days. In Canada, both species are most abundant on the Atlantic coast. Small numbers of common murres breed in BC; thick-bills in the western Arctic. Almost 90% of eastern N American common murres breed in Newfoundland with about 75% (400 000 pairs) at FUNK I. Breeding distribution of thick-bills is also restricted; most breed at 11 sites in the eastern Arctic. The thick-billed murre population in eastern Canada totals 1 283 000 pairs, representing the entire population in eastern N America and 55% of all thick-bills breeding in the western N Atlantic. Numbers of both species have been seriously reduced over the last century because of habitat disturbance, hunting, oil pollution and probably fisheries development. D.N. NETTLESHIP

Mushroom and Puffball, fleshy, spore-bearing fruitbodies produced by many club FUNGI (Basidiomycetes) and a few sac fungi (Ascomycetes). Such fungi may be saprophytes, living on and causing decay of organic matter; symbionts, living in association with tree roots to their mutual advantage; or occasionally PLANT parasites. In soil-inhabiting species, mycelium (mass of filaments forming the vegetative body of the fungus) grows indefinitely; fruitbodies are produced when conditions are favourable. Rings of fruitbodies (eg, fairy rings) mark the location of buried mycelium. Rings expand annually and ages can be estimated from annual diameter increase. Some rings are over 500 years old. Mushroom species in Canada may exceed 2000; of these many also occur on other continents.

Mycologists (biologists studying fungi) do not distinguish mushrooms from toadstools, although the latter term is popularly used for poisonous types. Related species may differ markedly in edibility and no simple tests exist for identifying edible types. Identifying features are macroscopic or microscopic. For specialists, microscopic features are most significant, eg, shape of spore-bearing cells, size and other features of spores and microscopic fruitbody structure. Macroscopic characteristics include fruitbody shape and colour, presence or absence of ring (annulus) and cup (volva), form of spore-



Bear's head hydnum (*photo by Mary W. Ferguson*).

producing layer (hymenium) and spore-print colour.

Annulus and Volva In the button stage, the cap and stalk of a mushroom are joined by a membrane (veil) that ruptures as growth occurs, preparatory to spore dispersal. As the destroying angel (common in eastern Canada) develops, remnants of 2 membranous veils are left as a ring on the stalk and a cup at the stalk base. Fly agaric or fly amanita has a bright red cap with warts (also veil remnants) and a ring; its cup consists of irregular ridges around the swollen stalk base. Mushrooms may have only the ring or only the cup; many have neither.

Hymenium Gill fungi, such as market mushrooms and amanitas, produce spore-bearing cells on surfaces of structures called gills. Pore fungi (eg, boletes) have pores (tubules) instead of gills. The hymenium of hedgehog mushrooms is borne on teeth; that of crested coral mushroom covers branch surfaces. The morels and potentially poisonous false morels produce spores in sacs (asci) on the outer cap surface. All of these have exposed spores, but puffball spores are enclosed in the fruitbody. Gemmed puffballs become dry at maturity, a pore develops at the top and the fruitbody functions as a bellows when struck (eg, by water drops).

Spore-Print Colour Spore masses, shown in spore prints, are white in amanitas and fairy-ring mushroom; chocolate brown in market mushrooms; yellowish, pinkish, rusty brown or black in other species.



Fly amanita fungus, with its bright red cap and warts (*photo by Stephen J. Krasemann/DRK Photo*).



Oyster mushroom (*photo by Mary W. Ferguson*).



Chantarelle, an edible wild mushroom (*photo by Tim Fitzharris*).

Mushroom poisonings are caused by several toxins. Amanitas and some galerinas produce heat-stable amatoxins and phallotoxins, which induce symptoms felt only after 4-48 hours. Also potentially fatal, with a delay of up to 2 weeks before symptoms appear, are the orellanins produced by some Cortinarii. False morels produce a potent toxin (monomethylhydrazine) which is lost if the mushrooms are thoroughly cooked. Muscarine, present in small quantities in fly amanita, is abundant in some inocybes and clitocybes, poisoning by which may cause death; appropriate treatment neutralizes poison. Mild poisoning (diarrhea, etc) occurs with ingestion of numerous other mushrooms.

Commercial exploitation of wild mushrooms is not extensive in Canada, but a few are harvested and sold. Pine mushrooms (Canadian matsutake) and chanterelles are exported. *See* MUSHROOM CULTIVATION.

R.J. BANDONI

Reading: O. Miller, *Mushrooms of North America* (1980).

Mushroom Cultivation The mushroom cultivated on a large scale in Canada is *Agaricus bisporus* (also called *A. brunnescens*). The most commonly grown strains have white caps, less common strains are cream and brown. Small quantities of *A. bitorquis* (a related white species) are also grown. *Agaricus*, first cultivated in France in the 17th century, was grown by E. Cauchois in 1877 in Québec.

Nutrients for *Agaricus* are usually provided by horse-manure composted with straw and nitrogen-rich additives (eg, chicken manure, brewer's grains, ammonium nitrate, etc). Gypsum is added for texture. Composting is initiated by watering horse-manure mixture stacked in long piles (2.0-2.4 m high, 1.8-2.2 m wide) on a concrete floor outdoors. Piles are turned mechanically 4 times during a 2-week period. Water may be added at each turn or less often, depending on the season. The temperature inside the piles rises to 70-75°C through action of bacteria and fungi, which decompose plant and animal matter and convert inorganic to organic nitrogen compounds, providing nutrients for the mushrooms. Trays (1.2x1.8 m) or long shelves, arranged in tiers in dark mushroom houses, are filled with a layer (20 cm) of cooled compost. During the subsequent "cook-out" process, continuing microbial activity raises the temperature to about 45°C and, after 1-3 days, steam is let into the houses for several hours allowing pasteurization to occur (60°C), thus killing parasites. The compost is left for 5-12 days (at about 50°C), during which "conditioning period" microorganisms produce more nutrients. The compost is then cooled to about 25°C. Mushroom spawn, prepared under sterile conditions by allowing vegetative mushroom mycelium to grow into cereal grains, is inserted into the compost and spread over the surface. The mycelium penetrates the compost in about 2 weeks. Compost is then covered (cased) with a 2-3 cm layer of pasteurized loam topsoil, or a deeper layer of sphagnum moss or peat mixed with soil (acid peat is neutralized with hydrated lime or limestone). The casing layer is watered and the mycelium grows through it. Beds are cooled by ventilation to about 20°C, stimulating formation of young mushrooms (pinheads) in about 4 days. They are harvested when caps are about 2-8 cm. At 7-11-day intervals new crops ("flushes" or "breaks") appear, one batch of compost yielding up to 7 crops. Strict sanitation is maintained and PESTICIDES used because *Agaricus* is susceptible to attack by viruses, bacteria, microscopic FUNGI, nematodes and mushroom fly larvae.

Mushrooms are the third most valuable Canadian vegetable crop. In 1980 Canadian production of *Agaricus* was 29 071 t ($65.7 million), of which 21 183 t were sold fresh (most of the remainder being canned). Ontario produced about half; BC almost 28%; Québec, Alberta, the Maritimes, and Manitoba, the remainder. In 1979 per-capita consumption was 2.5 kg. On a small scale, 2 edible mushrooms are cultivated commercially on wood: *Lentinus edodes*, known by Japanese name Shiitake, in Ontario and BC, and the oyster mushroom, *Pleurotus ostreatus*, in Ontario and, at least experimentally, in Québec.

HANS E. GRUEN

Reading: F.J. Ingratta and T.J. Blom, *Commercial Mushroom Growing* (1980); N.W. Tape, *How to Grow Mushrooms* (1980).

Music, Profession of Professional musicians are those who through their skill, training and commitment are able to earn a living as musicians. They may be teachers, performers or non-performers, and their specialty may be popular, classical, military or religious music. Musicians are often active in more than one occupation at a time, particularly in teaching combined with other musical activities. The largest group of professional musicians is teachers working in schools, conservatories and universities, as music therapists and as coaches of singing and instrumental groups. Teaching, especially if associated with an institution, provides the most stable income and working conditions for a musician, though schoolteachers usually require a college degree or diploma. At the conservatory and university level, exceptionally talented musicians may not need certification.

Competition is greatest among performers, whether ensemble or solo instrumentalists and vocalists or conductors. Artists perform only a few hours each week as far more time is spent in practice, rehearsal and, if on tour, travel. Experience in performance is included in all music training at the post-secondary level for popular or classical music. While it is possible to obtain good training in Canada (*see* MUSIC EDUCATION), most musicians seeking a virtuoso career will study abroad. Canada does not have a national school of music similar to those in ballet and theatre. Nonperforming professional musicians include composers, musicologists, ethnomusicologists, music librarians and archivists; journalists and editors; instrument builders, repair craftsmen and tuners; and music producers for radio, TV and recordings. Certain administrators in music schools, unions, performing rights societies, artist management and record companies, as well as technicians such as engineers in recording studios, may be trained musicians.

The cost of preparing for a career in music can be high, involving lessons, instruments and equipment, travel, promotion and management. Most musicians begin music study in their preteen years, though a talented person can make a later start. Income for the independent performer is often irregular and unpredictable. There are few fringe benefits and a musician in poor health cannot work. Musicians can be subject to arbitrary and unfair decisions by employers and as a group are poorly represented politically. Some areas of performance are highly stressful. Many of these unfavourable working conditions have been improved through the efforts of music unions and professional organizations for teachers, organists and composers. The American Federation of Musicians of the US and Canada (AF of M) negotiates union agreements with the CBC, CTV, NFB, the recording industry and companies producing commercials in which music is used, and its local branches negotiate with individual symphony orchestras and concert halls. The Union des artistes (UDA, French-language) and the Assn of Canadian Television and Radio Artists (ACTRA, English-language) protect members' rights and fees on radio, TV and the recording industry; and Canadian Actors' Equity Assn protects live-stage performers.

Before the early 1800s most musicians for whom there is documentation in Canada were connected to the church. During the 19th century, the church, the military, private teaching studios, instrument building and the music trade were the main sources of income, though most musicians combined 2 or more of these activities. Not until the mid-20th century was it possible for musicians to earn a living in one specialized field, as careers opened up in CBC broadcasting, symphony orchestras and school teaching. Opportunities for professional musicians expanded following the establishment of the CANADA COUNCIL and various provincial arts councils, although the amount of government funding is diminishing.

Women have been active in the profession since at least the middle of the 19th century. It is likely that they were the bulwark of private teaching in the years after Confederation, and women appeared early as instrumentalists in orchestras in Canada. In spite of its disadvantages, the profession of music continues to attract participants. It is a challenging, creative career with scope for personal growth and satisfaction. *See also* CHAMBER MUSIC; COUNTRY AND WESTERN MUSIC; FOLK MUSIC; JAZZ; MUSIC BROADCASTING; MUSIC CRITICISM; MUSICAL INSTRUMENTS; MUSICOLOGY; OPERA; ORCHESTRAL MUSIC; POPULAR MUSIC; RECORDING INDUSTRY; RELIGIOUS MUSIC; SONGS AND SONG WRITING; and individual entries for organizations and groups.

CHRISTOPHER WEAIT

Music Awards and Competitions Music awards are given on a noncompetitive basis or are won in competition. Noncompetitive music awards recognize outstanding accomplishment, merit, leadership or generosity. Recipients may be part of a larger group honoured by government institutions (the Order of Canada, the Alberta Achievement Awards); they may be winners of prizes or trophies given specifically to members of the music community by musical clubs, professional organizations or businesses associated with music (the Canadian Music Council Medal or the Juno Awards); or they may be the object of salutatory awards made by schools (honorary degrees). Winners are usually chosen by a specially appointed jury or awards committee. Noncompetitive music awards can also take the form of scholarships, bursaries, fellowships or study grants, as established by individuals, businesses, foundations, music clubs, educational institutions or professional music organizations.

Competitive music awards can be divided into several categories: those given at competitive festivals, or in performance, conducting or composition competitions. Some provide honours only and others give monetary awards. Competitive festivals provide opportunities for young musicians to compete against their peers and profit from the experience of public performance and the advice of the judges. Some competitive festivals award medals and trophies to prizewinners.

Performance competitions usually involve participation at the advanced-student or young professional level. Winners are chosen by an appointed jury. In addition to a monetary prize, there are rewards such as national recognition by press coverage of the competition, possible offers of recording contracts and invitations to perform for radio or TV or with major orchestras, choirs or concert groups. These competitions are sometimes held publicly in concert halls (the Montréal International Competition) or on radio (the CBC Radio Talent Competition, formerly the CBC Talent Festival and successor to "Opportunity Knocks"). Conducting competitions are recent in Canada. They are sponsored by foundations, schools or conservatories to honour a well-known conductor who has shown particular interest in young musicians wishing to perform as conductors (the Heinz Unger Award). As well as offering a prize, usually money, these competitions provide a showcase for conductors to demonstrate their skills before representatives of community orchestras needing energetic and ambitious conductors. Composition competitions have increased greatly during the last 30 years. Sponsored by both the CBC and various corporations, as well as by musical organizations across Canada, composition competitions usually offer a cash prize for the winning composer, and the public performance and sometimes the recording of the successful composition, usually by a major orchestra, choir, ensemble or soloist. In recent years an increasing number of music prizes and awards have been established by corporations. To facilitate this, the Council for Business and the Arts was established (1974). Also, corporations offer cash prizes and awards for specific accomplishments such as orchestras performing the most Canadian works in a season. For a listing of music awards and competitions consult the ENCYCLOPEDIA OF MUSIC IN CANADA. *See* MONTREAL INTERNATIONAL COMPETITION.

MABEL H. LAINE

Music Broadcasting is the transmission of music via AM and FM radio and television networks and stations and by satellite. All transmission modes have French and English services and operate through privately and publicly owned systems. The FM stereo network is one of the world's largest high-quality music networks. In general, radio has been more important than TV for music broadcasting. The development of music broadcasting in Canada falls into 4 well-defined periods: pre-1936 (to the establishment of CBC); 1936-52 (to the introduction of TV); 1952-75 (to the pan-Canada FM stereo network); 1975 to the present.

Canada's contribution to BROADCASTING is noteworthy. Montréal's XWA (now CFCF) was one of the first stations in the world (May 1920) to offer regular, scheduled broadcasts. On 1 July 1927, the Diamond Jubilee of Canada's Confederation, a transcontinental network was inaugurated with a daylong broadcast, mostly music. In the early 1920s the Canadian National Railway, under its president Sir Henry THORNTON, built radio studios in several centres across the land. In the mid-1920s complete Gilbert and Sullivan operas were studio broadcast, as was an ambitious series, "The Music Makers." In 1927 the famed HART HOUSE STRING QUARTET travelled coast to coast for (and on) the CNR, broadcasting recitals of Beethoven quartets. In 1929 the new network began N America's first series of radio symphony concerts, by members of the TORONTO SYMPHONY under Luigi von Kunits. The CPR had also begun to broadcast concerts, but the Depression in the 1930s ended the railways' involvement in national broadcasting. Between 1932 and 1936 Canadian public radio was developed by the Canadian Radio Broadcasting Commission under the Toronto critic Hector CHARLESWORTH. It was hastily organized and not well supported by the federal government.

In 1936 the CANADIAN BROADCASTING CORPORATION was founded and by the 1940-41 season CBC radio, operating nationally, regionally and locally, and in 2 language services, had presented some 600 symphonic broadcasts (many from the US), 2000 broadcasts of chamber music and 45 full-opera broadcasts (including the Metropolitan Opera, still broadcasting today). In 1942 the CBC commissioned from Healey WILLAN and John COULTER the radio opera *Transit Through Fire*, and 3 years later, the major opera *Deirdre of the Sorrows*.

In this period Canadian programs were heard over the US Mutual, NBC and CBS networks. This was a time of much original live broadcasting, including the talent hunts ("Singing Stars of Tomorrow" from 1943, "Opportunity Knocks" from 1947) and many amateur-hour programs. Between 1944 and 1962 the CBC operated an alternative English-language network, the Dominion. Toronto's CJBC was owned by the CBC, but all other stations were privately owned affiliates. Alternative programming was mostly lighter than that of the trans-Canada network, though the Toronto and Montréal Symphony orchestras performed on Dominion on Tuesday nights followed by "CBC Concert Hall." In that period the CBC maintained studio orchestras in Halifax, Québec, Montréal, Toronto, Winnipeg and Vancouver, providing welcome employment for local musicians. By the late 1940s the CBC was the largest single employer of musicians in N America. Music broadcasting ranged from symphonic and opera to light and popular. Private stations gave broadcasts of local musicians and many pop singers and instrumentalists owed their first encouragement to radio broadcasts. In general, the most intensive music broadcasting was from the CBC.

In Sept 1952 the CBC inaugurated its television broadcasting. In those first years CBC TV was inventive and adventurous. Major opera and dance productions were mounted by Franz Kraemer, Vincent Tovell and Norman CAMPBELL in Toronto, and Pierre MERCURE in Montréal (whose French-network series "L'Heure du concert" was among the most remarkable ever produced on this continent). As costs mounted and the CBC was forced to economize by buying imported programs, Canadian TV production dwindled, especially in music programs, though the occasional special made its mark, such as Norman Campbell's 1966 National Ballet production of Prokofiev's *Cinderella*, or Harry SOMERS opera *Louis Riel* produced by Franz Kraemer in 1969.

Although large audiences enjoyed the TV medium and private radio narrowed its perspectives, music on CBC Radio continued to flourish in the period from 1952 to 1975. The jazz and popular stylings of Phil NIMMONS (Toronto), Neil CHOTEM (Montréal) and Lance Harrison (Vancouver) were widely appreciated. Chamber music broadcasts also abounded. The CBC Symphony Orchestra, N America's only radio symphony orchestra, was active from 1952 to 1964 and featured many modern works, with special attention to Canadian composers. The Orchestra's growing reputation drew Igor Stravinsky to Toronto in the early 1960s for his 80th

birthday celebration. This was a period of exceptional support for Canadian composers, through performances of their works, commissions and the engagement of John BECKWITH, Somers, Norma BEECROFT, Mercure and François MOREL as commentators. The English network began to produce its own series of stereo discs, first for broadcast use but later for public sale.

After 1975 the increasing use of disc and tape wrought profound changes in the pattern of music broadcasting. The live or studio broadcast gave way to the varied program package, held together by a program host. The radio networks were reorganized in the mid-1970s and for the first time a fully national FM stereo network of high technical quality was inaugurated. AM retained its policy of providing programming for a general audience and FM was mostly music, largely non-pop though with some serious jazz. At first the schedule was perhaps 75% records, rarely Canadian. By the 1980s, however, CBC radio programmers had begun once more to diversify their formats, reviving "live-to-air" techniques for special events and in other ways projecting music as an art.

There was much live broadcasting of local origin, but after the early 1950s private radio settled comfortably into the "top 40" and foreign records, effectively preventing it from contributing to the development of music in Canada. One private-sector initiative of special note was the Canadian Talent Library, initiated and developed by Lyman Potts for the Standard Broadcasting syndicate. The Library recorded discs for broadcast only, featuring Canadian performers and much original Canadian composition.

By the early 1970s the regulatory CANADIAN RADIO-TELEVISION AND TELECOMMUNICATIONS COMMISSION (CRTC) had laid down new rules governing community service and Canadian content, which stimulated Canadian recordings and pop groups. New Canadian stars emerged (Anne MURRAY, Bruce COCKBURN, Burton Cummings, the GUESS WHO) retracing a similar development already far advanced in Québec, where chansonniers (Gilles VIGNEAULT, Pauline JULIEN and Robert CHARLEBOIS) had for years been accorded star status *(see* POPULAR MUSIC).

During WWII the federal government established its International Service (mostly shortwave radio), supervised by the Dept of External Affairs but operated by the CBC. In 1968 the service came under full CBC responsibility and was renamed Radio Canada International in 1972. The IS/RCI made and distributed internationally hundreds of recordings. By 1977 RCI had begun its Anthology series, each a package of several discs of the music of a particular Canadian composer.

Music broadcasting has been crucial to the vitality of music in Canada. New technologies and changing tastes will affect form and style, but broadcasting will still play a leading role in bringing music to the public. KEITH MACMILLAN

Music Criticism Serious music criticism in Canada has existed only since the late 19th century. It takes the form of concert and record reviews written for publications and, in a few instances, longer articles in books. Prior to 1867, few commentaries about concerts were judgemental. Instead, articles simply reported on a social event, briefly commenting upon the performers, the staging and audience. Because concerts were so rare, any performance was appreciated and treasured. In the 1870s a limited critical awareness began to emerge as touring companies regularly made circuits through Canada and audiences could now compare the standards of local and visiting musicians. When choral societies and symphony orchestras were formed in major cities, regular concert seasons set the stage for critical assessments. Unfortunately, criticism was generally delegated to a local music teacher or amateur musician who avoided writing anything critical about concerts in the community. Newspaper reporters assigned the task often had little musical knowledge. Notable exceptions in French Canada were Guillaume COUTURE (*La Minerve, Revue de Montréal, La Patrie, Montréal Star*) and in the early 20th century Léo-Pol MORIN (*La Patrie, La Presse, Le Canada*), both of whom demanded higher performance standards and changes in repertoire. Their English Canada counterparts, Hector CHARLESWORTH (*Saturday Night*) and Augustus Bridle (*Toronto Daily Star*), also wrote critical reviews and assessed, for the first time, Canada's composers. J.D. LOGAN in 1917 attempted the first examination of the foundations of criticism in Canada in an essay on the aims, methods and status of aesthetic criticism. Such philosophical considerations of music criticism have been rare and in more recent times have usually been part of symposia or annual conferences.

Musical reporting now appears regularly in newspapers and some magazines in most major cities and large towns. With the growth of interest in POPULAR MUSIC and JAZZ, the media have created entertainment sections that include regular reviews and feature articles about the music scene and recordings, although discussions of new compositions and newly published scores are rare. Among many writers active across Canada in the 20th century are Thomas Archer, Claude Gingras, Eric McLean and Gilles Potvin in Montréal; Léo Roy in Québec; Jacob Siskind in Montréal and Ottawa; Augustus Bridle, Hector Charlesworth, John BECKWITH, William Littler, John Kraglund and Kenneth Winters in Toronto; Lorne Betts in Hamilton; Loretta Thistle in Ottawa; A.A. Alldrick and S.R. Maley in Winnipeg; Stanley Bligh, Max Wyman and Ida Halpern in Vancouver. Writers on jazz and popular music include Ritchie York, Bob Smith, Peter Goddard, Mark Miller, John Norris and Gilles Archambault. FREDERICK HALL

Music Education in Canada has progressed from rustic beginnings in the colonial period to the present time when music training is available both for amateurs and professionals, and, indeed, as an increasingly important facet of general education. Historically he main branches of music education can be identified as private teaching, school instruction (public and private), and music in higher education. However, music education in the 1980s has evolved into a sophisticated complex of activities involving institutions, professional organizations, government agencies and cultural groups within the Canadian community.

Colonial Period to 1918 Missionaries and military personnel furnished early forms of musical activity. As permanent settlements developed, church choirs and bands, however informal and unsophisticated, became the wellsprings from which a vigorous musical life emerged. Religious orders provided most of the instruction in French Canada, with the result that music was closely associated with convent schools and other church institutions. Their contribution in English-speaking regions should also be recognized, particularly that of the Irish orders in Newfoundland. French and English origins of Canadian culture account for much of the diversity in music education. For example, solfège in Québec was based on the fixed doh system of continental Europe whereas the movable doh tradition in English Canada had its roots in Britain. Early American influences can be seen in the singing schools of Upper Canada where Protestant churches were prevalent.

Egerton RYERSON listed vocal music as a subject in the common schools of Upper Canada in 1846, and has been considered the champion of school music ever since. As chief superintendent of education, he formulated his educational plan after extensive travel to Britain, Europe and the US, where school systems had introduced singing on the strength of Pestalozzi's educational theories.

The question of "who should teach school music" and what training they should receive was never resolved satisfactorily. Ryerson attempted to provide such training within his Normal School but the most successful results in the schools were achieved in cities such as Hamilton and London, Ont, and Ottawa where trained musicians were hired. As the population increased, these special music teachers assumed the role of supervisors and were expected to conduct in-service programs for the regular teachers. Generally, rote singing was the main activity although more competent teachers also taught sight reading and voice culture; written examinations suggest a certain preoccupation with the rudiments. Achievement in music was dependent upon the expertise and interest of the individual teachers, consequently the outcome was uneven from school to school. By the late 1880s enthusiasm for John Curwen's Tonic Solfa system had been transplanted to Canada by British immigrants such as A.T. Cringan who taught in the Toronto schools. Their missionary spirit was heightened in a controversy over a proposal to sanction a rival American method. Music in the rural schools was neglected or often nonexistent, but in the cities music supervisors mounted massed concerts and demonstrations to display their accomplishments, especially on the occasions of royal visits or Empire Days. These events were characterized by the singing of patriotic airs and a certain amount of flag waving. In the Prairie provinces where there was an influx of European peoples, school officials encouraged the use of national songs in their zeal to Canadianize the population. Too often music in the schools relied upon these utilitarian benefits rather than a sound educational philosophy.

In the late 19th century, music was an important subject in ladies' colleges and finishing schools, but the general curriculum for boys was tailored to university entrance and professional careers and usually did not include music. Later on, when girls attended regular high schools, the curriculum retained its commitment to the interests of the university and, consequently, music did not achieve any major status in secondary education.

A colourful array of private teachers in the 19th century free-lanced as organists, band conductors and music dealers; teaching was just one facet of their endeavours in a society which revelled in amateur artistic pursuits. The appellation "Professor" was common among these versatile entrepreneurs, some of whom left a trail of bad debts or were otherwise involved in social scandal. The more pretentious female teachers advertised themselves as "Madame" and, flaunting their superior European training, often claimed to be schooled in foreign languages. Such idiosyncrasies aside, even though much of the teaching was of a dubious standard, there were some outstanding individuals, most of whom gravitated to the cities.

Apart from degrees awarded to James Paton CLARKE and George William Strathy, BMus and DMus degrees were not granted in Canadian universities until the 1880s. In the British tradition, they were extramural programs administered through syllabi and examinations in theoretical subjects without regular instruction being given. These early beginnings did not establish music as a discipline in higher education.

The turn of the century brought a profusion of conservatories, although many were merely glorified studios and relatively few enjoyed any

permanence or prestige. The major conservatories affiliated with universities in an arrangement whereby the former gave instruction and the latter conducted examinations. By the early years of the 20th century the Associated Boards of the Royal Schools of Music (England), the McGill Conservatorium and the Toronto Conservatory had established their examinations on a national scale. They served private teachers well through their graded syllabi and examination standards. The competitive festival movement, which had its origin in Edmonton (1908), also stimulated private instruction. After 1890, women's musical clubs became the patrons of music by sponsoring recitals and providing scholarships.

1919-45 The Toronto Conservatory became a Canadian mecca for musicians during the principalship of Sir Ernest MACMILLAN, 1926-42 (*see* ROYAL CONSERVATORY OF MUSIC OF TORONTO). The number of local conservatories decreased but several remained as centres of musical life in their respective regions: Halifax Conservatory, Mount Allison Conservatory, McGill Conservatorium, Regina College Conservatory, Alberta College Music Centre (Edmonton) and Mount Royal College Conservatory (Calgary). Although teachers from overseas dominated the scene, gradually more Canadians came to the fore — yet most of them still went abroad for advanced study.

The player piano and phonograph enhanced the place of music in the home, and in a striking way the growth of radio broadcasting increased the potential for American influence on Canadian society. Therefore, the establishment of CBC radio in 1936 was as vital to the cultural unity of the nation as railways had been for economic development in the 1880s (*see* BROADCASTING, RADIO AND TELEVISION).

In order to improve professional standards, private teachers formed organizations, first in the cities and then province wide. In 1935 the 4 western provinces took the initial step towards a national organization at a conference in Vancouver; Ontario joined in 1942 and others followed in due course. Another example of western initiative was the founding of the Western Board of Music (1936), a co-operative venture involving the universities and provincial departments of education in the 3 Prairie provinces.

Significant changes in general education owe their existence to the child development movement in the US and the focus in educational psychology on the growth of the individual. The specific changes in music were related to the "song method," with less emphasis on reading skills and the paramount importance of music apprecation. Teachers could obtain learning materials from the Victor Talking Machine Co or tune in to radio programs prepared especially for schools (*see* EDUCATIONAL BROADCASTING). In practice, "progressive education" was not accomplished in the way it was idealized. Many classroom teachers dabbled in the "new," while the old generation of music specialists continued to stress basic skills. Inconsistent results in elementary grades reflected the inadequate training in normal schools, but, in several provinces, summer music sessions helped to improve the situation.

In some places music introduced as an option in junior high schools eventually led to its acceptance in secondary schools, but in most cases music was extracurricular. Glee clubs, orchestras and operettas became a tradition long before music teachers as such were appointed.

Music in the Protestant schools of Québec paralleled progress in Ontario, but in the Catholic schools the situation was static. Recognizing the need for improvement, in 1934 the Montréal Catholic School Commission appointed Claude CHAMPAGNE as director of music education.

Between the wars some universities retained their extramural degrees but, with few exceptions, music in higher education did not expand rapidly even where faculties of music were established — at Toronto (1918) and McGill (1920) or at Laval, where a school of music was created (1922). However, in the 1930s the Carnegie Foundation of New York financed record collections in many universities, a chair in music at U of Saskatchewan, and an expansion of extension programs at U of Alberta which led to the founding of the Banff Summer School. Through a Carnegie grant, Ernest Hutcheson examined the need for advanced training at U of T (1937). When recommendations of that report were finally implemented (1946), it represented a landmark in Canadian music education.

1946-84 The remarkable growth of music education since WWII can be attributed to developments in higher education and secondary schools, particularly in the field of instrumental music. The creation of the CANADA COUNCIL (1957) added further momentum through its sustained support of the arts, nurturing vital areas of Canadian culture on a general level.

U of T was at the heart of this cultural transformation. Advanced training was offered in the conservatory's newly created Senior School (1946), which featured an opera division that ultimately led to the CANADIAN OPERA COMPANY. At the same time, the Faculty of Music introduced a degree in school music to prepare specialists for secondary schools. Under the leadership of Macmillan, Arnold Walter gave direction to these programs with insight and vision. Among the students enrolled were many returned servicemen and from this nucleus came a new generation of Canadian performers, composers and teachers.

The school music degree was based on American patterns — a combination of practical and theoretical music with courses in the liberal arts. Of faculty members recruited from the US, Robert Rosevear and Richard Johnston were strongly committed to music education. Concurrent with developments at the university, Brian McCool of the Ontario Dept of Education effectively promoted programs in the schools. In order to meet the demand, the department's summer school certificated a multitude of instrumental teachers who had performing experience but little if any university education. Consequently, there have been marked philosophical differences in the ranks of Ontario's teachers.

Across the country the climate was conducive to change; instrumental music was already emerging in the high schools of Montréal and parts of BC. Consequently, by the 1960s similar developments in other regions demonstrated the need for specialized teachers and, in time, most universities either created new music departments or expanded their course offerings. This unprecedented growth in higher education necessitated the recruitment of additional faculty but since Canada had produced few students with graduate qualifications, universities turned primarily to American personnel to fill these positions.

The province of Québec experienced its own profound change in the late 1960s when the Parent Report, followed by the Rioux Report, led to a comprehensive plan for music at all levels within a modernized educational system. Based primarily on N American models, these revisions brought Québec into closer line with other provinces.

Québec's unique venture — Conservatoire de musique et d'art dramatique — had been founded in 1942 by Wilfrid PELLETIER. A leader in several spheres of French Canadian music, Pelletier strengthened the influence of this institution even further after he became director of music, Ministère des affaires culturelles du Québec, in 1961. The conservatoire consists of 7 teaching institutions throughout the province. By providing free tuition on a competitive basis, Québec has produced a system of professional training unmatched in any other province.

Individual instruction, in both private and institutional settings, has been influenced by the growth of applied music in higher education, particularly in the appointment of distinguished performers and artists-in-residence. To some extent, this has checked the predilection of Canadians to study abroad.

The recent flowering of summer schools, institutes and special projects has stimulated a more competitive milieu for aspiring professionals, including opportunities at regional and local levels. The National Youth Orchestra, JEUNESSES MUSICALES, BANFF CENTRE SCHOOL OF FINE ARTS, CBC Talent Festivals, National Competitive Festival of Music, to name only a few, have become familiar names to Canadians. Nevertheless, it is evident that the quality of individual instruction in private domiciles and commercial studios associated with music dealers is still inconsistent.

Elementary school music has retained close ties to the song method with an increasing interest in Canadian folk songs (*see* FOLK MUSIC). Listening, rhythmic, and creative elements are also integrated into eclectic curricula. Since the 1960s Orff and Kodály programs have flourished in a number of Canadian schools where specialized teachers have been used. Nevertheless, Canada has not taken full advantage of these international systems because music instruction is usually left to classroom teachers.

There is a diversity of choral, instrumental and general programs in junior high and secondary schools. Many of them are performance-oriented with a continuing stake in the competition festival, but, philosophically, there has been a trend towards a more balanced curriculum in order to foster aesthetic sensitivity. In the 1960s the John Adaskin Project addressed the lack of contemporary music in schools. This dialogue between composers and teachers, enhanced later by the books of R. Murray SCHAFER, proved to be a catalyst for creative approaches and alternatives. Recent excursions into new areas of folk, contemporary and popular culture have raised concerns within the profession, especially where traditional priorities have been threatened in a rapidly changing society.

One measure of maturity in Canadian music education has been evidenced by the formation of its professional organizations: Canadian Music Educators' Assn (1959), Canadian Federation of Music Teachers' Assns (1961), Canadian University Music Society (1965, originally Canadian Assn of University Schools of Music), and Fédération des associations de musiciens éducateurs du Québec (1966). Through professional development and publications, they provide valuable leadership and, in 1978, co-operated in hosting the World Congress of the International Society for Music in Education, held in London, Ont. On that occasion delegates from around the world became more aware of our cultural achievements and, for the first time, music education in Canada came into an international limelight.

See also MUSIC HISTORY. J. PAUL GREEN

Reading: Encyclopedia of Music in Canada (1981); H. Kallmann, *A History of Music in Canada, 1534-1914* (1960); A. Walter, ed, *Aspects of Music in Canada* (1969).

Music History Music has had a home in N America for the thousands of years that Indians and Inuit have lived on this continent. Their music, however, enters recorded history only with early 17th-century European observers such as Marc LESCARBOT, Father Paul LE JEUNE and Father Gabriel Sagard, who were as fascinated by the exotic sounds and sights of native music making as they were ill equipped to describe

and analyse it. Skilled investigators such as Franz BOAS, Ernest GAGNON and Alexander T. Cringan appeared only in the late 19th century, and another 50 years passed before composers integrated elements of native music into some of their works.

Since colonization began in the 17th century, the mainstream of musical development has been little affected by native music. The original settlers transplanted their songs, dances and religious chants, and successive waves of immigrants reinforced old-world traditions. The import of printed music, of teachers and of touring star performers, followed later by recorded and broadcasted music, has shaped taste and has by its weight stifled or at least retarded original expression. Music in Canada has paralleled the basic European style periods from the baroque to the classical, romantic and contemporary, usually lagging behind by a few decades. The attempt to transplant Old World patterns in a sparsely populated country with widely separated settlements could never be quite successful, however. The system of patronage and the professional resources for grand opera, symphony orchestras and other sophisticated manifestations of music were wanting; European-trained Canadian and immigrant musicians, settling down to their careers, were cut off from new developments in composition and therefore stagnated. In turn, adventurous young musicians sought their models from among foreign composers: until the middle of the 20th century the influence from outside has nearly always outweighed the influence from one Canadian generation to another. Imperceptibly, however, the Canadian environment began to assert its influence, first of all in the popular sphere. Song texts were adapted to local conditions and new ones invented; dance tunes were exchanged by French and Irish Canadians; amateurs and professionals outdid each other in writing patriotic music in the 1850-1920 era; and N American social dances came to be preferred to European genres. Such institutions as the competition festival, the "local centre" examination supervised by a conservatory or examination board, the touring company, the annual conference of specific branches of the profession, and the network broadcasting system — all these are typically and congenially Canadian ways of sharing artistic experiences and exchanging ideas. From the "history of music in Canada," nourished from the outside, we are moving to a "Canadian music history," growing from within through the individuality of our musicians, the quality of our institutions, and the strength of our COMMUNICATIONS systems.

To the Fall of New France Written contemporary records of music in NEW FRANCE are few. Most consist of incidental references in the diaries and travel accounts of explorers and the reports of missionaries to their superiors in Europe. They begin with Jacques CARTIER's mention of the singing of the mass at Brest (Bonne Espérance Harbour) on 14 June 1534 and of the playing of the "trumpets and other musical instruments" at HOCHELAGA [Montréal] a year later. In the following century the missionaries regularly translated religious texts into verses in native tongues, since singing proved a useful handmaid in their efforts to convert the Indians to Catholicism.

As early as the 1630s French and Indian children at Québec City were taught to sing and play European instruments. Viols, violins, guitars, transverse flutes, drums, fifes and trumpets are among the instruments named in early accounts, but it would be wrong to conclude that all were cultivated continously in New France.

By 1661 the Jesuit chapel at Québec City had an organ, and the parish church received one in 1663; 60 years later a craftsman, Paul Jourdain, was engaged to do extensive repair and construction work. There hardly was a need for professional musicians — at least Bishop LAVAL seems to have been concerned less with training in church music than in the decorative arts — but some priests applied their talent or European training to take charge of the musical aspect of divine service (acting as *grand chantre*) or to play the organ. A French-born priest, René Ménard, composed motets around 1640, and the second Canadian-born priest, Charles-Amador Martin, is credited with the plainchant music for the Prose "Sacrae familiae felix spectaculum" (about 1700) in celebration of the Holy Family feast-day. Early literature contains other references to religious composition, but "composing" may have meant simply selecting music for the service or writing the words. Surviving copies of early 18th-century editions of motets, masses and cantatas by de Bournonville, Campra, Morin and other French composers make it reasonable to conclude that skillful part-singing was practised. Similar evidence for instrumental performance is provided by the 1980 discovery of a manuscript volume with nearly 400 keyboard pieces brought to Montréal (where the first organ was installed about 1700) by Jean Girard in 1724 (*see also* RELIGIOUS MUSIC).

Though it is unlikely that formal concerts were held, some of the administrators and explorers participated in music. Louis JOLLIET, the explorer, played the organ at church; Jacques RAUDOT, the intendant, encouraged vocal and instrumental performance; and one of his successors, Claude-Thomas Dupuy, owned a library of operatic scores. Although contemporary documentation is sparse, modern research has established that everyday life in New France abounded in yet another genre of music: the hundreds of French folksongs that preserved memories of the homeland, made hard work go faster and provided rhythm for dancing, accompanied perhaps by a fiddle, a drum or at least handclapping and foot-stomping (*see* FOLK MUSIC). Thus, musical life in colonial Canada was diversified from the beginning, even though outside the church it lacked formal organization.

Urban Musical Life, 1750-1830 Vigorous immigration to the area between the Atlantic Ocean and Lk Huron and the stationing of British military bands in garrison towns were among the factors generating a more intensive and organized musical life in the second half of the 18th century. Our knowledge owes much to the introduction of the printing press to Canada (Halifax 1751), for in due time NEWSPAPERS began to announce concerts and carry advertisements for teachers and merchants. This information is supplemented by occasional references in travel literature, more often than not commenting on the French Canadians' love of dancing and singing. The singing of the VOYAGEURS was especially admired.

The regimental bands, featuring perhaps a dozen woodwind and brass instruments, entertained at parades, participated in festive ceremonies and played minuets and country dances at suppers and balls. A "Concert Hall" existed in Québec City by 1764 and subscription concerts by 1770, given, one may presume, by band players and skilled amateurs. Programs for the Québec City and Halifax concerts of the 1790s reveal orchestral and chamber music by Handel, J.C. Bach, Haydn, Mozart and Pleyel. Not until recent times was new music introduced to Canada more quickly. Beginning with the *Padlock* by Dibdin (Québec City, 1783), ballad and comic operas were heard in Halifax, Montréal and Québec City in performances by strolling actor-singers, often assembled in the US from among European artists but occasionally staged by resident amateurs, such as in Montréal's Théâtre de société, founded in 1789. One of that group's offerings was a light opera, *Colas et Colinette* (1790), with words and music by Louis-Joseph QUESNEL. The vocal parts of this work and those for Quesnel's *Lucas et Cécile* survive, but the music of John Bentley's pantomime *The Enchanters* (Montréal, 1786) and of his *Ode* marking the establishment of Upper and Lower Canada in 1791 is lost.

In the late 18th and early 19th centuries, the only way to make a living from music was to be a jack-of-all-trades: performer on several instruments, bandleader, teacher, repairer of instruments, importer of printed music and composer of marches, dances or church music for special occasions. Such versatile musicians were Frederic Henry Glackemeyer, Jean-Chrysostome Brauneis, Sr, and Theodore F. Molt, from Germany; Guillaume Mechtler from Belgium; Louis Dulongpré (also a painter) from France; and Bentley and Stephen Codman from England. From the US came singing teachers — itinerant like the portrait painters and companies of actors — to teach the rudiments of notation and choral singing in "singing schools" set up in a community for a few weeks or months and ending with a concert. This movement spread west from the Maritimes after about 1800 and for over 100 years contributed to the improvement of church choirs. As a rule, until the mid-19th century, only the larger Anglican and Catholic churches could afford organs and skilled musicians; elsewhere a bass fiddle, serpent or bassoon might "give out" the hymn tune; yet other denominations frowned on elaborate music. Church music also received an impetus with the publication of liturgical and hymn collections. *Le Graduel romain* (1800, Catholic), the first music printed in Canada, *Union Harmony* (1801, Methodist) and *The Colonial Harmonist* (interdenominational, 1832) are the oldest, respectively, from Québec, NB and Ontario.

The Victorian Age The inventions of the steamship and the railway, the growth of towns into cities with a prospering middle class, and the establishment of RESPONSIBLE GOVERNMENT all helped in the 1840s to usher in the age of musical pioneering, the period when the foundations were laid for the institutions and relationships of present-day musical life. Beginning with the English singer John Braham in 1841, famous artists appeared in Canada: the violinists Ole Bull and Henri Vieuxtemps, the singer Jenny Lind and the pianist Sigismond Thalberg had all, by 1858, delighted audiences and set norms for resident artists to strive for. There were many musicians who took up the challenge through dedicated work in the cause of good music in good performance. In setting up teaching studios, in training their church choirs to appear in concerts and, together with other singers and with instrumentalists, to form "philharmonic societies" or "musical unions," in opening music stores and publishing firms, they drew on an abundance of natural talent and a thirst for "the finer things in life." The obstacles were many: the vanity of the newly prosperous merchant class was revealed in the shallowness of its taste; rivalries between musicians, dearth of performers on certain instruments and poor audience support made all musical enterprises precarious.

While a few of the first Canadian-born professional musicians were able to make decent livings at home — eg, the bandmaster Charles Sauvageau, the teacher Jean-Chrysostome Brauneis, Jr, and the church musician Jean-Baptiste Labelle — those who craved major careers in music had of necessity to seek them abroad, and indeed the exceptionally gifted found them, including Joseph B. Sharland, a music educator in Boston; Hugh A. Clarke, a professor at U of Pennsylvania; Samuel P. Warren, a virtuoso organist living in New York; Calixa LAVALLÉE, composer of Canada's national anthem ("O Canada"), who found success as a pianist and composer in Boston; Solomon Mazurette, who lived

as a pianist in Detroit; and, perhaps the most outstanding of all, Emma Lajeunesse, the great soprano who, under the name ALBANI, became Canada's first world-famous musician. Many skilled musicians from Europe assumed Canadian roles as teachers, organists and leaders of musical societies, among them James P. CLARKE in Toronto, Antoine DESSANE in Québec City, Gustave Smith in Ottawa, Frederick Herbert Torrington in Montréal and later Toronto, and Frantz JEHIN-PRUME, primarily a violinist, in Montréal.

Among the earliest musical societies were the New Union Singing Society (1809) of Halifax; the Québec Harmonic Society (1820); the singers and band of the Children of Peace at Sharon, UC, proof of how strong leadership could make music flourish in a small village community; the York [Toronto] Band (1824); and the Phil-Harmonic Society of Saint John, NB (1824). When the West was opened to colonization, the speed of musical development was telescoped, and societies were formed in the earliest years of many settlements. Victoria had a Philharmonic Society in 1859; Calgary and Winnipeg had bands in the 1870s, and concerts were given in Regina and Saskatoon in the 1880s. After Confederation every city and town had a number of societies, usually built around the core of a choir, and assisting orchestras were formed for special concerts with the help of band players, music teachers and amateurs. The largest and most enduring were the Toronto (1872-94) and Montréal (1875-99) Philharmonic societies, under the principal leadership of Torrington and Guillaume COUTURE, respectively, and the Septuor Haydn (1871-1903), a Québec City instrumental group led by Arthur Lavigne. Programs ranged from the haphazard assortment of band overtures, piano solos, national songs and choral pieces (the "grand concert of vocal and instrumental music") to oratorio performances and concert performances of operas (eg, *Messiah, The Creation, The Flying Dutchman,* and Beethoven's *Symphony No 9*). For OPERA, Canadians depended mainly on visiting troupes, although, sporadically, amateur performances were staged locally, and the Holman English Opera Troupe resided in Toronto and London, Ont, for some years. Instead of the ballad operas of the 18th century, the repertoire now embraced Italian and French grand opera. From rare performances of truncated versions accompanied by a handful of instrumentalists about the mid-century, opera became a frequent entertainment by professional companies, including those from New York, by the end of the Victorian era. "Opera houses" opened in every community from Vancouver to Yarmouth, NS, but in general, except for Toronto's MASSEY HALL (1894), concert halls were inadequate.

On the popular level, orally transmitted folk songs yielded increasingly to fashionable ballads and dances (waltzes, quadrilles, galops, polkas) propagated by imported printed music. However, there was a counter-current in Québec, where songs like "A la claire fontaine" and "Vive la Canadienne" were quasi-national hymns and where new patriotic songs like "Un Canadien errant" (words 1842) and "Le Drapeau de carillon" (1858) gained wide popularity. Ernest Gagnon's collection *Chansons populaires du Canada* (1865-67) helped some 100 songs to a new life by bringing them to the attention of city folk and sophisticated musicians. Gagnon himself arranged folk tunes for choir, and Ontario composer Susie F. Harrison utilized such material in her *Trois Esquisses canadiennes* (1859) and her opera *Pipandor*, as did several foreign composers, eg, Sir Alexander Mackenzie in his *Canadian Rhapsody* (about 1905) for orchestra. James P. Clarke successfully captured a Canadian flavour in his group of songs "Lays of the Maple Leaf" (1853), but the bulk of composers accepted without question the stylistic trends current during their student years in Paris or Leipzig in both the concert and the popular genres. Most of the surviving Canadian compositions of the Victorian era were intended for the immediate needs of churches, bands, dance halls, patriotic rallies and the ever-growing number of parlour pianists and singers. Rarely did such music rise above the level of competence and prettiness, but it matched the average music in these genres produced in other countries. Couture's *Rêverie* (1875), W.O Forsyth's *Suite* (1888) and Clarence Lucas's 3 Shakespeare overtures (about 1899) are among the rare orchestral works. Given the local resources, there was a greater incentive to write cantatas and light operas. Landmarks were Charles W. Sabatier's *Cantata in Honour of the Prince of Wales* (1860), J.B. Labelle's *Cantate: La Confédération* (about 1867), Lavallée's US-produced light operas *The Widow* (1881) and *TIQ (The Indian Question/Settled at Last)* (publ 1883), Oscar F. Telgmann's "Canadian military opera" *Leo the Royal Cadet* (1889), which had over 150 performances, J.J. Perrault's *Messe de Noël* (1859-65) and Charles A.E. HARRISS's dramatic legend *Torquil* (publ 1896).

Progress in performance and composition was accompanied by the development of instrument building, music publishing and MUSIC EDUCATION. The making of pianos, pipe and reed organs began in the second decade of the 19th century in small workshops by German and US craftsmen and became a major industry by the end of the century, while violin making remained a cottage industry (*see* MUSICAL INSTRUMENTS). Important names were Samuel R. Warren and Casavant Frères in pipe-organ building, T.A. Heintzman in piano manufacturing (*see* HEINTZMAN AND CO), and the Lyonnais family in violin building. R.S. Williams & Sons and Whaley, Royce & Co Ltd were among the largest instrument dealer-manufacturers.

Following the publication of church-music volumes (*see* HYMNS), music was printed in newspapers (1831) and periodicals, and after 1839 it appeared on its own, as sheet music. Dance music, marches and parlour pieces for the piano and for songs made up the bulk of publications, but cantatas and light operas also found their way into print. Canadian works and foreign compositions were about equal in number. A. and S. Nordheimer, Arthur Lavigne, A.J. Boucher and Whaley, Royce & Co Ltd were among the most active companies. There were no public or university music libraries, but musical societies built collections of musical literature for their own members.

Music was introduced as an activity in many public schools after the middle of the 19th century; Alexander T. Cringan was one of its principal pioneers, and the Petit Séminaire de Québec had a school orchestra as early as 1833. King's College (later U of T) granted James P. Clarke a Bachelor of Music degree in 1846, and George W. Strathy received a Doctor of Music from the U of Trinity College (Toronto) in 1858, but only late in the century did several universities establish degree examinations, leaving the teaching to conservatories. The conservatories, of which the Toronto Conservatory (1886) soon became the leading institution, provided individual lessons (*see* ROYAL CONSERVATORY OF MUSIC).

Flourishing and Transition, 1900-40 Grandeur — an expression of wealth and power — was a universal characteristic of the turn of the century, and it showed itself in musical life as well. Compositions such as *Caïn* (1905) by Alexis Contant and *Jean le Précurseur* (publ 1914) by his fellow Montréaler Guillaume Couture were oratorios with full orchestra on a scale never before attempted in Canada. Joseph Vézina, bandmaster in Québec City, produced 3 comic operas. In 1903 C.A.E. Harriss organized the Cycle of Musical Festivals of the Dominion of Canada, which involved over 4000 singers and instrumentalists in 15 communities from Halifax to Victoria. Choirs of hundreds of singers coexisted in the large cities, and Toronto came to be called the "choral capital of North America" largely because of its TORONTO MENDELSSOHN CHOIR founded by A.S. VOGT. Montréal boasted an ambitious Montréal (later National) Opera Company (1910-13; 1913-14), and visiting companies presented such giant works as *Tristan und Isolde, Parsifal,* the *Ring* cycle and *Otello,* though these were exceptional. For orchestral fare even the large cities depended on visiting ensembles, usually from the northern US, that would accompany Canadian oratorio choirs and present programs of their own. However, Québec City, Montréal, Toronto, Halifax and Calgary established semiprofessional orchestras (*see* ORCHESTRAL MUSIC). Piano companies flourished as never before (*see* PIANO MANUFACTURING) and Emile Berliner, inventor of the disc recording, established his gramophone business in Montréal, Conservatories mushroomed and examination boards were set up, the Académie de musique de Québec (1868), the Associated Board (British, operating in Canada from 1895 to 1953), the Dominion College of Montréal and the Toronto Conservatory, among others. After years of insular development, Canadians were able to find out about musical life in each other's cities from such periodicals as *Le Passe-Temps* (1895-1935, 1945-49), *Canadian Music Trades Journal* (1900-33) and *Musical Canada* (1906-33).

WWI produced a spate of patriotic songs, but it decimated orchestras, choirs and many other enterprises. After the war the era of active music making waned under the impact of the new technologies of recorded and radio-transmitted sound (*see* MUSIC BROADCASTING). Imports again dominated the market, filling homes with US popular and European concert music, providing only a modest outlet for Canadian performers and composers. In combination with the GREAT DEPRESSION, this shift caused a decline in the instrument industry and an employment crisis for musicians. There were significant new developments, however. Faculties or schools of music were established at the universities of Toronto (1918), McGill (1920) and Laval (1922). Orchestras, few of which had survived the war, were re-established, or new ones were founded, notably in Toronto (1922), Montréal (1930 and 1934) and Vancouver (1930; *see* TORONTO SYMPHONY; ORCHESTRE SYMPHONIQUE DE MONTRÉAL; VANCOUVER SYMPHONY), and broadcast studios employed musicians for musical and dramatic programs. Orchestras, choirs and solo performers could now be heard on networks across the country and in communities where concert facilities did not exist. Representative ensembles, in addition to the orchestras, were the Elgar Choir of BC, based in Vancouver, the Bach-Elgar Choir of Hamilton, the Toronto Mendelssohn Choir, the Arion Male Voice Choir of Victoria, the Schubert and Canadian Choirs of Brantford, the Winnipeg Male Voice Choir, the Disciples de Massenet of Montréal, the Dubois and HART HOUSE STRING QUARTETS of Montréal and Toronto, respectively, and the Société canadienne d'opérette of Montréal and its successor, Variétés lyriques. Recitals were fostered, in particular by the women's musical clubs. Famous popular groups were The DUMBELLS, a vaudeville troupe born in the trenches of WWI; Guy LOMBARDO and his Royal Canadians, a dance band that moved to the US; and the Bytown Troubadours, a male quartet. The western provinces found a congenial outlet for musical energies in the competition festivals. These were begun in Edmonton in 1908 and in the 1980s still bring thousands of children and music lovers together to match skills and take advice from visiting adjudicators (*see* MUSIC AWARDS AND COMPETITIONS).

The period between the wars also produced the first musician of national stature, Sir Ernest MACMILLAN, the only Canadian musician to have been knighted. Other musicians who achieved national or international recognition included, in chronological order, the singers Marie Toulinguet, Rodolphe PLAMONDON, Béatrice LA PALME, Edward JOHNSON, Louise Edvina, Florence Easton, Pauline DONALDA, Eva Gauthier, Sarah Fischer, Frances James and Raoul JOBIN; the organist Lynnwood Farnam; the pianists Emiliano Rénaud, Mona Bates, Léo-Pol MORIN, Ernest Seitz, Ellen Ballon and Muriel Kerr; the violinists Kathleen PARLOW and Frederick Grinke; the orchestra conductors Luigi von Kunits, Wilfrid PELLETIER, Reginald Stewart, Geoffrey WADDINGTON and Jean-Marie BEAUDET; the choirleaders Herbert A. Fricker, Bruce Carey and Charles Goulet; the bandmasters John Slatter, Charles O'Neill and J.J. Gagnier; and the carillonneur Percival PRICE.

The field recording, archival deposit and publication of folk and aboriginal music by Marius BARBEAU, W. Roy Mackenzie, Helen CREIGHTON and others resulted in the discovery and preservation of an unsuspected wealth of traditional music and local compositions. The series of folk arts and handicrafts festivals organized by J.M. Gibbon for the CPR from 1927 to 1934 (especially in Québec City and Banff) promoted public awareness of folk music and stimulated arrangements and new compositions by W.H. arrangements and new compositions by W.H. Anderson, Claude CHAMPAGNE, Hector Gratton, Roy, Alfred Whitehead, Healey WILLAN and others. A foundation of regional folk idioms was widely believed to be the precondition for a distinctive Canadian music. However, although Champagne's *Suite canadienne* and MacMillan's *Two Sketches for Strings* have become Canadian classics, the majority of compositions were international in orientation. Anglo-Canadian composers and teachers of the craft, such as Douglas CLARKE, MacMillan, Leo Smith, Whitehead and Willan, were steeped in turn-of-the-century aesthetics and usually in British church traditions. On the whole, French Canadians such as Champagne, Laliberté, Rodolphe MATHIEU and Morin represented more modern influences, ranging from Scriabin to Debussy. Mathieu and Colin McPhee, who later investigated the music of Bali, were among the few exploring contemporary techniques. The majority of compositions were songs, choral settings and short piano pieces. Symphonies, string quartets and cantatas were usually written as degree exercises, but at least one composer, Willan, wrote in nearly all forms, from ballad and radio operas to symphonies, from organ pieces to choral music.

The teaching content at universities and conservatories and the concert repertoire were conservative, but to audiences in Canada the bulk of Bach, Mozart, Brahms and Debussy was still music to become familiar with. Without doubt, however, the dearth of pioneers for the radical new music of the day did delay the development of composers and audiences considerably.

Expansion since WWII, 1940-84 A swift expansion, almost an "explosion," of musical activity occurred in the 1940s. Subsequent progress has been nothing short of spectacular, retarded only slightly by the economic austerity of the 1970s and 1980s. It manifested itself in the emergence of world-rank performers and ensembles, of a large number of professional composers, and in the import, and assimilation by audiences, of a diversifed literature of new and old music from many parts of the world, offered in abundance in splendid new concert halls and arts centres, at festivals, on recordings and broadcasts (*see* RECORDING INDUSTRY). This growth has been concomitant with a new pride in Canadian achievement and a conscious will to establish and maintain a cultural identity. It has been nurtured by enriched school music programs, the development of facilities for advanced education and scholarly research, and by new communications technologies. It has been built with the help of nationwide organizations setting standards, coordinating resources, promoting talent, protecting legal interests and lobbying governments. Agitation throughout the arts community has been largely responsible for new patterns of financial support for the arts from governmental agencies — foremost the CANADA COUNCIL — and, to a lesser degree, from private sources. Direct support is given through subsidies of various kinds (*see* ARTS FUNDING), indirect support through quotas set on the Canadian content of concert series and broadcasts.

Before WWII there had been a few national music organizations (all named here by their latest name only), Composers, Authors and Publishers Assn of Canada (CAPAC, 1925), the Canadian Band Directors' Assn (1931) and the Canadian Federation of Music Teachers' Assns (1935). Later ones include Performing Rights Organization of Canada (PROCan, 1940), the umbrella organization the Canadian Music Council (1945), the CANADIAN LEAGUE OF COMPOSERS (1951), the CANADIAN MUSIC CENTRE (1959), the Canadian Music Educators' Assn (1959), the Canadian University Music Society (1965), the Assn of Canadian Orchestras (1972), and others for folk music, music libraries, music publishers, record producers and other special concerns.

The improvement of music education began with the establishment of the Conservatoire de musique du Québec by the province of Québec in 1942, first in Montréal and later in 7 centres, and the creation of courses at the U of T for professional performers and school music educators (1946). The number of university music departments has grown from a handful in the 1930s to over 30. New research facilities include electronic music studios, folk and native music archives at the NATIONAL MUSEUM OF MAN, Laval U and elsewhere, and the national collection of musical Canadiana at the NATIONAL LIBRARY OF CANADA (1970). The National Youth Orchestra (1960) provides experience for a young elite of instrumentalists, while JEUNESSES MUSICALES DU CANADA (1949) and CAMMAC (Canadian Amateur Musicians/Musiciens amateurs du Canada) (1953) and numerous summer music camps appeal to the wide range of music lovers. Music information and discussion has been fostered by such periodicals as *The Canadian Music Journal* (1956-62), *Opera Canada* (1960-) and *The Canada Music Book* (1970-76). The ENCYCLOPEDIA OF MUSIC IN CANADA (1981, French ed 1983) bears witness to the growing interest in the history and current state of music in Canada.

The intensity and diversity of musical performance has assumed staggering proportions, whether one thinks of the 100 professional or community orchestras, the opera companies of Toronto (CANADIAN OPERA COMPANY), Montréal (Opéra du Québec, followed by Opéra de Montréal), Vancouver, Edmonton, Calgary (Southern Alberta Opera Assn), Winnipeg (Manitoba Opera Assn) and elsewhere, the chansonnier and *boîte à chansons* phenomenon of the 1960s, the summer FESTIVALS, the rock bands or the broadcast fare (*see* POPULAR MUSIC). Only a few highlights may be listed. The CBC had its golden age of music in the 1950s with its own symphony orchestra and opera company and its "L'Heure du Concert" (French TV), but has since turned from a prime producer of music programs into a channel for programs originating in concert halls (*see* RADIO PROGRAMMING). Festivals have included those in Montréal (1936-65), STRATFORD, Ont (1953-), Vancouver (1955-68), Ottawa (NATIONAL ARTS CENTRE, 1971-), as well as giant celebrations during EXPO 67 in Montréal and the 150th anniversary of the city of Toronto in 1984. International acclaim has been won by such groups as the ORFORD STRING QUARTET (1965), the FESTIVAL SINGERS OF CANADA (1954-79), the CANADIAN BRASS QUINTET (1970), the GUESS WHO rock band (1965-75) and others (*see* CHAMBER MUSIC). The main cities have ensembles for the performance of medieval and renaissance music on authentic instruments and also societies for the most recent music, notably the Société de musique contemporaine du Québec of Montréal (1966).

Individual performers of world repute include the singers Maureen FORRESTER, Lois MARSHALL, Louis QUILICO, Léopold SIMONEAU, Teresa STRATAS and Jon VICKERS (*see* SINGING); the pianists Glenn GOULD, Anton KUERTI, André Laplante and Ronald Turini; the violinists Ida HAENDEL and Steven STARYK; the cellists Lorne Munroe and Zara Nelsova; the harpsichordist Kenneth GILBERT; and the JAZZ musicians Maynard FERGUSON (trumpet) and Oscar PETERSON (piano). Mireille Lagacé and Hugh McLean are among the best organists; Alberto Guerrero, Lyell Gustin, Yvonne Hubert and Lubka Kolessa have been renowned piano teachers; and the list could be continued for many other disciplines. Canadian conductors of the period include John AVISON, Mario BERNARDI, Alexander BROTT and Boris BROTT, Victor FELDBRILL, Pierre HÉTU, Elmer ISELER, as well as many outstanding immigrants. Rika Maniates is one of several fine musicologists (*see* MUSICOLOGY); Edith FOWKE and Conrad Laforte are distinguished folk song scholars. Nicholas Goldschmidt (festivals), Gilles Lefebvre (Jeunesses musicales) and Arnold WALTER (education) have been organizers on the grand scale. Popular and folk singer-songwriters have included Paul ANKA, Edith Butler, Félix LECLERC, Monique LEYRAC, Gordon LIGHTFOOT, Alan Mills, Joni MITCHELL, Anne MURRAY and Gilles VIGNEAULT. The list of talented performers is long and distinguished.

The breakthrough in composition that occurred about the middle of the century was 3 pronged: it established composition as a primary musical occupation; it introduced the teaching of contemporary techniques to the classroom, and it ended Canadian isolation from the avant-garde of Western music. Internationalism and diversity ruled as composers caught up with 12-tone technique, neoclassicism, electronic sound and other developments (*see* ELECTROACOUSTIC MUSIC). Many young Canadians polished their art in Paris, Rome or Darmstadt; some 3 dozen studied with the celebrated teacher Nadia Boulanger. Barbara PENTLAND, John WEINZWEIG and Jean PAPINEAU-COUTURE became leaders of the "radical" wing, Weinzweig and Papineau-Couture also the first 2 presidents of the Canadian League of Composers, and teachers of great influence. Listing composers by their teachers can be misleading, since the relationship may have been short or long, may have influenced technique or style, and may have been superseded by stronger influences. To list composers by labels of style ignores the process of maturing. Therefore a chronological list within the most recent areas of activity will suffice. To indicate the variety of influences, the countries of birth of adult immigrants are given, and to show the variety of genres, specialties are named.

Atlantic Provinces: Janis Kalnins (Latvia).

Québec: Otto Joachim (Germany), Maurice Blackburn (film), Alexander BROTT, Gabriel CHARPENTIER, François MOREL, Clermont PÉPIN, Pierre MERCURE, Bengt Hambraeus (Sweden), Serge GARANT, Roger Matton, Gilles TREMBLAY, André Prévost, Alain Gagnon, Jacques Hétu, Micheline Coulombe SAINT-MARCOUX, Bruce MATHER, Brian Cherney, Claude Vivier.

Ontario: Keith Bissell, Lucio Agostini (radio drama), John Weinzweig, Eldon Rathburn (film), Samuel Dolin, Oskar MORAWETZ (Czecho-

slovakia), Louis APPLEBAUM (film), Godfrey RIDOUT, Udo KASEMETS (Estonia), Talivaldis Kenins (Latvia), István ÁNHALT (Hungary), Robert FLEMING (film), Harry FREEDMAN, Harry SOMERS, John BECKWITH, Lothar Klein (Germany), R. Murray SCHAFER, Norma BEECROFT, Srul Irving Glick.

Manitoba: S.C. ECKHARDT-GRAMATTÉ (raised in France and Germany), Robert Turner.

Alberta: Violet ARCHER, Richard Johnston (USA), Gerhard Wuensch (Austria).

British Columbia: Murray ADASKIN, Jean Coulthard, Barbara Pentland, Rudolf Komorous (Czechoslovakia), Michael C. Baker, Barry Truax.

Considering the variety of genres, techniques and styles embodied in the works of these and many other Canadian composers, can one detect distinct regional or national traits? Some critics have drawn parallels between lonely scenery and stark climate and the austere vocabulary of certain composers; others deny such parallels. Folk idioms, historical subject matter (as in Somers's opera *Louis Riel*) and the blending of pioneer-age music with modern techniques (as in certain Beckwith works) also provide means towards distinctiveness. A close awareness of our "soundscapes" has led Schafer to some original experiments. To shake off international influences would be pointless and impossible; gradually Canadian music will be shaped by composers who, like other Canadians, are products of Canadian society and react to their environment in ways that are subtly different from those of others. Among these composers there will be, if there are not already, a few of such talent and individuality that their music will determine what is called Canadian.

HELMUT KALLMANN

Reading: W. Amtmann, *Music in Canada 1600-1800* (1975) and *La Musique au Québec 1600-1875* (1976); J. Beckwith and K. MacMillan, eds, *Contemporary Canadian Composers* (1975); I. Bradley, ed, *A Selected Bibliography of Musical Canadiana* (rev 1976); M. Calderisi, *Music Publishing in the Canadas, 1800-1867/L'Édition musicale au Canada, 1800-1867* (1981); *Encyclopedia of Music in Canada* (1981); C. Ford, *Canada's Music: An Historical Survey* (1982); H. Kallmann, *A History of Music in Canada 1534-1914* (1960); E. MacMillan, ed, *Music in Canada* (1955); *Music Directory Canada '84* (1984); G. Proctor, *Canadian Music of the Twentieth Century* (1980) and *Sources in Canadian Music* (2nd ed, 1979); S. Sadie, ed, *The New Grove Dictionary of Music and Musicians* (1980); Soeurs de Ste-Anne, eds, *Dictionnaire biographique des musiciens canadiens* (1935); K. Toomey and S. Willis, eds, *Musicians in Canada* (1981); A. Walter, ed, *Aspects of Music in Canada* (1969); *Aria* (1979-); *The Canadian Composer/Le Compositeur canadien* (1965-); *The Canadian Music Journal* (1956-62); *The Music Scene/La Scène musicale (1967-); Musical Canada* (1906-33); *The Musical Journal* (1887-90?); *Musicanada* (1967-70, 1976-); *Opera Canada* (1960-).

Musical Instruments Canadian musical instruments have had a successful but specialized history. There has been little industrial or private manufacture of brass, woodwind or percussion instruments, which have been imported from other countries. The making of violins has flourished periodically, and the artistic traditions of the 19th-century Québec violin-making families Lyonnais, Martel, Lavallée and Bayeur have recommenced with the opening in 1979 of a school of stringed-instrument making in Québec by de Lellis and Lamarre. The vogue for free-bass accordion playing, fostered since the 1960s, has been supplied by imported instruments. Individual enterprise founded unique companies such as the Stoermer Bell Foundry (Breslau, Ont, 1931) and Norman Acoustic Guitars (La Patrie, Qué, 1972).

Through the dynamism and integrity of personal and family establishments, and the reliable quality of their products, the PIANO and the organ have been the principal musical instruments of Canadian manufacture for both national consumer markets and international export. The piano was fashionable and popular before WWI in parlours, officers' clubs, church halls, schools, pioneer homesteads and gold rush saloons. The zealous religious conviction that partially motivated the settlement of Canada was given musical expression through the organ. Canadian-made harmoniums (reed organs) were popular from about 1870 to 1910.

Business acumen, high production standards and the involvement of several generations in family firms have characterized the manufacture of musical instruments in Canada: Nordheimer, HEINTZMAN, Willis, Lesage (pianos); Casavant (organ); Heinl (strings), to mention only a few. Individual commercial firms have been affected by social and economic factors. In 1912 30 piano factories produced 30 000 instruments, sold almost exclusively to a domestic market. A post-Depression slump was followed by a rise to a second sales peak (about 11 000 in 1965), but since then the Canadian piano industry has suffered a dramatic decline to the point that by 1982, after financial failure and merger, only Heintzman, Lesage and Sherlock-Manning survived. The piano is rivalled in the home by portable popular instruments, the record player, radio and TV, and small Canadian companies are unable to compete with international firms. In contrast, for organ builders such as Casavant Frères of St Hyacinthe, Qué, the maintenance of fine craftsmanship and reliance on national products for components has developed an output 80% of which is exported, with 18 installations in Japan alone.

Canadian forests have provided timber suitable for the manufacture of keyboard and stringed instruments that could function in the nation's climate. The availability of excellent wood has been a factor in attracting skilled craftsmen to this country, such as viola maker Otto Erdész who established a shop in Toronto in 1975. There is a developing interest in the construction of replicas or personal interpretations of medieval, Renaissance and baroque instruments. The new violin and bow specialists, harpsichord makers (Albarda, Kater, Redsell and Turner) and experts in the fashioning of lutes, viols and other early stringed instruments (Allworth, Philpot and Schreiner) have revived a positive attitude to the craft and a personal pride in home industry reminiscent of the original 19th-century workshops of Theodore Heintzman and Joseph Casavant. High-quality acoustic GUITARS are produced in limited numbers by craftsmen such as Frank Gay, Jean Larrivée and Pat Lister in different centres across Canada.

Collections Canadian-made musical instruments, in various states of playing condition, may be seen in pioneer villages, forts and museums of local historical societies. The sound of the 19th-century Québec violin makers is lost, with only a few examples in private ownership. Working examples remain of early organ builders Samuel Warren (Chambly, 1854), Louis Mitchel (Vaudreuil, 1871), Casavant Frères (Lacolle, 1885) and Napoléon Déry (St Roch-des-Aulnaies, 1874). Listed in the *Encyclopedia of Music in Canada* are 23 public and private collections of instruments, of Canadian and international provenance. The largest holding is that of the Royal Ontario Museum, based on the R.S. Williams Collection. Over 1000 instruments are divided among its Far Eastern, Ethnology and European departments. Native Canadian and non-Western instruments are found in the UBC Museum of Anthropology (Vancouver), Provincial Museum of BC (Victoria), Glenbow-Alberta Institute (Calgary), Robertson Collection (Regina) and National Museum of Man (Ottawa).

WALTER H. KEMP

Musical Theatre includes pageants such as Augustus Bridle's *Heart of the World* (1927); spectacles like those at the CANADIAN NATIONAL EXHIBITION, beginning with *Ivanhoe* (1906); OPERA; operetta, especially the ever-popular Gilbert and Sullivan repertoire; masques like F.A. Dixon and Arthur Clappé's *Canada's Welcome* (1879); and Broadway-style book shows and revues, composed of songs and comic sketches. The first theatrical performance in Canada, *Le Théâtre de Neptune* (1606) by Marc LESCARBOT, used music. Another early work, Joseph Quesnel's *Colas et Colinette* (1790) was a "comedy with ariettas." In the later 19th century most plays written to be performed were burlesques, parodies with original lyrics set to borrowed melodies. Local amateurs appeared in burlesques such as *'Our Boys' in the Riel Rebellion* in Halifax, *Dolorsolatio* in Montréal, *Ptarmigan* in Hamilton and *The Tricky Troubadour* in Winnipeg. In the 1880s E.A. McDowell's professional company toured the country with William H. Fuller's *H.M.S. Parliament*, a satirical version of *H.M.S. Pinafore*. Although vaudeville was popular until the 1920s, it was dominated by Americans. Talented Canadians such as Eva Tanguay and May Irwin had to emigrate to achieve stardom.

Canadians excelled at writing reviews. The DUMBELLS, Canada's famous soldier entertainers of WWI, continued to perform through the 1920s. In the 1930s groups such as Toronto's Arts and Letters Club and the Winnipeg Press Club presented evenings in sophisticated satire, while workers' theatres staged more biting revues such as *We Beg to Differ* in Montréal and the "Beer and Skits" shows in Winnipeg (*see* THEATRE, HISTORY). Gratien GÉLINAS's annual *Fridolinons!* revues entertained Québec audiences from 1938 to 1946 with the views of a cocky kid in a Montréal Canadiens' sweater. The annual satirical revue *Spring Thaw* was first produced by Toronto's New Play Society in 1948 under the direction of Mavor MOORE. Twenty-four consecutive editions of *Spring Thaw* used skits and comic songs to help Canadians laugh at themselves. *My Fur Lady* (1957), a McGill University show that toured Canada, was similar to *Spring Thaw*, but had a tenuous plot. *My Fur Lady* featured several songs by Galt MacDermot, who later composed the music for *Hair*. In the 1960s Toronto's Theatre in the Dell and Old Angelo's became the first of many licensed cabarets to open across Canada offering light, intimate, small-cast professional entertainment. Many cabarets are based on the work of one composer (eg, *Oh Coward*, a pastiche of Noël Coward's songs) or on similar types of songs (eg, *Flicks*, film music, and *Blue Champagne*, songs of the 1940s). Successful original cabarets have included *Sweet Reason*, David Warrack's *Oops!* and *Tease for Two*, Jacqueline Barrette's *Heureux celui qui Meurt*, Clémence Desrocher's Québec reviews such as *La Grosse Tête* and Mark Shekter's and Charles Weir's *Toronto Toronto*.

While most Canadian theatres, including Winnipeg's Rainbow Stage, which specializes in musicals, prefer to present Broadway musicals, Canadians continue to write book musicals. Mavor Moore tried to establish a Canadian musical theatre in the 1950s by writing shows such as *Sunshine Town*, which was based upon the work of Stephen LEACOCK. Then Moore helped found the Charlottetown Festival in 1964, which his successor Alan LUND dedicated to Canadian musicals. Charlottetown's most widely produced musical has been *Anne of Green Gables* (Norman Campbell/Donald Harron), both nationally and internationally (London, Eng, 1969; Osaka, Japan, 1970; on Broadway, 1971-1972). Also popular have been *Johnny Belinda* (John Fenwick/Mavor Moore), *The Legend of the Dumbells*, which used the troupe's original songs, and the mini-musical for 4 performers, *Eight to the Bar* (Joey Miller/Stephen Witkin). Some of Canada's finest young musicians have written for the Charlottetown Festival: Jim Betts (*On a Summer's Night*), David Warrack (*Windsor*) and



Anne of Green Gables, the Charlottetown Festival's most widely produced musical, has also appeared in London, Eng; Osaka, Japan; and on Broadway (*photo by Barrett and MacKay/Masterfile*).

Cliff Jones (*Kronborg: 1582*, a rock version of *Hamlet*). Jones's other Charlottetown shows have been *The Rowdyman*, based on Gordon PINSENT's book, and the mini-musical, *Love in the Back Seat*, which was later staged at the Citadel Theatre in Edmonton. The Citadel also premiered Jones's *Hey Marilyn!* an opulent tribute to American film star Marilyn Monroe.

While the Charlottetown Festival was concentrating on Broadway-style musicals, many Canadian writers and composers explored alternative forms; eg, Tom Hendry and Stanley Silverman's *Satyricon* (Stratford, 1969), which was a lush extravaganza; Hendry and Stephen Jack's *Gravediggers of 1942*, a chilling evocation of the DIEPPE raid; Jacques Languirand and Gabriel Charpentier's *Klondyke*, a Brechtian view of the gold rush; Robert and Elizabeth Swerdlow's *Justine*, a counterculture allegory; George Walker and John Roby's *Rumours of our Death*, a bizarre comedy; and Phil Schreibman, Gordon Stobbe and Nancy White's *I Wanna Die in Ruby Red Tap Shoes*, a song-and-dance perspective on Canadian theatre. Saskatoon's Persephone Theatre had an unexpected hit with *Cruel Tears*, based on *Othello*, written by Ken Mitchell and the bluegrass band Humphrey and the Dumptrucks. One of the most spectacular contemporary musicals in Québec has been *Starmania*, a rock fantasy by Michel Berger and Luc Plamondon.

Vancouver composer, lyricist and librettist John Gray has become Canada's dominant personality in musical theatre on the basis of 3 consecutive successful mini-musicals: *Eighteen Wheels*, a trucker's musical; *Billy Bishop Goes to War*, a one-man *tour de force* about the WWI flying ace; and *Rock and Roll*, an ironic commentary on the faded dreams of a popular small-time, small-town band. Writers like Gray, who in 1982 formed themselves into the Guild of Canadian Musical Theatre Writers (which grew out of workshops conducted in Toronto by Broadway's Lehman Engel), are continuing the challenging task of developing a distinctively Canadian musical theatre.

Ross STUART

Musicology is the study of the historical development of Western art music, folk and traditional music (ethnomusicology) and aspects of music in acoustics, aesthetics, psychology and sociology. As an academic discipline it was introduced to Canada in 1954 when U of T appointed Harvey J. Olnick to organize a course for the Master of Music degree. By 1982, 33 Canadian universities offered undergraduate instruction in musicology and ethnomusicology; 15 universities had graduate programs at the master's level, and 6 offered doctoral programs for musicology, ethnomusicology, composition, music education and performance.

Canadian musicologists make considerable contributions as participants, officers and organizers for international societies, since there is as yet no national society. Musicological papers are presented at the Canadian University Music Society (CUSM), the Assn pour l'avancement de la recherche en musique du Québec (ARMuQ), Canadian Folklore Society and other professional groups sponsored by the Canadian Learned Societies.

There are few outlets for scholarly articles on music in Canadian journals. Present publications are the *Canadian Folk Music Journal*, *Studies in Music from the University of Western Ontario* and CUSM *Review/Revue*. Canadian musicologists publish frequently in international journals and encyclopedias. Through these articles and monographs Canadians — including Gaston Allaire, Terence Bailey, Dimitri Conomos, Robert Falck, Andrew Hughes and Maria Rika Maniates on medieval and Renaissance music; Mary Cyr, Kenneth GILBERT and Hugh McLean on baroque/classical topics; and H. Robert Cohen, Donald McCorkle, Zoltan Roman and Alan Walker on more recent subjects — have contributed significantly to knowledge of Western art music.

Only brief, generally regional, surveys of Canadian music appeared before Helmut KALLMANN's *A History of Music in Canada 1534-1914* (1960). This pioneer publication was followed by Willy Amtmann's study of music under the French regime, *Music in Canada 1600-1800* (1975), and George Proctor's *Canadian Music of the Twentieth Century* (1980). The establishment of the CANADIAN MUSIC CENTRE in 1959 and the music division at the NATIONAL LIBRARY OF CANADA in 1970 facilitated the compilation of the ENCYCLOPEDIA OF MUSIC IN CANADA (1981). In 1982 the first complete overview in book form, Clifford Ford's *Canada's Music: An Historical Survey*, was published, and the Canadian Musical Heritage Society began publishing scholarly editions of early Canadian music in 1983. Individual researchers concentrated on specific areas to compile material from newspapers and periodicals: Phyllis Blakeley and Timothy McGee on NS; Nancy Vogan and J. Russell Harper on NB; William Bartlett on PEI; France Malouin-Gélinas and Juliette Bourassa-Trépanier on Québec City; J. Antonio Thompson on Trois-Rivières; Peter Slemon and Lyse Richer-Lortie on Montréal; Beverley Cavanagh, Frederick Hall, Elaine Keillor and William Lock on various cities in Ontario; Carl Morey on Toronto; Norman Draper and Norman John Kennedy on Calgary; and Dale McIntosh on Victoria. Antoine Bouchard and John S. McIntosh have investigated the development of organ building, and Dorith Cooper the history of opera. Helmut Kallmann in particular has done the basic research and collecting of resources that have made Canadian studies in music history possible as an academic subject. At American and Canadian universities, theses have appeared on various genres of Canadian compositions and, more specifically, on individual composers such as W.H. Anderson, Claude CHAMPAGNE, Jean Coulthard, S.C. ECKHARDT-GRAMATTÉ, Robert FLEMING, Bruce MATHER, Rodolphe MATHIEU, Léo-Pol MORIN, Jean PAPINEAU-COUTURE, Barbara PENTLAND, Godfrey RIDOUT, Harry SOMERS, John WEINZWEIG and Healey WILLAN. In 1975 the Canadian Music Centre initiated its series of monographs on individual Canadian composers with Brian Cherney's *Harry Somers*.

In ethnomusicology, Mieczyslaw Kolinski developed cross-cultural analytical procedures that had considerable influence internationally and Jean-Jacques Nattiez developed a methodology based on semiology. With Charles Boilès, Nattiez published a history of the discipline to the mid-1970s in *Musique en jeu* (Sept 1977). Norma McLeod has outlined field methods and performance practices. The first ethnomusicology studies done by Canadians occurred after the pioneer works by Theodore Baker (1882), Carl Stumpf (1886) and Franz BOAS (1888), which included studies of some Indian and Inuit music. James TEIT and Alexander T. Cringan began making cylinders of BC tribes and Iroquois, respectively, in the 1890s. In the 20th century, anthropologists and musical scholars, including Marius BARBEAU, have concentrated on Indian/Inuit music to define the musical style of various cultures, including the Eastern Woodlands area, Plains Indians and North Pacific Coast. Relatively little musical research has been done on the Montagnais/Naskapi, Athapaskan or Plateau tribal music, and in 1982 no comparative survey of Indian musical styles existed. The research on Inuit music saw much activity in the 1970s after the initial investigations of Boas, Knud Rasmussen, Diamond JENNESS and Helen Roberts (*see* articles under NATIVE PEOPLE).

In the FOLK MUSIC studies of French, English and other ethnic groups in Canada, folklorists have concentrated on the history, diffusion and variants of individual songs rather than the musical styles involved. Marius Barbeau of the Museum of Man and Carmen Roy, the first director of the Museum's Canadian Centre for Folk Culture Studies, collected thousands of Franco-Canadian folk songs. Conrad Laforte of the Archives de folklore, Laval U, tackled the problem of cataloguing these songs with a classification system based on poetic structure. Germain Lemieux, a notable collector in Ontario, became director of the Institut de folklore (now Centre franco-ontarien de folklore), U de Sudbury, in 1959. Acadian studies initially begun by Anselme Chiasson and continued by Charlotte Cormier are centered at U Moncton. Thousands of Anglo-Canadian songs have been collected by W. Roy Mackenzie, Gerald S. Doyle, Helen CREIGHTON, Louise Manny and Kenneth Peacock in the eastern provinces. Much research is being done at the Folklore and Language Archive at Memorial U under Neil Rosenberg. In 1957 Edith FOWKE began collecting in Ontario and has published many of the more than 1000 songs she has amassed. West of Ontario, Barbara Cass-Beggs, Tim Rogers and Philip Thomas have been the principal researchers. Of about 60 ethnic groups whose music has been collected in Canada, notable studies have been done on the DOUKHOBORS (Kenneth Peacock), Koreans (Bangsong Song) and UKRAINIANS (Robert Klymasz). (*See also* FOLKLORE).

In ACOUSTICS, Oswald Michaud of Montréal and R.W. BOYLE of Alberta, later of the National Research Council, were pioneers. In 1948 Jean Papineau-Couture gave the first course that directly related acoustics to musical composition. The Canadian project most prominent in research on the interaction of sound waves and people is the WORLD SOUNDSCAPE PROJECT at Simon Fraser U. In aesthetics, the only Canadian to promote new theories is R. Murray SCHAFER, in *The New Soundscape* (1969). M.R. Maniates has written on French musical aesthetics and mannerism, and Geoffrey Payzant is completing a reassessment and translation of the writings of Eduard Hanslick. Shafer has published studies on the aesthetic views of E.T.A. Hoffmann and Ezra Pound.

Experimental aesthetics and psychophysics have been the areas of greatest interest for Canadians involved with the psychology of music. Rodolphe Mathieu began musical-aptitude tests at the Canadian Institute of Music (Montréal) in 1930, and in 1935 the first courses in the psychology of music at the Maritime Academy of Music (Halifax) were given by Cyril Cornelius O'Brien. Although psychology departments in universities have carried out studies in music education, more research has been done on the perception of musical stimuli of pitch structure, order and tone sequences in music and various

aspects of "absolute pitch." In experimental aesthetics, D.E. Berlyne, F.G. Hare and J.B. Crozier have explored arousal theory and information theory as related to music, and Paul Pedersen and David Rosenboom have applied psychophysical research to music composition. In the relatively new field of the sociology of music, John Shepherd has been a pioneer with his publications *Whose Music? A Sociology of Musical Languages* and *Written to Order: A Survey of Tin Pan Alley (1900-1950)*. ELAINE KEILLOR

Reading: M.R. Maniates, "Musicology in Canada, 1963-1979," *Acta Musicologica* 53 (1981).

Muskeg [Algonquian, "grassy bog"], term describing a type of landscape, environment, vegetation and deposit. It attained widespread use in the 1950s during northward expansion of resource development. Peatland and organic terrain are equivalent terms generally referring to northern landscapes characterized by a wet environment and vegetation (eg, black spruce muskeg) botanically classified as mire (subdivided into bogs and fens). Muskeg defies precise scientific definition. It may cover large areas (Hudson Bay Lowland) or occur as small, isolated pockets. Muskeg produces PEAT deposits of variable thicknesses and types because of incomplete decomposition of plant matter in the wet, acid environment. The particular vegetation and hydrological patterns allow recognition of different muskeg types by REMOTE SENSING. Most peat and muskeg in Canada is less than 10 000 years old and occurs in areas covered by the last GLACIATION. Peat accumulation rates and the distribution of muskeg are dependent on climate conditions and controlled by CLIMATE CHANGES. In northern regions, muskeg and PERMAFROST are closely associated and can present difficult engineering problems. No comprehensive, Canada-wide survey of muskeg has been made, but various estimates indicate that Canada may have more muskeg (over 1 295 000 km^2) than any other country. Because of its importance to wildlife, WATER resources and the northern environment, muskeg is no longer considered wasteland. When managed properly, organic soils on peat have excellent capability for agriculture and forestry. Peat products have long-established uses in horticulture, and there is renewed interest in peat as an alternate ENERGY source. Peat provides raw materials for the CHEMICAL INDUSTRY (resins, waxes, paints, etc) and can serve as an efficient filter for some HAZARDOUS WASTES. *See* SWAMP, MARSH AND BOG; VEGETATION REGIONS. J. TERASMAE

Reading: N.W. Radforth and C.O. Brawner, eds, *Muskeg and the Northern Environment in Canada* (1977).

Muskellunge (*Esox masquinongy*), large, predaceous, soft-rayed, freshwater FISH occurring naturally only in eastern N America. The largest member of the PIKE family (Esocidae), it has an oval body and a duck-billed snout with large teeth. The single dorsal fin, anal fin and caudal fin are close together. Muskellunge are distinguished by a pattern of dark markings on a light background, 6-10 pores on the underside of each lower jaw, and the absence of scales from lower portions of cheeks and gill covers. Although individuals exceeding 1.8 m and 45 kg were once known, most modern specimens are much smaller (70-120 cm, 3-16 kg). Muskellunge prefer clean, cool, weedy waters. In Canada, they occur from Québec to eastern Manitoba. Other common names include musky, lunge and maskinonge. One of the most prized Canadian fishes, it is sought for its aerial acrobatics and hard fight, and also because anglers hope to establish a new record by catching one exceeding 32 kg. E.J. CROSSMAN

Muskoka Lakes, 3 interconnected lakes — Rosseau, Joseph and Muskoka — in the picturesque Ontario vacation land E of Georgian Bay. Lk Muskoka is fed from the E by the 2 branches of the Muskoka R, the N branch rising in Lakes Vernon and Fairy at HUNTSVILLE and the S in Lake of Bays. Lk Muskoka is connected to Lk Rosseau by the Indian R, and Lk Rosseau to Lk Joseph by the St Joseph R. A lock at Port Carling and a canal at Port Sandfield enable watercraft to cruise among the lakes. A western continuation of the Muskoka R drains the whole system from Lk Muskoka into Georgian Bay. The name "Muskoka" is likely a corruption of "Misquuckkey," an Algonquin chief whose name appears on 2 treaties surrendering the area to Britain Nov 1815. Samuel de Champlain (1616) and John Graves SIMCOE (1793) traversed the region, and David THOMPSON searched the area (1837) for a practical route from the Ottawa R to Georgian Bay.

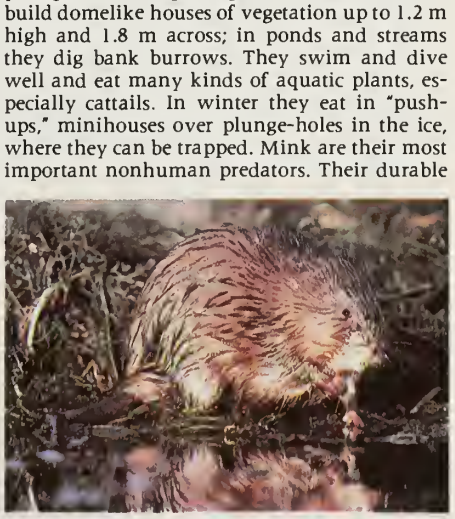
Muskoka was opened to settlement when the Free Land Grant Act (1868) made land available, but although movement within the area was easy, a trip to Muskoka was an ordeal until the railway arrived in 1875. There is some arable land interspersed among the rock and forest, but farming has not been successful, accounting for less than 4% of employment in the area. The lumber industry was active during the late 19th and early 20th centuries, but is only of local importance today. The permanent population is about 35 000, with major concentrations at Huntsville, GRAVENHURST and Bracebridge. The scenic splendour and recreational attraction of the forests and lakes brought visitors from the growing cities of southern Ontario in Victorian times. The early focus of recreation was the resort hotel, replete with dance halls, croquet lawns, tennis courts, etc. There were about 30 establishments by 1879, and there are now over 400. The first summer cottages appeared in the late 19th century on western Lk Joseph. At first the preserve of the wealthy, the area now has roughly 20 000 vacation homes, about half of them owned by Toronto residents. Access today is mainly by paved highways N from Toronto. JAMES MARSH

Muskox (*Ovibos moschatus*), shaggy, horned MAMMAL of the cattle family (Bovidae); occurs naturally only in Canadian arctic tundra (mainland and arctic islands) and in Greenland. Muskoxen are related to wild SHEEP and GOATS. They have humped shoulders and short legs, stand about 130 cm high, and weigh 180-270 kg. Muskoxen live in small herds in summer and larger groups (60 or more) in winter. Herds are loosely organized but a dominance hierarchy is present among bulls, cows and subadults. Synchronized cycles of alternating feeding and rumination keep the constantly moving animals together. Females produce a single calf in Apr-June. Though suckling may continue throughout their first year, calves begin feeding on plants within a few weeks of birth. The playful calves spend most of their time together, returning to the mothers only for suckling, travel or safety. When confronted by wolves or humans, muskoxen line up facing attackers, pressed tightly together with calves wedged in between. If surrounded, they form a solid ring and may charge out at the enemy. When harassed they stampede, sometimes leaving behind stragglers that are more easily killed by wolves. In midsummer the thick layer of insulating underwool is shed, giving muskoxen a very shaggy appearance. Prolonged courtship begins in late July as bulls assess the females' reproductive state. In Aug, courtship with increasing contact leads to successful mating. Males may challenge the dominant bull for herd leadership. After exchanging deep, roaring bellows, opponents show the broad bases of their horns and rub the preorbital glands against their forelegs in a ritualized display. They then back up and gallop forward to meet in a series of head-on clashes. Head-to-head scuffling may then determine the winner. Muskoxen dig craters in the snow with the forehooves to reach winter forage. Dominant herd members displace others from craters already dug. A wind-hardened crust is broken by pounding with the chin. In severe storms, muskoxen remain lying down for extended periods. Unusual snow conditions can lead to extensive deaths by starvation. Over hunting by explorers, fur traders and whalers led to a ban on HUNTING from 1917 to 1970. Muskoxen were protected further in 1927 with establishment of the Thelon Game Sanctuary. Inuit and sports hunting is now permitted in some areas. Muskox habitats are affected by resource exploration and development, and there are few places in Canada where muskoxen and their habitat are fully protected. DAVID R. GRAY



Muskox (*Ovibos moschatus*). The shaggy mammal, related to wild sheep and goats, occurs naturally only in the Canadian Arctic and Greenland (*photo by Fred Breummer*).

Muskrat (*Ondatra zibethicus*), fairly large RODENT common throughout much of N America in wetlands and waterways where water 1-2 m deep supports rooted vegetation and does not freeze to the bottom. It was introduced to Eurasia around 1905. Muskrats are brown, chunky in appearance, and 40-63 cm long, with a distinctive, laterally flattened, sparsely haired tail contributing 18-25 cm. Adults weigh 0.5-1.8 kg. Large hindfeet and slightly webbed toes are edged with short, stiff hairs (swimming fringes). Four incisors cut and hold plant food and 12 cheek teeth grind it. Paired glands beneath the tail base produce musk for marking territories. Two or three litters of 5-7 (range 1-11) young are born Apr-Aug. In marshes muskrats build domelike houses of vegetation up to 1.2 m high and 1.8 m across; in ponds and streams they dig bank burrows. They swim and dive well and eat many kinds of aquatic plants, especially cattails. In winter they eat in "push-ups," minihouses over plunge-holes in the ice, where they can be trapped. Mink are their most important nonhuman predators. Their durable



Muskrat (*Ondatra zibethicus*), a large rodent common to the wetlands and waterways of N America (*photo by Tim Fitzharris*).

pelts are an important source of income for Canadian trappers. Muskrats occasionally damage banks and dams. Wildlife biologists manage muskrat populations for sustained yields by improving habitat and regulating harvests. Muskrat numbers decline drastically every 6-10 years, because of infectious diseases and breeding failures. *See* FUR TRADE; FUR TRAPPING.

DONALD A. SMITH

Muslims, *see* ISLAM.

Musquodoboit Harbour, NS, UP, pop 936 (1981c), located 40 km NE of HALIFAX, takes its name from the Micmac, meaning "rolling out in foam" or "suddenly widening out after a narrow entrance at its mouth." The Musquodoboit Valley, comprising the communities of Upper, Middle and Centre Musquodoboit Harbour, was mostly settled by LOYALISTS and second-generation "planters" from TRURO. Industries today include lumbering, and harvesting and exporting Christmas trees, an industry begun in the 1930s. Still an agricultural area today, farming is mainly devoted to raising livestock. Gold mines opened in nearby Caribou, Mooseland and Moose R brought prosperity to the valley as it developed service industries. LIMESTONE extraction is now a major industry, and the valley is known for its good hunting and fishing.

JANICE MILTON

Mussallem, Helen Kathleen, nursing educator (b at Prince Rupert, BC). After beginning her career as a staff nurse at the Vancouver General Hospital, she served overseas during WWII as a lieutenant in the Royal Canadian Army Medical Corps. A graduate of Columbia University's Teacher's College, she was an instructor, then director of education, at the VGH School of Nursing. Active throughout her career in nursing education, she served as executive director of the Canadian Nurses' Assn 1963-81. She received several awards and citations for her work as a nursing educator both in Canada and abroad where she advised international organizations such as the International Council of Nurses and the World Health Organization. In 1969 she was made an officer in the Order of Canada and in 1981 received the Florence Nightingale Medal — the highest award of the International Red Cross.

DANIEL FRANCIS

Mussel, bivalve (hinged shell) MOLLUSC of either the marine order Mytiloida or the freshwater superfamily Unionacea. Mussels, prized worldwide for food, are the *moule* of French cuisine. Marine mussels are elongated by enlargement of the posterior end. They are found attached to a support by byssal threads (filaments secreted by the mollusc) or partially buried. The blue, bay or common mussel (*Mytilus edulis*) occurs on Canada's East and West coasts and is the only mussel of commercial interest in this country. Recent AQUACULTURE operations in the Maritimes have been successful. More than 100 t are produced annually and an industry is starting on the West Coast. Two other mussels provide a recreational fishery and have potential for development: sea mussels (*M. californianus*), found on the exposed West Coast, and horse mussels (*Modiolus modiolus*), present in deeper waters of the Pacific and Atlantic coasts.

FRANK R. BERNARD

Mustard, *see* OILSEED CROPS; VEGETABLE.

Mutchmor, James Ralph, Presbyterian and United Church minister (b at Providence Bay, Manitoulin I, Ont 22 Aug 1892; d at Toronto 17 May 1980). After serving in an artillery battery in WWI, he resumed his theological studies and from 1920 to 1936 served churches in Winnipeg's north end. In 1937 he moved to Toronto as associate secretary, and from 1938 to 1963 as secretary, of the Board of Evangelism and Social Service and crusaded against drinking, gambling and social immorality. He was elected moderator of the United Church in 1962. A humanitarian and an able administrator, he led several delegations to the government demanding improved social conditions. He published his memoirs, entitled *Mutchmor*, in 1965.

NEIL SEMPLE

Mutual Aid, the principal economic means by which Canada assisted its allies with food, raw materials and munitions from May 1943 until the end of WORLD WAR II. The Mutual Aid Board, chaired by C.D. HOWE, supervised all Allied purchases in Canada and allocated over $2-billion worth of Canadian production without charge, most of it going to Britain and the Commonwealth. Mutual Aid followed the BILLION DOLLAR GIFT and was a Canadian version of American LEND-LEASE. An act of enlightened self-interest, it adhered to the fundamental principle that there should be no war debts that would burden postwar trade. Mutual Aid was devised largely as a political solution to an economic problem, but it was no more popular than the Billion Dollar Gift. Both measures provided the financial basis for Canadian war production, which was the key to Canada's wartime prosperity and perhaps its most significant part in the victory.

HECTOR M. MACKENZIE

Mutual Funds, open-ended investment institutions that raise capital by issuing shares to investors. In contrast to closed-end funds, mutual funds do not have fixed capitalizations. They issue shares to investors continuously and are ready to redeem outstanding shares on demand. In principle, the types of securities in mutual-fund portfolios can vary widely but in practice a particular fund's portfolio is determined by the proffered investment objectives of the fund; some specialize in fixed-income securities, some in Canadian equities, some only in foreign securities, gold, securities of new ventures or securities of corporations in a particular industry.

Mutual funds are managed professionally by federally or provincially chartered management (investment advisory) corporations or by trust companies. Many firms will manage and distribute shares of only one mutual fund but on average a Canadian firm manages 4 different funds. The firms receive compensation in the form of management fees, calculated as a percentage of the net asset value of the fund (the difference between the market values of its assets and liabilities). In addition, some funds levy sales (load) charges at the time of purchase. The selling price of the shares of a fund with a load charge (usually 10%) is calculated by dividing the fund's net asset value per share by one minus the percent load charge. For example, if a fund levies an 8% sales charge and its net asset value per share is $5, the fund's shares will be sold at $5.43 = $5 ÷ (1 - 0.08). When shareholders sell shares in the fund, they will be redeemed at the prevailing net asset value per share. Most Canadian funds do not charge redemption fees.

Mutual funds are subject to provincial securities acts as are any fund's investment objectives and policies. In the 1970s the total asset growth of mutual funds declined as a result of the introduction of capital-gains tax; competition took the form of increased mortgage holdings, pension funds and corporate bonds.

S.M. TINIC

Mycorrhizae, symbiotic associations between plant roots and FUNGI, are thought to occur on roots of 95% of all SEED PLANTS. They are probably essential to the survival in nature of both partners. The plant derives an enhanced ability to absorb essential minerals and greater resistance to root diseases. The fungus obtains sugars directly from its partner, without competition from other micro-organisms. Mycorrhizae occur in several forms that differ in benefits conferred upon plants and fungi involved. The most widespread, endomycorrhizae, occur in about 90% of seed plants and involve approximately 50 species of fungi, thought to belong to the Zygomycotina. In these associations, the fungus invades cells of the root cortex (outer layer) and there forms swellings (vesicles) or highly branched and shrublike appendages (arbuscules). Less widespread types of mycorrhizae, restricted primarily to orchids and members of the heath family, resemble endomycorrhizae but involve Ascomycotina and Basidiomycotina. Ectomycorrhizae, which involve 5000-6000 species of fungi, occur on relatively few plants, mainly trees of pine, birch, willow and oak families. In ectomycorrhizae, the fungus forms a thick sheath around the root, often increasing its diameter several times; filaments penetrate between, but do not enter, root cells. In Canada ectomycorrhizae reach a particularly high level of development. Most Canadian forests are dominated by trees forming ectomycorrhizae and, during wet seasons, mycorrhizal fungi produce large numbers of MUSHROOMS.

Mycorrhizae are thought to enhance a plant's ability to absorb phosphorus. The role of nitrogen in mycorrhizal physiology is less well understood. Endomycorrhizae are thought to use simple sources of nitrogen. Ectomycorrhizae, able to absorb more complex forms of nitrogen, are thought to compete with soil microorganisms for nitrogen locked in leaf litter. Orchid and heath mycorrhizae may be the most efficient in extracting complex nitrogen compounds. Mycorrhizae are under study by researchers in FORESTRY and AGRICULTURE worldwide. Tree seedlings inoculated with selected ectomycorrhizal fungi have been found to have improved survival rates and field growth, and the practice may prove especially effective in areas where natural mycorrhizal levels are low. The manipulation of endomycorrhizae in agricultural practice shows great promise and eventually may eliminate heavy use of FERTILIZERS. At present, however, the inability to grow endomycorrhizal fungi in laboratories has hindered attempts to produce adequate amounts of inoculum. The Jardin Botanique, Montréal, and Laval University, Québec City, intend to begin production of maple seedlings inoculated with mycorrhizae, which will allow the trees to grow in nutrient-poor soils.

DAVID MALLOCH

Myers, Barton, architect (b at Norfolk, Va 6 Nov 1934). He immigrated to Canada in 1968 to join the faculty of architecture at U of T. He was principal of the firm of Diamond and Myers until 1975, then founded Barton Myers Associates with offices in Toronto and Los Angeles. He is an original designer with a strong sense of context and heritage; his projects include the CITADEL THEATRE and U of A Housing Union Building (HUB) in Edmonton, Sherbourne Lanes housing in Toronto and the Seagram Museum in Waterloo, Ont.

LEON WHITESON

Mynarski, Andrew Charles, gunner (b at Winnipeg 14 Oct 1916; d at Cambrai, France 12 June 1944). He was mid-upper gunner of a Lancaster bomber that caught fire. Though free to jump, he persisted in trying to save a trapped comrade. His parachute and clothing caught fire and he died from his burns, though his comrade miraculously survived the plane crash. Mynarski was awarded the VICTORIA CROSS posthumously for his effort to save another's life.

JAMES MARSH

Mysteries, *see* POPULAR LITERATURE.

NABU Manufacturing Corporation, *see* ELECTRONICS INDUSTRY.

Nahani, also Nahanni, is an Athapaskan word that, with various spellings, has been used to designate native groups in BC, the NWT and the YT. It is considered to be an inaccurate and inappropriate name for any specific group or for any cultural-linguistic grouping. European fur traders and explorers began to use the term Nahani in the early part of the 19th century, often in reference to an Indian group that was not in direct contact with them and only vaguely known from Indian reports. In the 20th century the term was gradually replaced by more accurate designations, although the Canadian government still used Nahani in the 1970s for the languages of 3 Yukon groups in the Whitehorse, Ross R and Liard R areas. These peoples have been identified as Southern TUTCHONE and KASKA speakers. *See also* SOUTH NAHANNI R; NATIVE PEOPLE, SUBARCTIC. BERYL C. GILLESPIE

Nahanni Butte, NWT, UP, pop 85 (1981c), is located on the N side of the SOUTH NAHANNI R near its junction with the LIARD R, 507 air km SW of YELLOWKNIFE. Named after the NAHANI people, the tiny Slavey DENE community is the access point for NAHANNI NATIONAL PARK (est 1971), which recently became a UNESCO world heritage site. The area has been haunted for some 60 years by rumours of a lost gold mine, and 25 deaths and mysterious disappearances have been reported. The site became settled 25 years ago when the government relocated people from a settlement at Netla River, 24 km away. ANNELIES POOL

Nahanni National Park (est 1972) is over 4700 km² of rugged mountains, wild rivers and luxurious hot springs stretched along the SOUTH NAHANNI R in the SW corner of NWT. Tales of lost gold mines and hidden tropical valleys lured prospectors in the early 1900s. Many disappeared without trace in the harsh land and, when 2 headless corpses were discovered, stories of fierce mountain men spread. No one found gold or tropical valleys, but prospectors did discover a land of incomparable beauty. The South Nahanni R twists for more than 320 km through the PARK, crashing through 3 immense canyons over 1000 m deep, plummeting 100 m over Virginia Falls, rushing past boiling hot springs, icy caves, soaring mountains and seething rapids. The vegetation is characterized by boreal and alpine species. Frequent, extensive fires have marked much of the forest. The park's 32 mammal species include Dall sheep, moose, woodland caribou and grizzly bear. Peregrine falcons, trumpeter swans and golden eagles are among the 120 species of birds recorded. The adventures experienced by the gold seekers can be recaptured by visitors canoeing, hiking or wilderness camping. Essential services and facilities are available in Fort Simpson, NWT. The park is a UNESCO World Heritage Site. LILLIAN STEWART

Nain, Nfld, Town, pop 938 (1981c), inc 1970, located in N Labrador, is the most northerly community in the province. It was given its name when chosen by the Unitas Fratrum (Moravians) in 1771 as their first mission. The site, once used by the Maritime Archaic Indians and early Inuit, had been known as Kauk Harbour. Until the 20th century the mission served as a permanent trading base for trappers, hunters and fishermen who followed ancient seasonal migration routes. The mission members, the only permanent European settlers, ran the store and trading post until 1926, when the HBC assumed its operation. In the 1940s this store passed to the Newfoundland government; the International Grenfell Assn and the Labrador E Integrated School Board took over the medical and educational services. The modern fishing town has been settled year-round since the



1950s, its population being augmented by the resettlement of the former Moravian missions of Okak and Hebron.
JANET E.M. PITT AND ROBERT D. PITT

Naismith, James A., physician, educator, inventor of BASKETBALL (b at Almonte, Canada W 6 Nov 1861; d at Lawrence, Kansas 28 Nov 1939). Orphaned at age 8, Naismith returned to Almonte High School at age 20 to complete his education. He showed prowess in athletics at McGill, and in Dec 1891, as a young instructor at the YMCA International Training School at Springfield, Mass (now Springfield College), he invented the game of basketball. At 37, Naismith graduated from the Gross Medical School of Colorado U with a medical degree. He was associated with the U Kansas for some 40 years as professor, physician, and director of physical education and published several books on sport. At 64 he became an American citizen. Basketball has grown to worldwide popularity.
FRANK T. BUTLER

Nakamura, Kazuo, painter (b at Vancouver 13 Oct 1926). After studying at Toronto's Central Technical School (1948-51), Nakamura became a member of PAINTERS ELEVEN His paintings, first of rectangular block structures recalling the prairies, and then of white oil paint over string laid horizontally on canvas, as in *Infinite Waves* (1957), had a simpler structure and coloration (mostly monochrome) than the work of the Eleven. Like Jock MACDONALD's painting, Nakamura's often concerned the new science, time and space. For this reason he is sometimes considered to have been the most advanced member of the group. He himself characterized his work as more geometric than hard-edge. His nature and landscape paintings, done at the same time as his abstractions, were equally general in tone. As part of Nakamura's explorations, he investigated number structure, the most complex field of mathematics, equating it with the structure of forms. JOAN MURRAY

Names At common law a person's surname is a question of custom and repute only; it can be changed at will provided it is not done for a fraudulent purpose. Married women are not obliged to take their husbands' names. Provincial laws, typically called Vital Statistics Act (governing the naming of children at birth) and the Change of Name Act, have supplemented or supplanted the common law. Legitimate children generally have to be registered within a specified period from birth in the father's surname. Illegitimate children are registered in the mother's name unless the father agrees in writing to the child taking his name. Change of Name statutes document a legal change of name. If adults change their names, the consent of a spouse to a change of name affecting both partners is necessary. Divorced women can revert legally to their original names. To change children's names, the consent of one or both parents, and sometimes of the child (if over 14 years of age), may be required. Under Québec law spouses retain their own names for legal purposes. Children take the family name of one or both parents. ALASTAIR BISSETT-JOHNSON

Nanabozo (Nanabozho or Nanabush), a mythological culture hero found in the cosmological traditions of the Algonquian tribes of central and eastern Canada. He is the impersonation of life, with the power to create life in others. He appears as diverse personalities which represent the various phases and conditions of the life cycle. In some myths Nanabozo creates animals and causes plants and roots to grow so men can eat. He plays a dual role in mythology, both as benefactor to the Indian and as a prankish and obscene fool. RENÉ R. GADACZ

Nanaimo, BC, City, pop 47 069 (1981c), inc 1874, is located on the E coast of VANCOUVER I, 110



Spectacular Virginia Falls on the S Nahanni R in Nahanni National Park, NWT (*courtesy Parks Canada/ Prairie Region*).



km N of Victoria and 27 km W of Vancouver, across the Str of Georgia. It is situated on a narrow coastal plain; a few areas in the city have elevations of 290 m. Nanaimo is surrounded by good agricultural land and rich timber resources. Its excellent deep harbour has made it an important distribution and regional centre. Also, it is the axis of several transportation routes: the Esquimalt and Nanaimo Ry; the Trans-Canada and Island hwys; and ferry services to and from the mainland. With its beautiful natural setting, mild climate and numerous beaches, parks and nearby camping sites, the city is an important tourist centre. It is governed by a mayor and 8 aldermen, but shares some responsibilities with the regional district of Nanaimo (est 1967). Nanaimo's most noted annual event is the "bathtub weekend," when "tubbers" from around the world race across the Str of Georgia to Vancouver in motor-powered bathtubs.

History The Coast SALISH Indians were the region's first inhabitants. The Spanish explorers Galiano and Valdés came in the 1790s. The HBC established a trading post 1849, but the discovery of COAL in 1852 led to permanent settlement. In 1854, 24 families arrived from England to settle in Colville Town, the name first given the settlement, after Andrew Colville, governor of the HBC. In 1862 the Vancouver Coal Mining and Land Co bought out the HBC mines and expanded operations. Completion of the Esquimalt to Nanaimo Ry (1886) spurred development. The city grew with its increasing coal output. Production from the 3 main seams in the area reached its peak in 1923 when over 1 million tonnes were mined. Once the easily accessible coal was mined, however, it became increasingly dangerous and expensive to extract the fuel and by the early 1950s the city turned to forest products.

Economy Nanaimo has used its good harbour for trading, servicing and distribution industries. Fishing and lumbering have also grown since the 1950s. The Port of Nanaimo has 3 deep-sea berths, and the BC and CP Ry ferries have docks at Departure Bay. Duke Point Industrial Park, when completed, will focus on forest products and related industries. Nanaimo is one of a few resource towns that have achieved transformation to a diversified regional centre.

Cityscape The HBC fort, built 1853, is the oldest preserved HBC fort in Canada and houses one of the city's 3 museums. Central Nanaimo's street pattern is based on a century-old radial pattern of streets converging on the waterfront and central business district. Until the 1950s Nanaimo was a city of contrasts — coal-mine officials and other businessmen built large homes in certain areas while the miners lived in "stark frame company houses."

ALAN F.J. ARTIBISE

Reading: E.B. Norcross, ed, *Nanaimo Retrospective: The First Century* (1979).

Nanisivik, NWT, UP, pop 261 (1981c), is located on the S shore of Strathcona Sound on the BORDEN PENINSULA of BAFFIN I, 1650 air km NE of Yellowknife. The mining community is the home of Nanisivik Mines, which produces cadmium, lead, silver and zinc. Opened in 1974, the mine today employs Inuit as well as southern workers on a rotations system. The area has historically never been inhabited by Inuit and is devoid of wildlife, while vegetation is scarce.

ANNELIES POOL

Nanogak, Agnes, graphic artist (b on Baillie Is, NWT 12 Nov 1925). She is known for her energetic and colourful depictions of traditional myths and legends. Her works have figured prominently in every print collection published by the Holman artists' co-operative since 1967. Daughter of William Natkutsiak (Billy Banksland) who came from Alaska to the Canadian Arctic with the explorer Vilhjalmur STEFANSSON, since 1937 Nanogak has made her home in Holman, NWT, where she married William Goose, raised a large family and developed her artistic career. Her narrative prints and drawings evoke a rich variety of stories reflecting the Alaskan roots of her father and the Mackenzie Delta/Copper Eskimo culture of her mother and husband. Nanogak illustrated a book of Inuit stories, *Tales from the Igloo,* ed and trans by Maurice Metayer (1972). MARIE ROUTLEDGE

Nanticoke, Ont, City, pop 19 816 (1981c), located on the N shore of Lk Erie, 58 km SW of Hamilton. It was created in 1974 by the amalgamation of several small rural communities, one of which was Nanticoke, an Indian word meaning "crooked or winding," referring to a nearby creek. Originally an agricultural community, it now has a growing industrial sector, including a massive Steel Co of Canada complex and a Texaco Canada oil refinery. Ontario Hydro has located a generating station here — the world's largest coal-burning plant.

DANIEL FRANCIS

Nanisivik, on Baffin Island, is one of the most northerly mining communities in the world (*photo by Karl-Heinz Raach*).



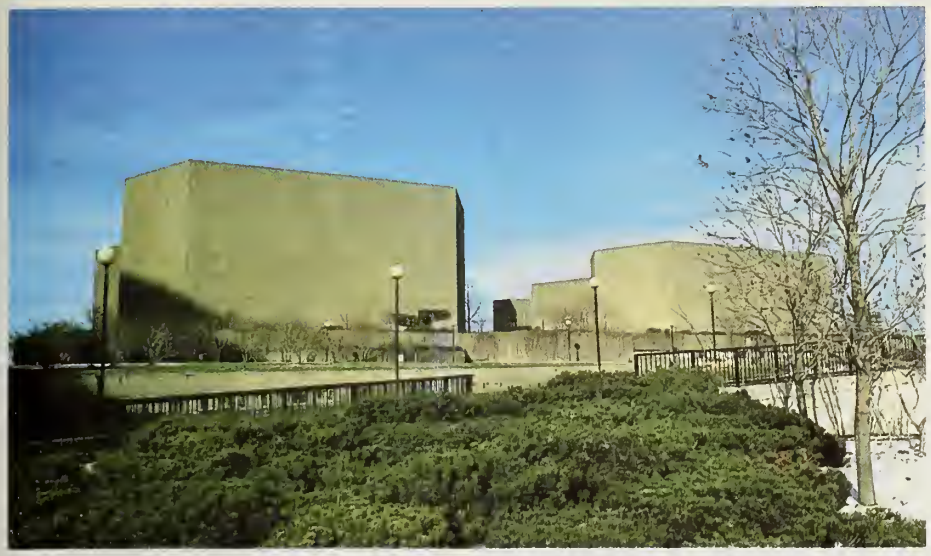
Narwhal (*Monodon monoceros*), once known as sea unicorn, is a toothed WHALE of arctic seas. It is best known for its straight, tightly spiraled tusk, which is one of 2 fully developed teeth in the upper jaw and projects through the lip, reaching 3 m in length. The tusk, found in adult males and, rarely, females is of unknown function. Double-tusked narwhals occur occasionally. Narwhals grow to a maximum length of 4.8 m (excluding tusk). Narwhals have no dorsal fin. Body colour is grey at birth, almost black in juveniles, and mottled black and white in adults. Old individuals can be almost completely white, with dark patches confined to the dorsal surface. The narwhal's distribution, centered in Davis Str, Baffin Bay and Lancaster Sound, also includes Hudson Str, Hudson Bay, Foxe Basin and waters surrounding most of the Canadian ARCTIC ARCHIPELAGO. Another population occurs in the Greenland Sea. Traditionally, narwhals were hunted by native people in Canada and Greenland, primarily for meat, oil, sinew and muktuk (skin and adhering blubber). A market for narwhal ivory developed during the Middle Ages in Europe and the Far East. Today, Inuit hunt largely to supply a trophy market. The ice-adapted narwhal is rarely found far from pack ice. It survives in the pack by using narrow cracks and small pools of open water, and eats mainly small fish, squid and crustaceans. In 1976, the narwhal population inhabiting Lancaster Sound was estimated at 20 000-30 000 animals. R. REEVES AND E.D. MITCHELL

Naskapi, *see* MONTAGNAIS-NASKAPI.

Nass River, 380 km long, rises in the northern interior of BC and flows generally SW, draining approximately 21 000 km², to reach the Pacific at Portland Inlet. Its major tributaries are the Bell-Irving, Meziadin and Cranberry rivers. The name comes from an Indian word meaning "food depot," referring to the biological productiveness of the river. Its annual eulachon run in particular attracted Indians from afar who traded with the resident Nishga, today still the main inhabitants of the Nass Valley. While the lower valley is an important timber-production area, and many traditional resource-harvesting practices have altered as a result, the Nishga still adhere closely to a complex system of land ownership and title throughout the entire area (*see* LAND CLAIMS). There are 4 villages, all Nishga, along the river — New Aiyansh, Canyon City, Greenville and Kincolith. Recent lava flows are a feature of the valley near New Aiyansh and play an important role in Nishga history. According to Nishga sources, some 2000 people were killed by volcanic flows in the late 1700s. ROSEMARY J. FOX

Nathanson, Nathan Louis, businessman (b at Minneapolis, Minn 24 May 1886; d at Toronto 27 May 1943). He purchased his first theatre in Toronto in 1916 and in 1920 sold a chain of theatres to Adolph Zucker's Paramount Pictures (US), becoming president of Paramount's newly formed Canadian subsidiary, Famous Players. The 1923 takeover of Allen Brothers Theatres established the predominance of Famous Players in Canadian film exhibition. Directly and through subsidiaries, Famous Players also dominated film distribution to Canadian theatres. Covertly, in the late 1930s, Nathanson began acquiring theatres on his own and making other arrangements with the intent of establishing his own theatre chain. He resigned from Famous Players in 1941 to join his son Paul in Odeon Theatres. A confidant of C.D. HOWE, Nathanson was appointed to the original board of governors of the CBC in 1936, becoming VP of the board in 1940. ROBERT E. BABE

National Action Committee on the Status of Women is an action-oriented organization made up of about 280 member groups from all



Façade of National Arts Centre (Ottawa), designed by Fred Lebensold (*courtesy Parks Canada/The Heritage Recording Service*).

over Canada. Started in 1971 with 30 groups, it is the largest umbrella organization of women's groups in Canada. It focuses mainly on pressuring the federal government to make changes that will improve the STATUS OF WOMEN on equal pay, native women's rights, pensions and other matters, but supports provincial and local issues as well. Policy is set at the annual general meeting. The executive is elected from the membership and is volunteer. DORIS ANDERSON

National Advisory Council on Fitness and Amateur Sport, est 1961 under the Fitness and Amateur Sport Act. The fitness, recreation and sport communities meet periodically and a general council meets twice a year to formulate recommendations for the minister of national health and welfare. The council attempts to involve all Canadians in physical recreation and amateur sport and supports Canadian athletes.

National Arts Centre is the most prestigious and beautiful performing arts complex in Canada. Designed by Fred LEBENSOLD, the Centre consists of a 2326-seat opera house, a 969-seat theatre and a 350-seat studio. The National Arts Centre Act (1966) called on the Centre "to develop the performing arts in the National Capital Region and to assist the CANADA COUNCIL in the development of the performing arts elsewhere in Canada." Since its opening in June 1969 under director general G. Hamilton Southam, the NAC has been a major national and international showcase for Canadian theatre, opera, music and dance. It has also been a focus of controversy because of its large operating budget. Construction, originally estimated at $9 million, mushroomed to over $46 million. Though financed in part by the Dept of the Secretary of State, the NAC has never enjoyed the full political and financial support needed to carry out its ambitious national bicultural objectives. While the National Arts Centre Orchestra, under conductor Mario BERNARDI, achieved an international reputation, the English- and French-language theatre companies made only limited national tours and failed to win consistent critical and popular acclaim. In 1983 opera production and the annual summer Festival Ottawa were suspended and in 1984 the English-language theatre company was disbanded.

ANTON WAGNER

National Assembly (Assemblée Nationale), unicameral provincial legislature of Québec. Following the abolition of the legislative council of Québec in 1968, the legislative assembly became the national assembly. It includes all provincially elected members of the governing and opposition parties. Its powers and procedures are comparable to those of the federal HOUSE OF COMMONS. RÉJEAN PELLETIER

National Atlas of Canada The *Atlas of Canada* (1906), published by the Dept of the Interior, was one of the world's first national atlases. A second edition similar in style and content was published in 1915, as a collection of small-scale thematic maps dealing with relief, geology, communications, forests, population origin and density, major political boundaries, and plans of principal cities. No new edition appeared until 1958 when, stimulated by the International Geographical Union and the Canadian Social Science Research Council, the Dept of Mines and Technical Surveys (now ENERGY, MINES AND RESOURCES) published 110 sheets in a loose-leaf binding. In their entirety they show the nature, extent and use of the physical resources of Canada, and their effect on the economy and society of the country. An edition in French was also produced for the first time. In 1974 a fourth edition, now titled *The National Atlas of Canada,* was published, similar in content to the third, but with smaller pages and a fixed binding. For the first time the atlas, in both English and French, was produced by the federal government, though it was published by a commercial firm (Macmillan of Canada). A fifth edition now in preparation (1984) is being issued as a number of separate sheets. N.L. NICHOLSON

National Ballet of Canada, with more than 60 dancers, is the country's largest professional dance company. It performs a majority of the full-evening story ballets that have survived from the 19th century as well as selections from its large accumulated repertoire of 20th-century works. Ballets by many of the century's leading choreographers such as George Balanchine, Frederick Ashton and Antony Tudor are included, but few of these works were originally created for the company. A majority of the original ballets have been created by Canadian choreographers, notably David Adams and Grant STRATE in the 1950s and 1960s and Anne Ditchburn, James Kudelka and Constantin PATSALAS during the late 1970s and early 1980s. Despite the large quantity of contemporary choreography it performs, the company's artistic character and public image is best defined by its lavish productions of such enduringly popular, full-length classics as *Giselle, La Fille mal gardée, Swan Lake* and *The Sleeping Beauty.*

The Toronto-based company was founded in 1951 by Celia FRANCA under the auspices of a group of local ballet enthusiasts. Despite its title, the company never received an official "national" mandate. Franca and her board of directors decided independently to give the company a national base by drawing its dancers from across Canada and by undertaking costly and extensive Canadian tours. Franca also believed that only by staging the classics could the dancers be properly developed and finally judged by internationally accepted standards of excellence. The NATIONAL BALLET SCHOOL, fd in 1959, has played a major role in helping the company to meet these standards.

Though the company's early years were plagued by financial problems that restricted its range of activities, it went on tour within Canada and the US and has since performed in a number of European countries, Mexico and Japan. In 1964 it adopted the 3200-seat O'Keefe Centre in Toronto as the site for its hometown performances; and as well-equipped theatres were built across Canada, the company expanded to fill their stages with large-scale productions. Apart from Franca, a number of figures have played significant roles in the company's development. Erik BRUHN, who became artistic director in 1983, was closely associated with the company for the preceding 19 years as guest artist, teacher and producer. Rudolf Nureyev, who first danced with the company in 1965, returned in 1972 to stage his spectacular version of *The Sleeping Beauty.* Nureyev is widely credited with having advanced the company's standards of performance, with promoting the careers of Karen KAIN, Frank AUGUSTYN and Veronica TENNANT, and with attracting to it a larger measure of international attention.

Alexander Grant, artistic director 1976-83, increased the number of annual performances, placed renewed emphasis on developing Canadian choreographers and improved the opportunities for younger dancers, particularly the men. Bruhn's directorship has been marked by increased efforts to attract first-rate choreography from leading international choreographers and to answer criticisms of excessive artistic conservatism in the company by introducing more modernistic works. *See also* BALLET.

MICHAEL CRABB

Reading: K. Bell and C. Franca, *The National Ballet of Canada* (1978); A. Oxenham with Michael Crabb, *Dance Today in Canada* (1977); H. Whittaker, *Canada's National Ballet* (1967).

National Ballet School, based in Toronto, is an independent, private residential and day school for students from grades 5 through 12. It offers an integrated program of academic studies and dance instruction for about 150 full-time students, designed to provide a balanced education for those contemplating a professional dance career. In addition to its regular program, the school offers a teacher-training course. Students who have graduated from grade 12 may continue to receive ballet instruction if necessary to prepare them for admission



Celia Franca (left), under whose direction the Toronto-based ballet company earned its national mandate (*courtesy National Film Board/Photothèque*).

to a performing company. Auditions for admission are held annually in major centres across Canada. Students from abroad are also occasionally accepted.

The school was founded in 1959 as a necessary adjunct to the NATIONAL BALLET OF CANADA. Although many of its graduates still join that company, the school has for most of its existence operated as an independent institution under the direction of its founding principal, Betty OLIPHANT. It is widely regarded as one of the world's leading ballet schools. Its students have distinguished themselves as prizewinners in a number of prestigious international ballet competitions and its graduates, among them such renowned artists as Veronica TENNANT, Karen KAIN, Frank AUGUSTYN, Kevin Pugh and Martine van Hamel, are to be found in leading dance companies around the world. MICHAEL CRABB

Reading: P. and G. Varley, *To be a Dancer: Canada's National Ballet School* (1971).

National Bank of Canada, with head offices in Montréal, is a Canadian chartered bank which commenced operations in 1979 as a result of the merger between the Banque Canadienne Nationale (fd 1874) and The Provincial Bank of Canada (fd 1861). In 1981 it purchased Laurentide Mortgage Corporation, which specialized in mortgage loan operations, and several active subsidiaries of Laurentide Financial Corporation. Today, it conducts a general banking business and offers related financial services at over 600 branches and offices throughout Canada. As of Oct 1983 it had revenue of $2.1 billion, assets of $17.8 billion (ranking 7th among banks and financial institutions in Canada) and 11 824 employees. DEBORAH C. SAWYER

National Capital Commission is a federal crown agency. It was created by the 1958 National Capital Act to prepare plans for and assist in the development, conservation and improvement of the national capital region so that the nature and character of the capital of Canada would be in accord with its national significance. Put simply, the task of NCC, and of similar predecessor federal bodies (the Ottawa Improvement Commission and the Federal District Commission) since 1899, has been to plan and help build an attractive national capital. The National Capital Region comprises some 4662 km², forming a rough square around Ottawa. About 60% of the region is in Ontario and the rest lies N of the Ottawa R in Québec. The NCC functions only within this region. Many of the responsibilities given to it are normally assigned to municipalities, which fall under provincial jurisdiction; thus the potential for federal-provincial municipal conflict has been considerable, and clashes over purpose and policies have been frequent since the 1950s. Nevertheless, the federal impact on the structure and appearance of the capital has been significant.

PM Mackenzie King brought Jacques Gréber from France (1938) as capital planning adviser, and Gréber's 1950 plan was accepted by local municipalities and largely implemented with federal money. Its key elements included the building of parkways, expansion of Gatineau Park, railway relocation and the creation of a greenbelt around OTTAWA. Most of Gréber's proposals involved land acquisition, since federal works were restricted to land it owned. The NCC's powers of expropriation were substantial; today, some 30% of the urbanized part of the Region is federal property. The Region itself has no juridical significance; it is not a federal district with powers of its own. The explosive growth of federal employment in the late 1960s and early 1970s, and the siting of new office buildings, helped shape the direction of the capital's growth. Notable was the 1969 decision to build federal offices on the Québec side of the river. Amenities such as landscaped gardens and parkways, bicycle paths, ski trails and skating on the Rideau Canal are NCC initiatives.

NCC spending and planning have recently focused on projects jointly funded with the municipalities and provinces, including water purification, sewage disposal, roads and bridges. The commission has 20 members, drawn from across Canada with each province represented. Its committees meet periodically, but its autonomy is limited; almost all decisions reside with the federal government. The operating budget in 1983-84 was about $53 million, and capital expenditures $34 million. DOUGLAS FULLERTON

National Council of Women of Canada (NCWC), founded in 1893 as part of Canada's first feminist wave, is a member of the International Council of Women. Led by its first president, Lady ABERDEEN, the NCWC became the champion of women and children. NCWC recruits have been overwhelmingly urban, anglophone and middle-class. A conservative leadership delayed adoption of a suffrage platform until 1910. A federal structure with local councils and nationally organized societies has moderated policy and contributed to the NCWC's influence as a lobbyist. In the 1960s it called for a Royal Commission on the STATUS OF WOMEN; in the 1980s it demanded the entrenchment of women's rights in the Constitution.

VERONICA STRONG-BOAG

Reading: R. Shaw, *Proud Heritage: A History of the National Council of Women of Canada* (1959); Veronica Strong-Boag, *The Parliament of Women: The Council of Women of Canada, 1893-1929* (1976).

National Defence, Department of, created 1 Jan 1923, the result of the amalgamation of the departments of Naval Services and Militia and Defence, and the Air Board. Intended primarily as an economy measure, but also to improve the co-ordination of national security policy, the formation of a single department brought the Royal Canadian Navy, the Militia (later Canadian Army) and the Canadian Air Force (later Royal Canadian Air Force) under one minister. Efforts to integrate the 3 service headquarters failed. WWII saw a major expansion and restructuring of the department. Although individual service departments were not created in law, a minister of national defence for air was appointed in May 1940 and a minister of national defence for naval services in July. In practice this meant that there were 3 separate ministries. Following demobilization, departmental organization reverted in 1946 to prewar form.

In an attempt to end triplication of effort, certain support services common to all branches were integrated over the next few years, and in 1951 a chairman, chiefs of staff, was appointed to co-ordinate training and operations among the 3 services. Integration followed in 1964, when 1 chief of the defence staff replaced the individual service chiefs; on 1 Jan 1968 these 3 services were unified into the Canadian ARMED FORCES. In Oct 1972 the civilian and military branches in Ottawa were merged into the single National Defence Headquarters. Senior appointments in DND are filled by both civilians and serving officers. The governor general, as the sovereign's representative, is commander in chief of the Canadian Armed Forces. The minister, deputy minister and chief of the defence staff (senior military adviser to the minister) are assisted by their staff at NDHQ. The vice chief of the defence staff is both head of his own division of the staff and the senior staff officer to the whole headquarters. Assistant deputy ministers may be either military or civilian. Including uniformed and civilian personnel, DND has been the largest government department since 1945, while its operating budget has consistently been among the 3 highest.

STEPHEN HARRIS AND O.A. COOKE

National Development in the Arts, Letters and Sciences, Royal Commission on (Massey-Lévesque Commission), established by order-in-council in 1949, was the broadest investigation of its kind ever undertaken in Canada. Its recommendations covered all aspects of education, culture and the mass media. The commission's work was pursued against the backdrop of a major transition in Canadian cultural affairs. Although the country's prewar cultural life was primarily focused on amateur, community-oriented, voluntary activities, the commission foresaw that these activities were giving way to a more urban, impersonal and national orientation; the overall character of the final report is a strange mixture of mourning for an age that was rapidly passing and of excitement at the new era of professional "mass culture" that lay ahead. It is generally believed that the commission's most important accomplishments were the ultimate establishment of arms-length federal support for the arts through the CANADA COUNCIL and the creation of the NATIONAL LIBRARY OF CANADA. It may be, however, that its most enduring legacies are the very high standards of analysis and writing that it set, standards that have not been surpassed by any of its successors. *See* ARTS FUNDING. RICHARD STURSBERG

National Energy Board, est 1959 under the National Energy Board Act. The 9-member board is responsible for regulation of oil, gas and electrical industries and for advising the government on matters concerned with the development and use of energy resources. The regulatory role encompasses the granting of permission for the construction of interprovincial PIPELINES, authorization of pipeline crossings, pipeline safety, regulation of pipeline tolls and tariffs, licences authorizing the export of oil, gas and electric power and control of exports of refined oil products. It has administered the National Oil Policy (1961-74) and the National ENERGY POLICY. The board is designated as a department and reports to the minister of ENERGY, MINES AND RESOURCES and has all the powers vested in a superior court of record.

National Energy Program, *see* ENERGY POLICY.

National Farmers Union, voluntary organization of farm families, democratically structured to assure members full control at the local, district, regional and national levels. Objectives of the NFU include the betterment of the social and economic status of farmers through education, promotion of improved legislation and agricultural marketing structures, and reduction of costs and service charges. As a general farm organization, the NFU focuses on promoting integrated policies on a broad range of issues to resolve conflicts of interest that exist between regions and between producers of various commodities (*see* AGRICULTURE AND FOOD POLICY). Active participation in NFU activities by its women and youth members is encouraged. Incorporated through a 1970 Act of Parliament, the NFU was founded in July 1969 through an amalgamation of provincial farm unions in Ontario, Manitoba, Saskatchewan and BC. It also has members in the Maritimes and Alberta. Estimates of individual membership range from 20 000 to 30 000. *See* CO-OPERATIVE MOVEMENT.

STUART A. THIESSON

National Film Board was the principal focus for Canadian FILM activity for the first 2 decades of its history. The NFB has pioneered developments in social documentary, animation, documentary drama and direct cinema; and it has been a continuing initiator of new technology. Its films have won hundreds of international awards. The NFB was established 2 May 1939 under the terms of the National Film Act and following a report on government film activities by John GRIERSON, who was appointed the

first film commissioner in Oct 1939. The Act was revised in 1950, primarily to separate the NFB from direct government control; this revised Act includes the NFB's mandate to interpret Canada to Canadians and other nations. The NFB was originally designed as a modestly staffed advisory board, but the demands of wartime production, together with Grierson's personality, led to a shift into active production by absorbing (1941) the Canadian Government Motion Picture Bureau (formerly the Exhibits and Publicity Bureau, est 1919). By 1945 it had grown into one of the world's largest film studios with a staff of 787. More than 500 films had been released (including 2 propaganda series, *The World in Action* and *Canada Carries On*, shown monthly in Canadian and foreign theatres); an animation unit had been set up, nontheatrical distribution circuits were established and many young Canadian filmmakers trained.

Grierson resigned in 1945 and was replaced by his deputy, Ross McLean, who faced considerable difficulties in the postwar years. Budgets and staff were reduced and the NFB came under attack for allegedly harbouring left-wing subversives and as a monopoly that threatened the livelihood of commercial producers. McLean's replacement (1950), Arthur Irwin, calmed the storm, initiated a new National Film Act, restructured the NFB along modern bureaucratic lines and planned to move the NFB from Ottawa to Montréal (completed 1956 under Irwin's successor, Albert Trueman). Also during the postwar decade, production expanded into new areas: the first dramatic films were made, new techniques explored in animation, and the information film and production for TV initiated. Filmmakers paid more attention to style and technical polish, and new approaches emerged, more intimate in tone than the didactic approach of the war years. These were clearly evident in the films of one production group, Unit B, headed by Tom Daly, whose work led, in the late 1950s, to the world's first consistent use of direct cinema in the *Candid Eye* TV series. In Québec the NFB was viewed for some years as a federalist agency that denied Québec's cultural aspirations. French-language production was minimal until the late 1950s when the demands of TV and the move to Montréal provided catalysts for expansion. Many young Québec filmmakers were hired who were to play seminal roles in the flowering of Québec cinema in the 1960s, both within and outside the NFB. These filmmakers refused to accept the anglophone domination of the NFB's administration. After a series of protests, the appointment of the first French-speaking commissioner, Guy Roberge, initiated a series of changes that culminated (1964) in a total separation of production along linguistic lines.

Women filmmakers made major contributions during the war years but were then virtually absent from active production until the early 1970s. Encouraged by such series as *En tant que femmes* and *Working Mothers*, and the development of Studio D under Kathleen Shannon, women have since made significant contributions both as directors and technicians. Native peoples objected for many years to the folkloric and condescending images of themselves projected in NFB films. Only in the late 1960s, in such programs as *Challenge for Change*, did a truer portrait emerge. At the same time, Indians and Inuit were given access to NFB equipment to produce their own films. This initial impetus towards an increasing accessibility to the means of production was continued through the 1970s as the NFB established regional production centres across Canada. Animation has always been an NFB priority and, though the work of such pioneers as Norman MCLAREN is widely recognized, it has been the continuing commitment to encourage new talent that has maintained the vigour of this section and made it one of the most admired in the world (*see* FILM ANIMATION).

Production of dramatic feature films for theatrical release began in 1963-64 and has continued, despite debate about the appropriateness of such production within a state institution. Many NFB feature films have won international awards and have had wide release. The growth of the commercial film industry in the late 1960s and the expansion of film production within the CBC effectively eliminated the NFB from its once dominant position in Canadian film. But it has continued to attract talented new filmmakers, to emphasize high qualities of production, and to maintain its position as the world's most widely respected national film agency. PETER MORRIS

Reading: D.B. Jones, *Movies and Memoranda* (1982); James Rodney, *Film as a National Art: NFB of Canada and the Film Board Idea* (1977).

National Gallery of Canada in Ottawa has the most distinguished collection of Canadian and European paintings in the country. When the marquis of LORNE was governor general he encouraged the foundation of the Royal Canadian Academy of Arts and the National Gallery of Canada, and presided over an exhibition of works by future members of the RCA on 6 March 1880 (*see* PAINTING). At first the gallery was a collection of the diploma works of academicians, supplemented by occasional gifts. It was only in 1913, with the adoption by Parliament of an Act to incorporate the National Gallery, the appointment of a board of trustees headed by Sir Edmund Walker, and the confirmation by the board of the 1910 appointment of Eric Brown as director, that the National Gallery could claim even the ambition of equalling other national galleries throughout the British Empire.

Both Walker and Brown were interested in Canadian art. Even before Tom THOMSON died in 1917, for example, the gallery had bought his work. Subsequent curators, such as Robert H. Hubbard, J. Russell Harper, Jean-René Ostiguy, Jean Trudel, Dennis Reid and Charles Hill have built up a representative selection of both historical and contemporary Canadian art. Sculpture and the decorative arts have also been acquired. The gallery has received gifts from many patrons, including J.M. MacCallum, Vincent Massey, Douglas Duncan, Mr and Mrs Harry Jackman and Henry Birks.

To provide a context for Canadian art, the gallery in 1907 began to buy European art from the end of the Middle Ages to our time. Even with the limited funds available before WWII, important works were purchased, such as paintings by Piero di Cosimo, Bronzino, Canaletto, Monet and Degas. After 1945 purchases were made from the Prince of Liechtenstein, including a Rembrandt, a Rubens and 2 Chardins, and from the Vollard Estate, among them paintings by Cézanne and pastels by Degas. In recent years a few pieces of decorative arts and major pieces of SCULPTURE, including marbles by Puget, Bernini and Canova, have been added to the collection. Sir Edmund Walker, a print collector himself, encouraged the development of a prints and drawings collection (*see* PRINTMAKING; DRAWING). This tradition was continued under Kathleen M. Fenwick, curator from 1928 to 1968. In 1967 a PHOTOGRAPHY section was established, with James Borcoman as curator.

The National Gallery of Canada has always had a sense of national responsibility. By 1914 it was sending exhibitions and making extended loans to other museums across the country. It sponsors Canadian art abroad through the Venice Biennale and other exhibitions in places as distant as Tel Aviv and Peking. Gallery research, in conservation and the history of art, is exemplary (*see* ART WRITING AND CRITICISM; CONSERVATION OF CULTURAL MOVABLE PROPERTY). All media — exhibitions, film, television, radio — have been used to communicate with Canadians about gallery collections and Canadian art.

In 1968 the National Gallery was incorporated as part of the NATIONAL MUSEUMS OF CANADA, and in 1982 the Canada Museums Construction Corporation was established to provide the gallery with a home. After more than a century in borrowed space, the gallery will finally have a building of its own. The new building, designed by Moshe SAFDIE, will be in Ottawa.

JEAN SUTHERLAND BOGGS

Reading: Jean Sutherland Boggs, *The National Gallery of Canada* (1971); R.H. Hubbard, National Gallery of Canada, *Catalogue of Paintings and Drawings*, 3 vols (1951-60).

National Harbours Board, a crown corporation est by Parliament in 1936 to administer and provide specialized professional services to the 13 harbours and 2 grain elevators under its jurisdiction. It reports to Parliament through the minister of transport.

National Health and Welfare, Department of, est 1944 by the federal Department of National Health and Welfare Act. It was originally formed in 1919 as the Department of Health, which was merged with the Department of Soldiers' Civil Re-establishment to form the Department of Pensions and National Health in 1928. It has charge of matters relating to the promotion and preservation of the health, social security and social welfare of Canadians and is responsible for investigation and research into public health and welfare, inspection and medical care of immigrants and seamen and supervision of public-health facilities. Other programs include the CANADA PENSION PLAN, FAMILY ALLOWANCES and Old-Age Security, Vocational Rehabilitation and New Horizons. The NATIONAL COUNCIL OF WELFARE and the MEDICAL RESEARCH COUNCIL report to the minister. The department's 1984-85 budget was $23.9 million.

National Hockey League, established at Montréal 26 Nov 1917. The original teams were MONTREAL CANADIENS, Montreal Wanderers, Ottawa Senators and Toronto Arenas; Québec held a franchise but decided not to operate that season. In the next 25 years the league underwent numerous changes in composition, scheduling and playoff format. Boston Bruins were the first American club to join (1924); by 1926, 6 of the 10 teams were from the US. In 1942 there were 6 teams left (Montreal, TORONTO MAPLE LEAFS, Boston, Chicago Black Hawks, Detroit Red Wings and New York Rangers) and the league remained stable until 1967 when 6 new US-based teams were added (California — later Oakland — Seals, Los Angeles Kings, Minnesota North Stars, Philadelphia Flyers, Pittsburgh Penguins and St Louis Blues). Buffalo Sabres and VANCOUVER CANUCKS joined in 1970 and Atlanta Flames and New York Islanders in 1972. The number of teams reached 18 by 1974 (with the addition of Kansas City Scouts and Washington Capitals) — of which only 3 were based in Canada. One team folded in 1978 but Hartford Whalers, EDMONTON OILERS, QUEBEC NORDIQUES and WINNIPEG JETS joined the following year after the collapse of the WORLD HOCKEY ASSN. The Atlanta franchise moved to Calgary (*see* CALGARY FLAMES), bringing the number of NHL teams in Canada to 7. The majority of players in the NHL are still recruited from Canadian junior hockey, although the number of players from Sweden, Finland, Czechoslovakia and the US has increased dramatically. The NHL has failed to win large TV contracts in the US and its image of supremacy has been tarnished by its encounters with European teams, but it remains the premier professional HOCKEY league in the world. The STANLEY CUP, awarded exclusively to NHL teams since 1926, is emblematic of the world professional championship. JAMES MARSH

National Holidays As with most countries, Canada's national holidays mark religious, quasi-religious or patriotic occasions. Statutory holidays are established by Act of Parliament and are observed, without fail, by federal employees and by most Canadians, although, increasingly, statutory holidays are becoming days for shopping and for large sales. Canadian statutory holidays are as follows: New Year's Day; Good Friday; Easter Monday; Victoria Day; Canada Day (formerly called Dominion Day); Labour Day; Thanksgiving Day; Remembrance Day; and Christmas Day.

The derivation of the 3 Christian holidays needs no explanation. New Year's Day, Jan 1, marks the beginning of the new year. VICTORIA DAY (variously known as May 24th, the Queen's Birthday, EMPIRE DAY or Commonwealth Day) is celebrated in all provinces except Québec on the Monday before May 25 and has been a national holiday since 1901. Traditionally, cottages are opened for the summer and gardens planted on this weekend, and the day is still celebrated in some parts of the country with fireworks displays. CANADA DAY, July 1, commemorates the day on which Canadian CONFEDERATION came into existence in 1867, and is celebrated on the first Monday in July. Originally celebrated in rather quiet — and hence very Canadian — ways, Canada Day is now the occasion for elaborate cultural and entertainment spectacles, paid for by the federal government to foster Canadian nationalism.

LABOUR DAY is celebrated on the first Monday in Sept, once again providing an occasion for a long summer weekend. The day honours the contribution of organized labour and has been celebrated since at least 1872 and as a statutory holiday since 1894. Labour Day is usually celebrated with large parades and union picnics. Thanksgiving Day, which provides another long weekend, is observed on the second Monday in October (unlike the holiday in the US which falls on the last Thursday in Nov) and celebrates the harvest season. The statutory holiday began in 1879, almost certainly as an imitation of the American celebration, but earlier in the year as a recognition of the shorter growing season in Canada.

REMEMBRANCE DAY is observed on Nov 11, the day of the armistice that ended the Great War in 1918. Usually celebrated with ceremonies at cenotaphs in towns and villages and at the National Cenotaph in Confederation Square, Ottawa, the day is marked by a moment of silence at 11 AM and by gatherings or parades of veterans of the world wars and the Korean conflict.

A substantial number of holidays are celebrated in the provinces. Boxing Day, Dec 26, is becoming almost universally observed as a day to recover from the exertions of the Christmas season. Civic Holiday, variously called Heritage Day in Alberta and Saskatchewan and Simcoe Day in Ontario, is also celebrated in Manitoba and the NWT and gives a long weekend at the beginning of Aug. Quebeckers celebrate St Jean Baptiste Day on June 24 and take a day off work on the last Monday in June. Newfoundland observes St Patrick's Day, St George's Day, Discovery Day, Memorial Day (July 1) and Orangemen's Day. *See also* RELIGIOUS FESTIVALS.

J.L. GRANATSTEIN

National Income, strictly, is a money measure of the incomes received or accruing to residents of a country as owners of the agents of production, during a specified period of time. National income includes wages, rents, interest and profits, not only in the form of cash payments, but as income from contributions made by employers to pension funds, income of the self-employed, and undistributed business profits.

In market economies such as Canada's, the measures of national income include (with some exceptions) only those economic activities in which goods or services are sold in markets; the few exceptions ("imputed values") are illustrated by the inclusion in the estimates of a rental income for owner-occupied homes, and by the inclusion in the income of farmers of an estimate of the value of the produce from their own farms consumed by the farm families themselves. At the same time, official and nearly all private estimates do not include anything for the value of all of the services performed in the household by the unpaid homemaker (*see* HOUSEWORK). This large omission is serious if national income is being used to measure the well-being of a country's people. As it stands, this measure of national income is exactly equivalent to what the net production of goods and services would sell for on the market if there were nothing else added to the prices of goods and services; it is therefore a measure of the net value of products measured at factor cost. However, the prices at which goods are exchanged in markets do include indirect taxes such as sales taxes and customs duties. In the national accounts, these taxes and the allowances for depreciation and obsolescence may be added to the net national income at factor cost to obtain the measure "gross national product at market prices."

In Canada, official national income estimates are prepared by Statistics Canada. By collecting a wide range of economic and other statistical data, Statistics Canada incidentally obtains information useful in estimating national income and related items in the system of national accounts; when necessary, it conducts surveys specifically designed to elicit data for national income estimates. In addition, it can obtain information provided to other public bodies, eg, tabulations prepared from both personal and corporate income-tax returns.

The components of national income given in the official accounts partly depend on the available data. Wages and salaries paid to hired workers (the largest component) are shown because they can be obtained from data sources such as the census of manufactures, reports filed by financial institutions, and income-tax returns. Similarly, estimates of property income, the recompense for the productive services of capital goods, natural resources and entrepreneurship, are obtained from much the same sources and are shown in interest and rental income and corporation profits. Net interest and dividends paid to residents of other countries are not included. Incomes of unincorporated self-employed persons must be otherwise estimated. Incomes of farmers are estimated by subtracting from the receipts from sales of farm products the expenses incurred in production; the resulting farm income is a mixture of labour income (for the work of the farmer and his unpaid family), and of property income. Incomes of other unincorporated businesses, eg, those engaged in the professions, and in merchandising or service industries, are calculated in the same way, or, in some instances, from income-tax tabulations.

Gross National Expenditure, Canada (Billions$)

Personal expenditure on consumer goods and services	206.0
Government current expenditure on goods and services	75.7
Gross fixed capital formation of government	10.6
Gross fixed capital formation, private	65.8
Value of physical change in inventories	-8.7
Net exports of goods and services	1.2
Residual error of estimate	-1.7
GNE at market prices	348.9

National Income and Gross National Product, Canada (Billions$)

Wages, salaries and supplementary labour income	199.5
Military pay and allowances	2.2
Corporation profits before taxes less dividends paid to nonresidents	18.4
Interest and miscellaneous investment income	29.7
Accrued net income of farm operators from farm production	4.6
Net income of nonfarm unincorporated business including rent	14.0
Inventory valuation adjustment	-3.8
Net national income at factor cost	264.8
Indirect taxes less subsidies	40.6
Capital consumption allowances	41.9
Residual error of estimate	1.7
GNP at market prices	348.9

The indirect taxes and capital consumption allowances (depreciation) added to national income to yield GNP are derived respectively from government records and from business and other records; some imputation of depreciation is necessary in certain cases, eg, those involving government-owned buildings and owner-occupied housing.

The national accounts include 4 main categories of expenditure: consumer purchases; purchases of new capital goods by businesses, governments and persons; government purchases; and net exports of goods and services. The measure of these expenditures reflects the prices actually paid for goods and services. The expenditure on capital goods also includes both the component of capital expenditure that just makes up for capital consumption and the net addition to the capital stock. The sum of these expenditures is gross national expenditure.

Gross domestic product (as opposed to GNP), is a money measure of the value of all goods and services produced in Canada regardless of the fact that some of the income generated in their production may belong to residents of other countries. GNP is a measure of the goods and services that are available to residents of Canada. The former exceeds the latter to the extent that interest and dividends paid abroad exceed those received from abroad.

The UN has encouraged its members to prepare uniform national income calculations, but comparisons of the resulting per capita national incomes must be interpreted with care for 3 reasons. First, the exchange rates used to put such measures into a common currency so that the comparisons can be made, reflect the comparative prices in each currency only of goods that are traded internationally (comparative prices of untraded goods may not be at all well reflected in exchange rates); second, the size of nonmarket production and hence the portion of production that is not measured in national income estimates vary greatly among countries (typically, less-developed countries have relatively large nonmarket sectors of production); third, patterns of consumption vary greatly among countries and comparisons of money incomes may not reflect the effect of these variations on a population's well-being.

Comparisons are also made intertemporally for a single country. National income and related estimates are usually calculated first in the prices of the period (most commonly a year) to which they apply. For year-to-year comparisons, the aggregates, usually the national expenditure estimates, are deflated by price indices to remove the effects of price change from the changes in the aggregate production; they are then said to be measured in constant prices, ie, the prices of a particular year. M.C. URQUHART

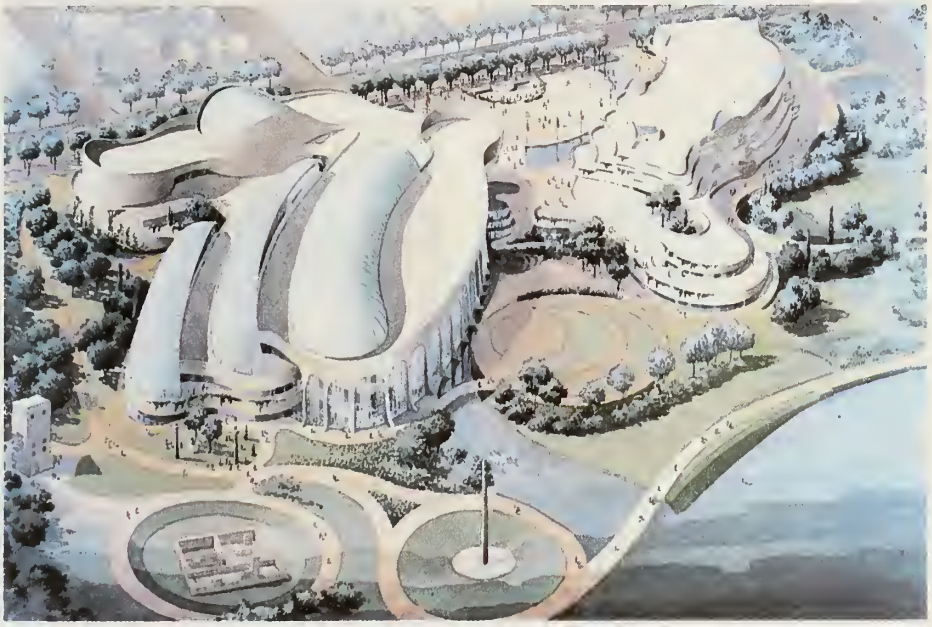
National Indian Brotherhood, *see* ASSEMBLY OF FIRST NATIONS.

National Library of Canada was established by the National Library Act (1953) as a government department to collect, preserve and promote the printed heritage of Canada, and it is housed in the same building as the PUBLIC ARCHIVES OF CANADA in Ottawa. A broad collection of foreign publications in the humanities and the social sciences is also available. The library maintains a central file of the principal collections held by Canadian libraries. It publishes the national bibliography (*Canadiana*), other bibliographies, checklists, indexes, union lists (inventories of periodicals collections), results of surveys, technical reports and exhibitions catalogues. Collections and reference services are available to users through mail, telephone and telex. A national system of interlibrary loan, with international connections, is co-ordinated by the library. Especially noteworthy are the following collections: Canadiana; official publications of the Canadian, provincial and foreign governments; music and other performing arts; economics; bibliography; and Judaica. The library holds the largest collection of Canadian newspapers and periodicals in Canada. Theses of most Canadian universities are filmed for preservation, sale or loan. Information can be provided on virtually all subjects through access to hundreds of Canadian and foreign information data banks. The National Library coordinates federal libraries and promotes the development of a nationwide library network to increase the sharing of library resources. Participation in international programs facilitates the exchange of books and information between countries. The library develops and promotes bibliographic standards to aid transfer of information between libraries both in Canada and internationally. Legal deposit regulations require that 2 copies of current Canadian publications be deposited with the library. Canadian publications are promoted both at home and abroad through general and specialized catalogues and exhibits. The library is directed by the National Librarian (W.K. Lamb 1953-68; G. Sylvestre 1968-83; M. Scott 1983-), assisted by a National Library Advisory Board comprising librarians and scholars from all parts of Canada.

GUY SYLVESTRE

National Museum of Man (NMM) traces its origins to 1841, when Queen Victoria granted £1500 for the "creation of the Geological and Natural History Survey of the Province of Canada" (*see* GEOLOGICAL SURVEY OF CANADA). The Survey was located in Montréal and scholars spread out across Canada collecting geological, archaeological and biological material. In 1877 an Act of Parliament ensured the continued existence of the Survey, which had broadened the collection base to include botanical, zoological and ethnographic specimens and artifacts. Four years later the Survey moved to the Clarendon Hotel in Ottawa. The fieldwork continued and the national collections grew. In 1911 the Survey occupied the new Victoria Memorial Museum building, an imposing piece of Gothic architecture usually called "the castle."

In 1910 a new Anthropology Division was established, under the direction of Edward SAPIR, which included 2 sections in charge of archaeological and ethnological fieldwork. Since 1911 the museum has been a centre for research in Canadian anthropology. When fire destroyed most of the PARLIAMENT BUILDINGS in 1916, however, the Parliament of Canada was housed in the museum building and the collections put in storage until 1920. In 1927 an Act of Parliament created the National Museum of Canada, although it was not until 1950 that its operational links were finally severed from the Geological Survey.



Artist's conception of the new National Museum of Man building, designed by Douglas Cardinal. Construction began in Hull, Qué, in 1984 and the building is scheduled for opening in 1988 (*courtesy National Museums of Canada/National Museum of Man*).

In 1942 the Canadian War Museum, established in 1880 but in storage since 1897, was formally inaugurated in the War Trophies Building. The CWM became a division of the National Museum of Canada in 1958, and expanded significantly when it took over the old PUBLIC ARCHIVES OF CANADA building in 1967.

The NATIONAL MUSEUMS OF CANADA Corporation was established in 1968, comprising the NATIONAL GALLERY, National Museum of Man (including the Canadian War Museum), NATIONAL MUSEUM OF NATURAL SCIENCES and NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY (and its National Aeronautical Collection).

By 1984 the NMM had grown to be one of the largest museums in the world. There are 5 scientific divisions: ARCHAEOLOGICAL SURVEY OF CANADA, Canadian Ethnological Service, Canadian Centre for Folk Culture Studies (*see* FOLKLORE), Canadian War Museum, and the History Division. The NMM carries out the usual museum activities in the areas for which it is responsible: collection of artifacts and data; conservation and preservation; scientific research; and exhibition and publication. Monographic series are published in archaeology, physical anthropology, ethnology, linguistics, folk culture studies and history, including military history. In the decade 1974-84 approximately 200 travelling exhibitions were circulated within Canada and to the US, Europe, Africa, New Zealand and Japan. Museum kits for schools, fact sheets and catalogues, and film and video programs are also produced.

Subsequent to a 1982 government announcement, in 1984 construction began on a new NMM building in Hull, Qué, designed by Douglas CARDINAL and scheduled to open to the public in 1988.

FRANK CORCORAN

National Museum of Natural Sciences (NMNS) The origins of the NMNS may be found in the GEOLOGICAL SURVEY OF CANADA (1842) and the National Museum of Canada. In 1956 Natural and Human History branches were established that were to become the NMNS and NATIONAL MUSEUM OF MAN (NMM) under the National Museums Act of 1968. Following a major renovation of the Victoria Memorial Museum in the early 1970s, only the permanent galleries of the NMNS and NMM remained in the building, with staff and collections being dispersed throughout the National Capital Region. After the 1988 relocation of the NMM to a new site in Hull, the NMNS expects to expand its exhibitions throughout the building's 8000 m^2 of available display space. The NMNS is a component of the NATIONAL MUSEUMS OF CANADA, a crown corporation reporting to the minister of communications.

The collections of the museum are its prime asset and in their scientific, heritage and commercial value are irreplacable. Although used in exhibits, they are much more than display collections for they contain the essential standards against which all biological and geological research is conducted. These specimens are the definitive proof of the existence, variation and distribution of animals, plants and minerals in time and space.

Curators, while collecting for the national collections, played an important role in exploring western Canada and, in more recent times, the Arctic. Notable were John MACOUN, who made valuable botanical studies of the Prairies in the 1870s; Percival Algernon TAVERNER, whose ornithological research culminated in the classic *Birds of Canada*, published in 1934; Charles Mortram STERNBERG, who collected more dinosaur fossils than any other individual, mostly from the Alberta Badlands; and Alf Erling PORSILD, an authority on the alpine and arctic plants of N America and Greenland.

The NMNS maintains collections of vascular plants, mosses, bryophytes, lichens, algae, birds, mammals, film and audio records of bird and mammal behaviour, reptiles, amphibians, fishes, invertebrate animals (notably molluscs, polychaetes and crustaceans), minerals, gemstones, rocks, vertebrate fossils (notably dinosaurs and Quaternary mammals), and fossil spores and plants. The majority of these collections are the most complete of their kind in Canada and many rank among the best in the world. The museum also houses a collection of natural history art, and collections of mounted birds and mammals that are available with specimens and models for exhibit and education programs. In total, the NMNS collections, soon to be rehoused in a new curatorial complex, contain over 2.5 million accessioned specimen lots that include about 5 million species. Approximately 100 000 specimens are added to the collections annually, with most collected by staff. An arctic research station is maintained on BATHURST I to support field projects.

Among the museum's first public successes were an exhibition of economically valuable minerals for the 1851 Great Exhibition in London and the instigation of specimen loans for schools in 1874. Currently, there are 8 exhibition galleries that average one-half million visitors annually, and more than 70 travelling exhibits that circulate to institutions throughout Canada and abroad are produced each decade. Innovative education programs continue to be an essential component of exhibitions, with theatre, film, workshops, field trips and other media being used to meet the needs of special audiences such as preschool children, the aged and the handicapped. A natural history information and identification service is available to the public. The NMNS publishes 2 scientific series, *Syllogeus* and *Publications in Natural Sciences*, in addition to trade publications which have included such national best-sellers as *The Birds of Canada* by W. Earl Godfrey.

The museum is organized into 6 curatorial research divisions (Botany, Invertebrate Zoology, Paleobiology, Mineral Sciences, Vertebrate Zoology, Zooarchaeology), 3 public programming divisions (Exhibit Planning & Design, Technical Operations, Public Services), an administration section and a directorate. In 1984 the NMNS had a budget of $7.7 million and a full-time staff of 140. Library, security and other support is provided to the museum by the National Museums of Canada Corporation. RIDGELEY WILLIAMS

Reading: A.F. Key, *Beyond Four Walls: The Origins and Development of Canadian Museums* (1973).

National Museum of Science and Technology (NMST) had its roots in the GEOLOGICAL SURVEY OF CANADA Museum (1842), renamed the National Museum of Canada in 1927. In 1966 a separate Science and Technology Branch was created, under its own director, and small collections of artifacts which had been under the trusteeship of other branches of the National Museum were transferred to it. In Apr 1967 an industrial warehouse on the outskirts of Ottawa was put at its disposal and the museum was opened to the public on 16 Nov 1967. The following year it became the NMST, a part of the NATIONAL MUSEUMS OF CANADA.

The NMST collects and preserves objects and data relating to scientific and technological history and development in Canada, carries out research, and sponsors exhibits and public programs. Major subject areas include pure science (mathematics, physics, chemistry), astronomy, transportation, communication, agriculture, forestry, fishing, extractive industries, industrial technology, energy, aviation and space, marine technology, fire technology, graphic arts technology, medical technology and photography. Collections total approximately 17 000 artifact lots with 54 000 individual objects, and 55 000 photos as well as associated archival material.

The National Aviation Museum, an autonomous submuseum of the NMST, is considered one of the world's finest aeronautical collections, and in 1984 construction began on a new building to house the historic aircraft and aero-engines assembled from Canadian Armed Forces, the Canadian War Museum and the first National Aviation Museum augmented by 30 aircraft since 1967. The new facility will provide for temporary aerotechnology and chronological displays of aircraft, a mock control tower, and permanent restoration and collections storage space. WWI aircraft demonstrations by museum staff at airshows and exhibitions across the country are very popular.

The museum's observatory houses Canada's largest refracting telescope, obtained from the Dominion Observatory, which is used for education programs. In 1983 astronomy evenings and telescope viewing attracted 5000 visitors. Monthly skysheets were distributed to 11 000 readers, and the monthly Stargazing column was published by 19 newspapers across Canada. Other public programming activities include steam train excursions between August and Thanksgiving from the museum to Wakefield, Qué, artifact demonstrations, regional science fairs, special tours and films, travelling exhibits and publications. Public attendance in 1980-83 averaged over of 700 000 each year. Exhibits, both continuing and temporary, use innovative design and display methods and stress visitor participation. In 1983-84 the NMST co-operated in several joint projects: with Agriculture Canada, in a new Agriculture Museum at the Central Experimental Farm; with Atomic Energy of Canada Ltd, on the uses of nuclear energy; with the CBC, on the history of public radio in Canada, from Marconi and Fessenden to satellite distribution and digital transmission; and with the National Research Council, on scientific expeditions to the North Pole and on a "Canadarm" space exhibit.

NMST has been in the forefront of developing modern museum practices, with experiments in the use of computers, traffic management studies, analysis of visitor patterns, and the use of the outdoor surroundings of the museum as a technology park. Its expertise in restoration of heavy objects, particularly those in transportation, has been made available to museums both nationally and internationally. DAVID M. BAIRD

National Museums of Canada is the collective title of the NATIONAL GALLERY OF CANADA, NATIONAL MUSEUM OF MAN, NATIONAL MUSEUM OF NATURAL SCIENCES and NATIONAL MUSEUM OF SCIENCE AND TECHNOLOGY, joined in a single corporation with the Canadian Conservation Institute, the Museum Assistance Program, the National Museum Library, and a range of museums' support and administrative units. Together, the museums collect and conserve data and artifacts, particularly in relation to the Canadian heritage; conduct research in their various disciplines; sponsor publications as well as public programs and exhibits both in Ottawa and across the country; aid and advise institutions and individuals abroad; and assist and partly fund galleries and museums within Canada.

The NMC Corporation owed its origin to many factors, including a desire for more dynamic leadership and to simplify the procedure of reporting to government, but also to augment the role of the museums nationally and thereby attract more funding to the institutions. Several resignations and feuds inside the National Museum during the 1950s and 1960s also attracted unwelcome attention, which was increased when a long-delayed new building was again postponed in 1967. In Nov 1967 Secretary of State Judy LAMARSH introduced a bill in the House of Commons providing for the reorganization of the federal government's cultural repositories into one corporation. Despite some vociferous objections, the National Gallery was embedded in the new entity, while the former National Museum was divided into 3 parts. Within the corporation, the 4 directors reported to a new board of trustees, who, with a secretary general, supervised the National Museums, in conjunction with special advisory committees for each museum or gallery. The National Museums Act took effect on 1 Apr 1968.

A further change occurred in 1972 when Gérard PELLETIER, as secretary of state, announced a new policy intended to strengthen the role of the national museums within Canada. A Museum Assistance Program was established to furnish subsidies to regional and local museums, and other central services were expanded to help local collections unable to afford elaborate and expensive equipment and highly trained personnel (*see* CONSERVATION OF MOVABLE CULTURAL PROPERTY). The effect was most beneficial, although critics noted that subsidies, once started, tended to become permanent as local museums integrated them into their budgets. It also proved impossible, in the long run, to accommodate every museum and every purpose in the subsidy program.

Although much progress was made in rehabilitating the central museum facilities during the 1970s, it remained true that new buildings were a relatively low priority of government, with the effect that museum facilities were dispersed all over the Ottawa region, sometimes in highly inappropriate quarters and locations. The style in which the museums and the National Gallery were administered varied according to the particular board and secretary general. Relations between the board and the secretaries general were not always smooth, and in case of conflict it was still necessary, as it had been before 1968, to appeal to the attention of an often busy and preoccupied minister. While, in the early 1980s, money was finally made available for new National Museum of Man, National Gallery and National Aviation Museum buildings, direction of their construction was assigned to a new CROWN CORPORATION, the Canada Museums Construction Corporation, separate from the National Museums. In retrospect, it appears that the attempt to distance the National Museums from the public service, which seemed so promising in 1967-68, was not entirely successful, while the attempt to broaden the museums' national service, and therefore their political support, was achieved at the cost of postponing necessary improvements at the centre. It was, in short, a very Canadian compromise. ROBERT BOTHWELL

National Policy, tariff protection for Canadian manufacturers, the rallying cry of Sir John A. MACDONALD's Liberal-Conservative Party in its successful 1878 general election campaign. Alexander MACKENZIE's Liberal Party, in office 1873-78, adhered to a policy of tariffs for revenue purposes — around 20% CUSTOMS duties on manufactured goods — despite the depression of the 1870s and the failure of the government's 1874-75 attempt to negotiate a RECIPROCITY agreement with the US. Macdonald's National Policy became a public issue after the Liberal government failed to raise the tariff in the 1876 budget. It was set in motion in the budget of 14 Mar 1879 after consultation with business interests. It was intended to be a nationalistic policy which would broaden the base of the Canadian economy and restore the confidence of Canadians in the development of their country. That the National Policy would also assist in the development of a group of wealthy businessmen who could be counted on to contribute generously to the Conservative Party was another factor that Macdonald acknowledged. The tariff on most foreign manufactured goods was increased, affording substantial protection to Canadian manufacturers. Equally important to the manufacturers were the reduced customs duties on the necessary raw materials and semi-processed products, which lowered their costs of production.

Over time the National Policy took on a broader meaning in Conservative Party rhetoric, which tended to equate the National Policy with its larger development policies: the CANADIAN PACIFIC RAILWAY (1880); western settlement (the DOMINION LANDS Act of 1872 and immigration policy); harbour development; and the subsidization of fast steamship service to Europe and Asia to facilitate the export of Canadian products. It became the centrepiece of Conservative Party policy for decades, being espoused by R.B. BENNETT in the 1930s as fervently as it was by Macdonald in the 1880s. Macdonald's last election, in 1891, was fought in defence of his Na-

tional Policy. Sir Wilfrid LAURIER's Liberal government, 1896-1911, adopted the PROTECTIONIST principles if not the rhetoric of the National Policy tariff and kept its general tariff at similarly protectionist rates. Even the Laurier government's famous reciprocity agreement with the US in 1911 made only a few concessions on import duties on manufactured goods; the bulk of the agreement abolished duties on natural products, and customs duties were lowered on a restricted list of manufactured goods. But this alarmed manufacturers enough to swing their support back to the Conservatives in the 1911 general election. Campaigning on the argument that a mature economy had developed under the National Policy, that reciprocity threatened the Canadian economy, and that the choice before the electors was "whether the spirit of Canadianism or of Continentalism shall prevail on the northern half of this continent," Robert BORDEN's Conservatives swept to victory, bringing a continuance of the National Policy. *See also* CONTINENTALISM; NATIONALISM; ECONOMIC NATIONALISM.

ROBERT CRAIG BROWN

Reading: V.C. Fowke, *The National Policy and the Wheat Economy* (1957); Robert Craig Brown, *Canada's National Policy, 1883-1900* (1964); P. Russell, "The National Policy, 1879-1979," *Jnl of Canadian Studies* 14 (1979).

National Research Council of Canada (NRC), federal CROWN CORPORATION responsible to Parliament, through the minister of state for science and technology. The NRC was formed in 1916 as the Honorary Advisory Council for Scientific and Industrial Research. It immediately funded research committees for special needs, offered science fellowships at Canadian universities, and carried out a research inventory (the first statistical review of Canadian scientific manpower and budgets). Early plans to found an NRC national laboratory at Ottawa were not authorized until 1928. During the presidency of H.M. TORY (1923-35), laboratory staff reached 153, including 54 scientists and research engineers all but one of whom were employed on industrial or applied research. Tory's successor, Gen A.G.L. MCNAUGHTON, enlarged the staff to 300 and prepared the NRC laboratories for their central role in war research (from medicine and food packaging to weapons and synthetic fuels). Under C.J. MACKENZIE, president from 1939 to 1952, NRC staff reached 2000 and was reorganized to provide a stronger foundation in basic (pure) SCIENCE. Pres E.W.R. STEACIE (1952-62) established the principle that NRC extramural budgets for university grants and fellowships should rise to match the intramural budget ($21.5 million in 1962-63) and initiated the Industrial Research Assistance Program for extramural grants to private industry (*see* INDUSTRIAL RESEARCH AND DEVELOPMENT).

Many of the NRC's functions have been "spun off" to separate bodies. For example, the council was the government's general adviser on SCIENCE POLICY from 1916 until the Science Secretariat was created in 1964. Laboratory activities initiated by the NRC and delegated to separate bodies include military research (to the DEFENCE RESEARCH Board, 1947), atomic research (to ATOMIC ENERGY OF CANADA LTD, 1952), medical research grants (to the MEDICAL RESEARCH COUNCIL, 1966), and university grants and scholarships (to the NATURAL SCIENCES AND ENGINEERING RESEARCH COUNCIL, 1978).

Structure and Functions

In 1984 the NRC had a total staff of 3207 (including 1061 scientists and research engineers) and a budget of $500 million. The 13 laboratory divisions, all but 4 of which are situated in Ottawa, include those for oceanography (the Atlantic Research Laboratory, Halifax); biology (Plant Biotechnology Institute, Saskatoon, and Division of Biological Sciences); physics and chemistry (Canada Centre for Space Science, Division of Chemistry, Division of Physics and Herzberg Institute of Astrophysics); engineering (Institute of Marine Dynamics, St John's, Industrial Materials Research Institute, Montréal, Division of Building Research, Division of Electrical Engineering, Division of Mechanical Engineering and National Aeronautical Establishment). Another institute was being planned in 1984, for biotechnology (at Montréal).

Since about 1920, continuing extramural activities have included dozens of Associate Committees on special problems, from tuberculosis to railways, from tribology (the science of lubrication and friction) to the National Fire Code. The NRC represents Canada in several international bodies and co-ordinates multilateral special projects, such as the Canada-France-Hawaii astronomical OBSERVATORY and the Tri-University Meson Facility in Vancouver. The NRC library, founded in 1924, became the national science library in 1957 and, in 1974, was renamed the Canada Institute of Scientific and Technical Information. CISTI collects all the world's major scientific journals for the main branches of science and engineering and a selection of others, totalling 33 642 serials in Apr 1982. In 1981 it supplied more than 200 000 requests, made in person or by mail or telex, and carried out more than 200 000 computer searches of the scientific literature. The NRC founded the *Canadian Journal of Research* in 1929. It now publishes 11 scientific journals and subsidizes 15 others. Also, since 1929, it has maintained a Technical Information Service to provide advice and information to INDUSTRY. In 1981-82 it answered 28 000 inquiries, chiefly from medium- and small-sized manufacturers.

DONALD J.C. PHILLIPSON

Reading: W. Eggleston, *National Research in Canada: The NRC 1916-1966* (1978); M. Thistle, *The Inner Ring: The Early History of the National Research Council of Canada* (1966).

National Resources Mobilization Act, was passed 21 June 1940 by Parliament as a result of stunning German victories in the spring. The Act enabled the government to requisition the property and services of Canadians for effective home defence. An earlier promise made by PM Mackenzie King in 1939 not to introduce CONSCRIPTION for overseas service was honoured, but it was reversed in Apr 1942 following a national referendum. The amended NRMA added a conscript army to the existing regular volunteer forces, creating a duality in Canada's military that was to last until the war's end. The NRMA's most important contribution to the war effort was that it provided trained recruits for the regular forces: from 1940 to 1944 close to 60 000 NRMA men ("zombies") volunteered for general service, and several thousand more were sent to the front after the introduction of general conscription late in 1944. N.F. DREISZIGER

National War Labour Board, est 1941 with 5 regional boards to enforce the Canadian government's program of wage stabilization in the volatile wartime economy. The first chairman was Humphrey MITCHELL, later also minister of labour. In early 1943, strong pressures created by a steel strike and worker agitation led to his replacement by Justice C.P. McTague. McTague had broad powers to deal with labour militancy and, unlike Mitchell, he was not identified with partisan politics. PM Mackenzie King instructed him to recommend modifications to the Wage Stabilization Order and to draft a labour-relations code. McTague and his colleague on the board, lawyer Joseph Cohen, had strong personal and political disagreements that resulted in separate reports being presented in Aug 1943. Cohen was dismissed, but McTague's report considerably affected government policy. McTague recommended that the board should have the authority to adjust wages that had been held down unfairly by the government and that family allowances might be considered as an alternative policy if it appeared that wage adjustment would be inflationary. The government eventually adopted both recommendations. McTague's wartime labour code took form on 17 Feb 1944. It defined the right of labour to organize and established a system for defining and certifying bargaining units. It formed the basis for the postwar Canadian system of LABOUR RELATIONS. The board's authority declined soon afterwards, when McTague resigned to become a Conservative candidate. JOHN ENGLISH

Nationalism is the doctrine or practice of promoting the collective interests of the national community or STATE above those of individuals, regions, special interests or other nations. In the arts, nationalism is the expression of, or the appeal for, distinctive national styles. Although its historic origins are diverse, in its modern forms nationalism is a product of the late 18th and 19th centuries, particularly of the American and French revolutions and the unification movements in Germany and Italy. Emulating the European and American models, national movements of self-determination and liberation have, over the past 200 years, transformed nationalism into a worldwide political and cultural phenomenon. In the first 25 years after WWII, 66 new nations were created.

In Europe nationalist thought has contained a central (though often merely implicit) notion of racial superiority which has frequently been expressed in the display and use of military force. In contrast, US nationalism blossomed from the romantic conception of a free people joined together under God to create a new and perfect union, free forever from European sins and weaknesses. Nationalism does not necessarily have a particular ideological slant, but varies from right to left on the political spectrum; its flavour and content depend upon the historical circumstances.

Canada came to consciousness in a period when world war had undermined European power and discredited types of European nationalism and when the national power and influence of the US had spread throughout the world. In the Western world, the 2 wars, which were widely attributed to the excesses of nationalism, have contributed (along with liberal and Marxist historical thought) to strong antinationalist and internationalist reactions. Since 1945, Canadians have been divided about the Canadian variety of nationalism. Their federal governments, reflecting this confusion, have varied from the antinationalist to the nationalist — with incongruous results. The postwar prime minister most committed in rhetoric to the defence of national interests, John DIEFENBAKER, was probably the least effective in that defence; the prime minister most ardently opposed in principle to nationalism, Pierre Elliott TRUDEAU, zealously defended a nationalist ENERGY POLICY.

The aftermath of WWI brought a surge of cultural nationalism, centered in Toronto and reflected in the painting of the GROUP OF SEVEN, in the founding of the *Canadian Forum*, and the literary commentary of William Arthur Deacon in *Saturday Night* magazine. Political nationalism, under the guidance of the Liberal government of W.L. Mackenzie KING, was directed against the fading symbols of colonial ties with Great Britain. This anticolonial nationalism met no resistance from Great Britain, but it conflicted with the attachment many English-speaking Canadians felt for British symbols, an attachment most persistently expressed politically through the CONSERVATIVE PARTY. WWII thrust Canada, willy-nilly, into close military and economic integration with the US, which seriously undermined the possibility of independent Canadian nation-

hood. By 1945 the federal Liberal government and its influential senior civil service were inclined to believe that the country had passed beyond the era of nationalism into internationalism (in diplomacy) and CONTINENTALISM (in economic and cultural relations with the US), a condition considered blessed. In his last years of power, however, King sometimes brooded about the dangers of this absorption, and dreamed of independence. But, after the spring of 1946, COLD WAR hysteria caused King, as well as most Canadian politicians and their followers, to suppress such ideas.

Canadian national consciousness and the articulation of national interests were unexpectedly placed in suspension for a decade. English-speaking Canada was absorbed in economic development and Québec remained enveloped in its past. A vast and generally comfortable cultural and economic invasion from the south took place with the country's tacit consent. Only very tentative nationalist alarms could be sounded in this atmosphere of approval. The first of these in the postwar period was the Report of the Massey Royal Commission on NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES (1951). It noted that the Canadian community faced not only dispersal in a vast landscape, but "influences from across the border as pervasive as they are friendly." In education, book publishing, magazine publishing, filmmaking, and radio the commission surveyed the American influences of Canadian life and warned of "the very present danger of permanent dependence." Its nationalist program for containing the cultural challenge was increasingly accepted by the Liberal government of the early 1950s, while the same government maintained its indifference to any measures of ECONOMIC NATIONALISM. The Gordon ROYAL COMMISSION ON CANADA'S ECONOMIC PROSPECTS warned in 1956 of the potential dangers of economic subordination to the US and offered a mildly nationalist program of countermeasures. It was ignored by the ST. LAURENT administration. In view of the growth of direct US investment in Canada (*see* FOREIGN INVESTMENT), and Liberal encouragement of it, both the Conservative and CO-OPERATIVE COMMONWEALTH FEDERATION (CCF) opposition parties spoke in nationalist tones before the 1957 general election that brought the Conservatives to power. But in 6 years the Diefenbaker government could not work out a coherent cultural or economic program and continued, in practice, to promote economic and military integration with the US, while at the same time antagonizing the US administration with its defiant manner.

The Conservative defeat of 1963 brought a reformed Liberal Party to power under Lester B. PEARSON. In the beginning the Pearson government was dominated by the nationalist economic views of the minister of finance, Walter GORDON, a dissenting and atypical member of the Toronto business establishment. Gordon's program for gentle patriation of the economy suffered setbacks in Parliament and in party caucus almost immediately, but measures to limit foreign ownership of newspapers, magazines, radio and television were adopted in 1965, and the CANADA DEVELOPMENT CORPORATION was eventually established. After 1965 the Pearson government retreated into quietism and came to terms with the opponents of nationalist policy in the business community. The Report of the Watkins Task Force on FOREIGN OWNERSHIP AND THE STRUCTURE OF CANADIAN INDUSTRY (1968) was officially ignored, as had been the Gordon Report. The government's renewed anti-nationalism was reinforced by the accession in 1968 of Pierre Trudeau, whose dogmatic opposition to nationalism was the product of his experiences in Québec under DUPLESSIS and from his interpretation of European history.

The relative failure of Canadian nationalist policies in the 1960s and the evidence of overwhelming American influence in Canada stimulated the growth of a variety of popular nationalist organizations and activities in English-speaking Canada from 1968 onwards. The COMMITTEE FOR AN INDEPENDENT CANADA, led by Walter Gordon, Abraham Rotstein, Mel Hurtig, Peter NEWMAN and others lobbied during the 1970s for a range of nationalist policies. The WAFFLE group sought to stiffen the nationalist backbone of the NEW DEMOCRATIC PARTY but was eventually defeated and dispersed. The Public Petroleum Association incorporated nationalists from both movements in its campaign for repatriation of the oil industry. A select committee of the Ontario legislature on economic and cultural nationalism, a national commission on Canadian Studies at the university level led by T.H.B. Symons, and various commissions on national identity in the media were active in the early 1970s. During its MINORITY GOVERNMENT of 1972-74, the federal Liberal government conceded to evidence of increasing popular support for nationalist policies by creating the FOREIGN INVESTMENT REVIEW AGENCY and PETRO-CANADA, although both organizations lacked any clear direction from the Cabinet during their early years.

The nationalist movement in English-speaking Canada was weakened in the 1970s by an unreconciled division over attitudes to Québec nationalism. One element, while sympathetic to the cultural and linguistic aspirations of the Québecois, regarded Québec nationalism as a subversive force threatening the integrity of Canada. Another element saw it, on the contrary, as a potential complement to Canadian nationalism, to be emulated by English-speaking Canadians. The division has lasted into the 1980s, when both Québec and Canadian nationalism seem to have lost their popular momentum. Following the Liberal Party's defeat in 1979, the Conservatives under Joe CLARK adopted a generally antinationalist stance favouring appeasement of MULTINATIONAL CORPORATIONS and the provinces, but the stance was uncertain and was incoherently applied in policy. The government's early parliamentary defeat precipitated the election campaign of 1980, during which Pierre Trudeau and Marc LALONDE, in response to what they perceived as the forces of national disintegration in Québec and the West, adopted strong nationalist-centralist attitudes that led, on their return to power, to a drive for unilateral patriation of the Constitution and to the National Energy Program of November 1980. This new Trudeau nationalism was blunt and heavy-handed, aimed at undercutting the growing power of the provinces rather than promoting national objectives for their own sake. It promoted strong responses from the provinces and from international business, who were able to appeal both to an unusual Canadian sense of fair play and to strong latent distaste for the prime minister's style. In the face of this opposition, the government's constitutional policy was adjusted to meet some provincial objections (though not those of Québec); and the energy policy was modified.

In the fall of 1982 the Federal Cultural Policy Review Committee (Applebaum-Hébert) completed the first comprehensive survey of federal cultural policy since Massey's 1951 Royal Commission Report on Arts, Letters and Sciences. This review lacked the clear national vision and impact of the Massey Report. While it reflected the vastly expanded range of Canadian cultural enterprise in the intervening years, and contained over 100 policy recommendations, its proposals for retrenchment in the NATIONAL FILM BOARD and the CBC gave the Canadian cultural community confusing signals about national policy.

Since 1945 the provinces, with only occasional exceptions (particularly Saskatchewan under the NDP's Allan BLAKENEY from 1971-82), have followed open-door economic policies in competitive pursuit of foreign investment, regarding Ottawa's intermittent ventures into economic nationalism as misguided or worse. In the 1970s, however, the resource-rich provinces at last began to retrieve substantial shares of the economic rents formerly lost to the multinationals, but they typically did so in the name of provincial rather than national interests.

Canadian interests and the expression of national sensibility have been relegated to the margins of Canadian public life because of the overwhelming influences of American business and American culture in Canada and of the pressures of provincialism. Policies of national self-protection accepted as normal and uncontroversial in other industrial countries have been regarded with widespread alarm and disapproval in Canada. Efforts to sustain the Canadian arts have always been faced with the mass-marketing advantages of American competitors, whose products spill over the border, and with the dispiriting effects of rapid changes in technology that frequently render regulation obsolete. Nationalism in Canada, under the persistent barrages of the provincial governments, the business community, and the American private lobbies, administrations and media, has remained defensive and apologetic, rarely aggressive and never expansionist. It has become tenacious, but it remains the precarious nationalism of a diverse community that is still only dimly aware of itself, existing always in the American shadow and beset by doubt. *See* FRENCH CANADIAN NATIONALISM; NATIONAL POLICY; ECONOMIC NATIONALISM; IMPERIALISM; REGIONALISM. DENIS SMITH

Reading: D. Cameron, *Nationalism, Self-Determination and The Quebec Question* (1974); W.L. Gordon, *A Choice For Canada* (1966); G. Grant, *Lament For A Nation* (1965); K. Levitt, *Silent Surrender* (1970); Denis Smith, *Gentle Patriot* (1973).

Nationalist League fd in Montréal 1 Mar 1903, during renewed British IMPERIALISM, increased anglophone aggressiveness towards Francophones and growing Canadian INDUSTRIALIZATION. Comprising a few largely unknown journalists and lawyers, including Olivar Asselin (president), Omer Héroux (secretary) and Armand Lavergne, the league sought to spread the nationalist views of its indisputable mentor, Henri BOURASSA. Its program focused on achieving a purely Canadian NATIONALISM and was based on 3 points: autonomy of Canada in the British Empire and the provinces in Confederation; respect for Canadian duality; and establishment of uniquely Canadian economic and cultural policies.

The league had no clearly defined structure and had few members. After a promising beginning, when it launched the weekly *Le Nationaliste* and organized public meetings featuring Bourassa, it almost disappeared in 1906. The league then inspired the "nationalist movement." The nationalists were stubbornly doctrinal, tireless opponents of the governments in power and fervent participants in Québec electoral politics. But because it was poorly organized, elitist and too closely associated with Bourassa, the "nationalist movement" gradually declined after the 1912 provincial election without having attained its major objectives. (*See* FRENCH CANADIAN NATIONALISM.) RÉAL BÉLANGER

Nationalization, the takeover of ownership and control of a privately owned enterprise by the STATE. States have traditionally taken private property for public purposes, eg, land for construction of roads; but this "right of eminent domain" is in contrast to nationalization, which is often carried out in pursuit of economic, social or political policies, eg, to increase Canadian

ownership in the petroleum industry through the takeover of foreign oil companies by the federal crown corporation PETRO-CANADA. Whether it is justified for pragmatic reasons, eg, the provision of an essential service, or for broader collectivist goals, such as ECONOMIC NATIONALISM, nationalization infringes on the liberal tenet of the security of property. The state uses or threatens to use its power to obtain property either by expropriation, with or without compensation, or by acquiring property in a sale by using pressure and excluding other purchasers. Although compensation may be prompt and fair, the threat of coercion may reduce the value of property, and the state claims to be the final arbiter.

When a state nationalizes the holdings of foreign investors, the position of Western industrialized countries (especially the US) is that nationalization is only justified after prompt and adequate compensation, determined by an impartial authority. However, developing countries, in which there is often great resentment of foreign control, argue that states have perpetual sovereignty over their own resources and have the right to nationalize in order to further economic self-determination and economic development. They claim that nationalization and compensation are subject only to the laws of the nationalizing country — a position embodied in resolutions of the UN General Assembly, including Resolution 1803 of Dec 1962. However, nationalization is usually accompanied by compensation in recognition of fairness and of the need to maintain the confidence of foreign investors.

Although Canada generally supports the ideology of free enterprise, the extent of foreign ownership and control of Canadian resources prompted nationalizations during the 1970s, particularly by NEW DEMOCRATIC PARTY governments in BC (1972-74), which nationalized a number of firms in the forest-products industry, and in Saskatchewan (1975), which announced that it would nationalize at least 50% of the potash industry. Throughout the decade, the federal Liberal government proposed "Canadianization" of the oil industry, but Canadianization does not necessarily mean nationalization, since it includes the purchase of foreign firms by private Canadian companies. Moreover, state control was achieved by purchase, involving little coercion. Nonetheless, critics claimed that government measures distorted the market values and that too little or too much was paid.

The spate of nationalizations and a reaction against the increasing power of the state in the economy resulted in a countermovement, dubbed denationalization or "privatization." The BC Social Credit government "privatized" the BC Resources Investment Corporation, a crown corporation established by the previous NDP government, by giving away 5 free shares for every adult and child in the province and by exhorting residents to purchase more; they did, but the value of the shares dropped from $6.00 to $3.00. Federally, the short-lived Progressive Conservative government under Joe CLARK espoused the same philosophy, but its threat to "privatize" Petro-Canada was instrumental in its defeat in the subsequent election. The succeeding Liberal government re-emphasized Canadianization in the National Energy Program of 1980; this emphasis again shifted in Sept 1984 when the new Conservative government announced its intention to sell off several crown corporations and to alter the NEP. J. DONNER

Native Council of Canada Up to the 1950s, MÉTIS interests were represented by a variety of local political organizations and activists (*see* Louis RIEL; Gabriel DUMONT; James BRADY; Malcolm NORRIS). In 1961 the National Indian Council was founded as an umbrella group for Métis and Indian concerns. When these 2 groups proved politically incompatible, the Council split in 1968 to form the Canadian Métis Society (since 1970 the Native Council of Canada) to represent Métis and nonstatus interests and the National Indian Brotherhood (now ASSEMBLY OF FIRST NATIONS) to represent status Indians. The NCC is composed of provincial and territorial organizations, usually called Native Councils or Métis and NonStatus Indian Assns.

The NCC holds an annual assembly at which member organizations are represented, and is governed by a board of directors, consisting of presidents of the member associations, and an executive elected by the assembly. It is funded almost entirely by the federal government's Native Citizens' Directorate. The Constitutional Review Commission also receives federal funds to participate in the First Ministers' conferences on ABORIGINAL RIGHTS.

The number of persons represented by the NCC has been a matter of controversy. The NCC asserts there are one million Métis and nonstatus persons, but Statistics Canada data from the 1981 census indicate that only 75 110 persons identified themselves as nonstatus Indians and 98 260 identified themselves as Métis. The accuracy of these statistics is still unknown. Proposed changes in the INDIAN ACT to remove sections that treat some Indian women and their children differently from Indian men and their children will restore status to many persons now represented by the NCC (*see* Jeanette LAVELL). The NCC's constituency was reduced in Mar 1983 when provincial member associations from Manitoba, Saskatchewan and Alberta (always a distinct force within the organization) withdrew to establish the Métis National Council.

NCC policy operates around the premise of Métis nationalism within the Canadian context and the deeply felt sense of Indianness among the nonrecognized native people. It asserts that these groups have the right to define themselves historically and culturally, and to improve their position in modern Canadian society. NCC rests its demands on aboriginal rights (as mentioned in the Constitution) as well as on needs, and seeks a special relationship for Métis and nonstatus Indians with the federal government. *See also* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM. MICHAEL POSLUNS

Native People The native peoples of Canada are considered under 6 subheadings: Arctic, Eastern Woodlands, Northwest Coast, Plains, Plateau and Subarctic. Cross references are provided to entries on tribal groups and to thematic articles on native peoples.

Arctic

Territory and Natural Environment The INUIT have enjoyed almost exclusive occupation of the Canadian Arctic, those inland and coastal areas N of the TREELINE. In areas close to the treeline, Inuit and Indians have traditionally occupied similar environments (though rarely at the same time) and have hunted and fished similar game species. The arctic regions are characterized by long daylight hours in summer, with moderate temperatures. Winters are long and cold, and at more northerly locations there is a midwinter period when the sun is entirely absent. Plant cover may be continuous, especially in well-watered locations, although rocky outcrops and barren dry areas are common. Trees are entirely lacking in the Arctic, though low shrubby plants occur, including several varieties bearing edible berries. Landforms are variable, from lake-studded lowlands to glacier-strewn alpine areas (*see* VEGETATION REGIONS).

Major Language and Tribal Groups There are 8 main Inuit tribal groups in Canada, the LABRADOR, UNGAVA, BAFFIN ISLAND, IGLULIK, CARIBOU, NETSILIK, COPPER and Western Arctic Inuit (*see* NATIVE PEOPLE, DEMOGRAPHY). The Western Arctic Inuit (or Inuvialuit) are recent immigrants, or their descendants, from Alaska, taking the place of the MACKENZIE INUIT, who were decimated by





Etching (c1824) of a group of Inuit by Capt G.F. Lyon. Inuit skillfully made clothing and footwear from animal skins. The parka usually consisted of an inner and outer jacket of caribou fur, and the footwear was of sealskin (*courtesy Public Archives of Canada/C-25703*).

several smallpox and influenza epidemics at the turn of the century. The SADLERMIUT, in northwestern Hudson Bay, died out following contact early this century (*see* NATIVE PEOPLE, HEALTH).

All of the Canadian Inuit speak one language, Inuktitut or Eskimo-Aleut, though there are 6 different dialects (*see* NATIVE PEOPLE, LANGUAGES). However, because of improved travel opportunities and the development of Inuit-language radio and TV programming, language differences are diminishing (*see* COMMUNICATIONS IN THE NORTH; NATIVE PEOPLE, COMMUNICATIONS). Traditionally, there was no written language, but after contact with missionaries, writing systems were widely adopted. Since 1920 the adult literacy rate has been almost 100%.

Historical Summary The first sustained contact with outsiders occurred between Moravian missionaries and Labrador Inuit in the late 18th century. Fleeting trade contacts were established at a few other locations in the Arctic, but most contact occurred nearly a century later. During the latter half of the 19th century, explorers and commercial whalers introduced various trade items to the Inuit, though it was only following the end of commercial whaling, at the time of WWI, that trading posts became more or less permanently established in the arctic regions. Mission stations and police posts were also established during this period. Following WWII there was an intensification of government activity, including the establishment of schools, nursing stations, airports and communication installations, and housing programs in the newly established settlements and hamlets (*see* NATIVE PEOPLE, GOVERNMENT POLICY; NATIVE PEOPLE, GOVERNMENT PROGRAMS).

Traditional Culture Inuit tribal groups in traditional times contained 500-1000 members. The most important social and political unit was the regional BAND, several of which together constituted the larger tribal group within which marriages occurred and all members spoke a similar dialect. Regional bands would congregate for short periods, customarily during the winter months, when people would gather in sealing camps. During the rest of the year, they lived in smaller bands, often composed of 2 to 5 families. Each household generally consisted of a married couple and their children, though elderly or unmarried relatives might also be present. Many economic and social activities involved interhousehold co-operation, and widespread sharing was, and still is, a predominant characteristic of Inuit social life. Most families who chose to live together were closely related, with leadership of the group generally assumed by the oldest active male member.

Marriage was nearly universal among Inuit and customarily took place in early adulthood; it was usual for the young couple to reside close to the parents of one or the other spouse. Many households included adopted children, an indication of the high value accorded children. Children were an important means of establishing valued interfamily relationships through adoption, betrothal, adult-child relationships established at birthing ceremonies, and naming practices. The family was an important economic unit, relying on a decided division of responsibilities among all household members, including children and elderly relatives.

Most Inuit groups based their economy on sea-mammal hunting. In summer and fall many groups hunted caribou or moved to favoured coastal locations to hunt and fish a variety of game species. Fishing and food gathering (for bird eggs, shellfish and berries) were important seasonal activities, as were hunts for polar bear and whale. Though high value was placed on fresh food, quantities were also stored for future use. Drying, and caching in cool areas, were common techniques, although several special techniques (such as storing in oil) were also used.

The traditional technology was based on locally available materials, principally bone, horn, antler, ivory, stone and animal skins. In some areas grass or baleen was used for basketry, wood substituted for bone, native copper for antler or bone, and bird or fish skins for animal skins. Use was made of special parts of animals, eg, sinew, intestine and bladders. The improvising abilities of Inuit are well known today, and many Inuit inventions are considered technological masterpieces. The domed snowhouse (IGLOO), the toggling harpoon head and the KAYAK are noteworthy examples.

There was an understandable relationship between location of settlements and seasonably available food resources. The composition of settlements might change periodically in response to social needs and desires to interact with kinsmen residing elsewhere. Many hunting methods became more effective when several hunters worked co-operatively, eg, during winter seal hunting.

Sleds and skin-covered boats were universally employed by Inuit, though regional variations in both design and use were common. Dogs historically served as hunting animals and were used to locate seals under the sea ice or to hold bears or muskoxen at bay. They were also used as pack animals in the summer. Men used single-seat kayaks for hunting seal mammals or caribou in rivers and lakes. In Alaska, large skin-covered UMIAKS were used for whale hunting, although in the Canadian Arctic (and Greenland) such boats were more usually used by women to transport households from place to place.

The skin tent, often with a short ridgepole, was generally made from dehaired sealskins and weighted down along the ground with rocks. Among the Caribou Inuit, the tent was often conical in shape, and constructed from dehaired caribou skins. Tents were used when suitable snow was not available for snowhouses, or when away from the sites where sod and stone-walled houses were situated.

Snowhouse design was variable. At winter settlements the main living chamber could be quite large, perhaps 4 m in diameter and almost 3 m high. In addition, there were chambers for storage and an entrance passage, and often extra living chambers attached to the side. In some regions it was customary to line the walls with caribou skins for insulation. Most snowhouses had a snow sleeping platform and a window (made from clear lake ice) set into the roof (*see* HOUSE). Smaller, less elaborate snowhouses are still commonly used during winter travelling. In the western Arctic, where driftwood logs occur, permanent dwellings were constructed for winter use. Windows in this case were made from translucent animal-skin parchment.

Inuit skillfully manufactured footwear and clothing from locally obtained and prepared animal skins. Even though parkas, gloves and boots followed a similar basic design, regional variations in pattern and technique persisted. For most Inuit groups, footwear was made from the skin of 2 different species of seal, either haired (for winter use) or hairless (for spring and summer use); the latter were entirely waterproof. In some areas caribou skin replaced sealskin, especially for winter boots. The parka traditionally consisted of an inner and outer jacket, usually of caribou fur. Among some groups, sealskin parkas were commonly worn in spring through autumn, and caribou fur was preferred for winter clothing. Women's clothing was often more elaborate than men's, with a voluminous hood on the tailed and aproned parka. Infants were carried in a pouch against the woman's back, not in the hood. There was little bodily adornment, though women's facial tattooing was practised.

Birth was associated with several socially significant rituals. Among some groups, in addition to an attending midwife, there was another adult who served as the child's ritual sponsor, assuming responsibilities for the child's moral upbringing. Throughout life, special terms of

Inuit with traditional summer dwelling and kayak at Peel River, NWT, 1901 (*courtesy Public Archives of Canada/PA-124050/C.W. Mathers Coll*).



address were used, and in the case of a boy, his first killed game animals, and in the case of a girl, her first sewn items, were presented to this adult. Naming occurred at birth and had special significance, as Inuit names included part of the identity and character of the name bearer. Betrothal of children could occur at any time, even before birth. Young people promised to each other used a special form of address, and their families related in ways appropriate to the future relationship. There were many rituals associated with hunting, although these are becoming less common. Animal bones or ceremonial bundles, and ceremonies involving self-induced trance, were used to foretell future events. Marriage, an exceptionally stable institution among Inuit, was customarily preceded by a period of trial marriage. Polygamy, and more rarely polyandry, also occurred, but were not common practices.

In the 20th century, Inuit have universally embraced Christianity, and a large number of communities are now served by ordained Inuit clergy or trained catechists. Prior to missionary activity, Inuit religious leaders were shamans who often underwent lengthy and arduous training. Shamans were intermediaries between the Inuit and the various spiritual forces that influenced human affairs. Inuit life in pre-Christian days required strict adherence to various prohibitions and rules of conduct, so that the role of the SHAMAN was usually to determine transgressors and to prescribe appropriate atonement (*see* NATIVE PEOPLE, RELIGION). Early missionary activity was similarly constituted, with many new rules and prohibitions introduced and penitence demanded after sinning.

Young Inuit were expected to learn by example, through close association with adults. Desire to be praised by respected elders and to attain social competence were strong incentives for young people to join adult society (*see* NATIVE PEOPLE, EDUCATION). Many of the values and beliefs of the society were demonstrated implicitly in behaviour; eg, the constant sharing of food and other commodities was a manifestation of the value of generosity and co-operation and a negation of stinginess, greediness or selfishness. Reinforcements of these lessons were contained in the stories that elders enjoyed telling, especially to children (*see* INUIT MYTH AND LEGEND).

The traditional musical instrument was the drum, up to 1 m in diameter, made by stretching a skin membrane across a wooden hoop. Among Western Arctic Inuit several sitting drummers usually accompanied one or several dancers, whereas elsewhere in the Canadian Arctic drumming was an individual performance at which the drummer stood and chanted, swaying rhythmically with the drum beat. Following contact with outsiders, instruments such as concertinas, accordians, violins, harmonicas and, more recently, guitars became widespread. Square dancing, often in extended and intricate performances without a caller, was very popular. "Throat singing" occurred among some groups, usually performed by 2 women producing a wide range of sounds from deep in the throat and thorax.

Decorative arts were associated with skin sewing, or were inscribed on utensils. Recent innovations in INUIT ART, eg, soapstone carving, printmaking and wall hangings, stem from traditional skills, sometimes using new materials or techniques. Skills in creating string figures, and other games that develop memory, manual dexterity and patience, continue to be practised.

Culture Change Since contact with outsiders, many changes in Inuit society and culture have occurred (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS; NATIVE PEOPLE, SOCIAL CONDITIONS). The early adoption of iron tools, firearms, cloth and wooden boats altered or replaced certain material items. Adoption of Christianity has resulted in the loss of many traditional religious ideas and practices, and Canadian law has replaced customary law in areas concerned with marriage, dispute settlement and game management (*see* NATIVE PEOPLE, LAW). Even the language has changed, with English words replacing numerals above 6 (though the Inuit words for 10 and 20 are still retained). However, many material items cannot be satisfactorily replaced; among these are harpoons used in marine mammal hunting, sealskin boots and caribou parkas required for winter hunting, snowhouses and sleds used in winter travelling, and the techniques of preparing animal skins and sewing skin clothing. Important elements of the value system also resist change, including traditional child-rearing practices, concerns about environmental matters, the continued survival of the Inuit language and culture, and respect for individual autonomy (*see* INUIT CO-OPERATIVES).

In the early 1970s a national organization, the INUIT TAPIRISAT OF CANADA, was established to protect Inuit cultural and individual rights. The organization created several agencies in response to expressed needs. An Inuit Language Commission, for example, was formed to seek the best means of ensuring the increased use of Inuktitut for governmental, educational and communications purposes, and a Land Claims Office was established to research and negotiate Inuit LAND CLAIMS. Many of these issues, such as protection of the arctic environment, are international in scope. Therefore, an international Inuit organization, the Inuit Circumpolar Conference, was formed with committees seeking to strengthen pan-Inuit communication, cultural and artistic activities, and international co-operation in environmental protection. This organization has affiliation with numerous international bodies, including the United Nations, thereby ensuring that Inuit concerns become widely understood throughout the world.

MILTON M.R. FREEMAN



Indian Encampment on Lake Huron (c1845–50) by Paul Kane depicts the characteristic birchbark dwellings and canoes of the Ojibwa (*courtesy Art Gallery of Ontario*).

Eastern Woodlands

Territory and Natural Environment The Canadian Eastern Woodlands are part of a larger biotic region that extends SW to Illinois and E to coastal N Carolina. The deciduous forests of southern Ontario, the St Lawrence lowlands and coastal Atlantic provinces phase N into the mixed deciduous-coniferous canopy of the Canadian SHIELD in the W and the Appalachian uplands in the E (*see* VEGETATION REGIONS). Except in the Atlantic provinces, the Great Lakes-St Lawrence watershed provided access to water transportation to all Eastern Woodland peoples. Climate and soil conditions allowed peoples S of upland regions to grow corn, beans and SQUASH; by far the largest portion of their diet consisted of products of their extensive fields. The white-tailed deer was perhaps the most important game animal in Indian subsistence except in the N, where moose and caribou were found. Seals were hunted by some coastal peoples. Inland, freshwater fish, and along the seaboard eels, molluscs and crustaceans, were taken. Waterfowl and land birds were seasonally important in some areas. During the historic period, fur bearers, especially BEAVER, were significant to the Indian economy. A variety of berries, nuts, tubers and plants was collected, and some groups harvested maple and birch sap and WILD RICE.

Major Language and Tribal Groups Eastern Woodland Indians spoke languages belonging to 2 unrelated families, Iroquoian and Algonquian. At the onset of the historic period, Iroquoians occupied much of southern Ontario, northern Ohio, Pennsylvania and New York, and the St Lawrence Valley as far E as the Québec City area. Algonquian groups extended from Lk Superior N of Lk Huron to the Ottawa Valley, thence E through New England and the Atlantic provinces to the coast. Iroquoian peoples included Erie (S of Lake Erie), NEUTRAL (Grand R-Niagara R area), Wenro (E of Niagara R), Five Nations IROQUOIS — SENECA, CAYUGA, ONONDAGA, ONEIDA, MOHAWK (Genesee R to Mohawk R and N to the Adirondack Mts), HURON — 5 tribes (Georgian Bay to Lk Simcoe), PETUN (SE of Georgian Bay) and St Lawrence Iroquoians (Montréal to Québec City). Algonquian peoples included OJIBWA (Lk Superior to northeastern Georgian Bay), OTTAWA (Manitoulin I and Bruce Pen), Nipissing (Lk Nipissing area), ALGONQUIN (Ottawa R and tributaries), ABENAKI (Vermont, NH, western Maine and southeastern Québec), MALISEET (St Lawrence Valley S to Bay of Fundy, eastern Maine and western NB) and MICMAC (southeast Gaspé Pen, eastern NB, PEI and NS).

The speakers of Iroquoian languages belong to 2 branches, a southern one composed of Cherokee, and a northern branch that includes all of the tribes noted above. The languages of the Canadian Iroquoians (the St Lawrence Iroquoians, the Huron, Petun and Neutral) are now all extinct, and the 6 Iroquoian languages spoken in

Canada today (Mohawk, Oneida, Onondaga, Cayuga, Seneca, Tuscarora) were brought by groups of immigrants (LOYALISTS) from New York state. Within the Canadian Eastern Woodlands there are 2 branches of the Algonquian family, Central Algonquian (Ojibwa, Ottawa, Nipissing and Algonquin) and Eastern Algonquian (Abenaki, Micmac and Maliseet). Languages within each branch show a high degree of mutual intelligibility, with the Central Algonquian forming dialect chains (*see* NATIVE PEOPLE, LANGUAGES).

Historical Summary Although the NORSE seem to have made sporadic visits to the eastern seaboard between the 11th and 14th centuries, major European influences were initiated by fishermen to the Grand Banks — who also began trading for furs in the early 16th century just prior to Jacques CARTIER's contacts with Micmac and St Lawrence Iroquois in 1534-35. During the late 16th century the FUR TRADE expanded to involve, either directly or indirectly, most Eastern Woodland peoples. During this period the St Lawrence Iroquoians deserted their longtime homelands and, although there is debate as to whether its origin is precontact or postcontact, the famed Iroquois Confederacy became prominent.

By the early 17th century there were European settlements on Sable I (temporary), at Tadoussac, briefly on the St Croix R in Maine, and at PORT-ROYAL in the Annapolis Valley. In 1609 Henry HUDSON explored the New England coast and the river named after him, while Samuel de CHAMPLAIN accompanied a MONTAGNAIS war party against the Mohawk near Lk Champlain, an event that marked the beginning of European participation in the almost continuous intertribal hostilities that lasted for a century. By 1624, when the Dutch established New Amsterdam, fur bearers had been largely exterminated along the Atlantic coast. During the first half of the 17th century, European epidemics (*see* NATIVE PEOPLE, HEALTH) and warfare drastically reduced Indian populations, and subsistence cycles of hunter-gatherers were disrupted. Dependency relationships developed when a variety of European trade items replaced aboriginal ones, and new forms of territoriality and leadership emerged. In New England the Pequot War (1637) and King Philip's War (1675-76) led to population shifts clearing the way for European settlement. Some Abenaki moved to St Francis near the St Lawrence after about 1660. In the Great Lakes area, the Five Nations Iroquois intensified their attack on other Iroquoians and Algonquians during the 1640s and 1650s, forcing many peoples to flee from their homelands (*see* IROQUOIS WARS). Remnant groups of Huron, Petun, Neutral and Erie fled W and became known as Wyandot. One group of Huron settled at Lorette near Québec City. The Five Nations Iroquois, reduced by warfare and disease, replenished their numbers by adopting war captives and refugees. During the late 17th century, as Iroquois power began to wane, Ojibwa and Algonquin expanded into southern Ontario; their descendants occupy reserves there today. In 1722 the Iroquois accepted the Tuscarora, a northern Iroquoian-speaking people who had fled north from the Carolinas. Following this addition, the confederacy was often called the Six Nations, although the Tuscarora were never politically equal to the 5 founding nations.

Throughout the first half of the 18th century most Algonquians of the Eastern Woodlands supported the French and supplied them with furs in exchange for European commodities. Except for a group of Mohawk who had settled near Montréal, the majority of the Iroquois were allied with the British. At the time of the SEVEN YEARS' WAR and after the fall of NEW FRANCE to the British in 1759-60, Ottawa and Ojibwa, displeased with new policies, temporarily captured Detroit and Michilimackinac. Most Algonquians, however, supported the British cause during the AMERICAN REVOLUTION, but the struggle split the loyalties of the New York state Iroquois, many of whom subsequently moved to lands granted to them by the British in southern Ontario. Members of all the Six Nations Iroquois settled along the Grand R, and some Mohawk settled at the Bay of Quinte. Land cessions in New York, a growing dependency on whites, and general demoralization stimulated a revitalization movement in 1799 led by the Seneca prophet Handsome Lake. The new religion spread to other Iroquois communities in the US and Canada (*see* HANDSOME LAKE RELIGION). After the WAR OF 1812 some Ojibwa, Ottawa and Potawatomi moved from the US to the Georgian Bay area. A portion of the Oneida settled on the Thames R. During the first half of the 19th century, reserves were surveyed for Algonquians along Georgian Bay, the Robinson-Huron and Robinson-Superior treaties of 1850 enfranchising most Algonquians in Ontario. In the Atlantic provinces some 60 Micmac reserves were established (*see* INDIAN RESERVE; INDIAN TREATIES).

As white settlements throughout the Eastern Woodlands grew larger and more numerous, hunting and gathering by various Algonquians waned in importance. Small-scale horticulture, often the result of missionary influences, increasingly supplemented a diet which came to include store foods as well as locally obtained fish and game. Some Indians were employed by Euro-Canadians in such activities as lumbering, mining and the fur trade, or as part-time labourers.

On reserves, an elected system of chiefs and councillors replaced traditional political institutions, except among some Iroquois whose confederate chiefs filled political offices. At Six Nations the traditional system was formally replaced by an elected system in 1924, but the old confederate system often continued in opposition to the elected officers and the federal government that failed to recognize it (*see* NATIVE PEOPLE, GOVERNMENT POLICY).

By the 20th century the majority of Eastern Woodland Indians had adopted Christianity, albeit sometimes only nominally. Many Iroquois continued to practise the Longhouse religion of Handsome Lake. Dependency on government sources of economic support, owing to few employment opportunities or inadequate training, resulted in poverty on most reserves not situated near large urban centres. Following the GREAT DEPRESSION of the 1930s, many Indians moved to urban centres in Canada and the US to work, and many more have since done so. Often they make frequent trips to the reserve and, when not employed or after retirement, return (*see* NATIVE PEOPLE, URBAN MIGRATION). After about 1960 new government-sponsored job programs on reserves and the revitalizaton of old arts and crafts lessened economic dependency (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS). Health clinics and modern medical treatment have resulted in dramatic population growth so that many tribal groups are now numerically larger than at the time of contact (*see* NATIVE PEOPLE, DEMOGRAPHY). By 1980 there were over 20 000 Iroquoians on 8 reserves in Canada, including 1200 Huron at Lorette. Some 11 525 Micmac are affiliated with 27 reserves in the Atlantic provinces and 694 Abenaki with the St Francis reserve. The number of other Algonquians residing in the Canadian Eastern Woodlands is difficult to determine since not all are registered Indians associated with reserves (*see* INDIAN). A figure of 15 000, however, seems reasonable.

Traditional Culture *Iroquoian:* All Iroquoians relied primarily on cultivated corn, beans and squash. Fishing, hunting and gathering supplemented domestic crops. Men cleared forest areas while women planted and harvested and made pottery. The Huron exchanged corn for fish and hides with Nipissing. Crop storage permitted sedentary and often palisaded settlements varying from small hamlets with a few families to towns where as many as 2500 persons resided. Population density was high, reaching a peak of perhaps 24 persons per km^2 (60 persons per sq mile) among the Huron. Although estimates vary, there may have been from 70 000 to 90 000 northern Iroquoians at contact.

A typical village contained a large number of elm-or cedar-bark longhouses. Each LONGHOUSE sheltered several related families. Residence in these households was matrilocal; ie, upon marriage a man would move into his wife's longhouse. As well, descent inheritance and succession followed the female line. One or more households formed a matrilineage. Several lineages composed an exogamous clan designated by a particular totem emblem (crest). Tribes appear to have been composed of from 3 to 10 clans whose members were scattered in several villages. Among some groups, clans were divided into 2 categories or moieties. Clan mates, regardless of village, and among the Five Nations even through tribal affiliation, considered themselves to be siblings.

Most Iroquoian peoples possessed both civil chiefs and war chiefs. The Five Nations Confederacy had a council of 50 permanent and hereditary offices which has survived in modified form to the present. Among the Five Nations, condolence ceremonies commemorate deceased confederacy chiefs, replace them and bestow on the successors the honorary names associated with the office. The Huron had a similar political system.

All groups possessed religious specialists (SHAMAN), engaged in seasonal rituals often associated with crop harvests and held periodic feasts (*see* NATIVE PEOPLE, RELIGION). The Huron held elaborate FEASTS OF THE DEAD, usually at the time when villages were to be moved to new locations. The bones of dead relatives were gathered and placed in mass graves (ossuaries) with grave goods. The Five Nations had a number of medicine societies focused on curing, the best known being the FALSE FACE SOCIETY. During performances members wore elaborately carved wooden masks.

Algonquian: Horticulture as a subsistence activity was either absent or marginal among most Eastern Woodland Algonquians. Ottawa, Algonquin, Abenaki and Maliseet grew some crops; the Ojibwa and Micmac grew none, and the Nipissing traded fish for Huron corn. Hunting and fishing provided the bulk of the food. Deer, bear, moose, caribou and even seals, porpoises and whales were harvested in areas where they could be found. Bows, arrows, lances, traps, snares and deadfalls were used in hunting, and hooks, weirs, leisters and nets were employed to procure fish. In the Great Lakes area wild rice was harvested in the early fall, and maple or birch sap was collected in the early spring. Meat was either boiled or roasted for immediate consumption or smoke-dried for future use. A seasonal round of activities tended to inhibit a strictly sedentary existence, although the abundance of certain food, especially fish, and some horticulture permitted a greater degree of sedentation than among Subarctic peoples farther north. Dwellings were smaller and less permanent than among Iroquoians, varying from conical birchbark TIPIS to domed WIGWAMS or rectangular structures that housed several families (*see* HOUSE). Village size varied seasonally, with the largest population concentrations occurring in summer. Some Ottawa and Abenaki villages may have numbered 300 persons. Unlike the Iroquoians who travelled mainly on land or in crude elm-bark CANOES, the Algonquians made gracile birchbark canoes. In

winter they used SNOWSHOES, sleds and TOBOGGANS. Trade and visiting appear to have been common activities among adjacent Algonquian peoples.

The aboriginal population of the different Algonquian groups is difficult to estimate owing to postcontact movements and the effects of diseases. There may have been from 15 000 to 20 000 Central Algonquians in Canada and an equal number of Eastern Algonquians either in Canada or whose descendants later moved to Canada. More research is required before these estimates can be refined.

Prior to European intervention, the largest political unit among most Woodland Algonquians appears to have been the band-village, there being no confederacies of village chiefs. Each BAND or band-village appears to have possessed at least one chief or headman, whose position was usually hereditary within the male line. Patrilineal groups designated by an animal totem seem to have been characteristic of all peoples. Village-band territories were not strictly demarcated, and all members had equal access to basic subsistence resources. While intertribal feuds may have occurred, it is doubtful that warfare was conducted on the same scale as that which characterized the early historic period.

The most important religious figure was the shaman, who engaged in curing and performed magical rites to ward off evil spirits such as WINDIGO and to appease or locate game. Impersonal powers pervaded the universe, and Algonquians made no conceptual distinction between the human and animal worlds. Seasonal rituals and feasts were held, as well as rituals associated with birth, puberty and death. The vision quest associated with the acquisitions of a personal supernatural guardian helper existed among all groups. Central Algonquians held Feasts of the Dead that were similar but not identical to those of the Huron. During the 17th century these feasts attracted large numbers of persons, often from several tribes. Because quantities of goods were given away and the names of new chiefs raised, they came to resemble the Northwest Coast funerary POTLATCH.

Culture Change There has been considerable culture change among all Eastern Woodland groups. Hunting, gathering and fishing have become marginal subsistence activities except among some Micmac, for whom fishing has remained significant. Agriculture, altered by new technologies, crops and rules regarding the sexual division of labour, declined as reserve populations grew, lands were partitioned, and new job opportunities arose. Such traditional foods as corn bread and corn soup are still eaten, and tobacco continues to be grown for ritual purposes. Different reserve populations and different groups on the same reserve represent varying degrees of acculturation and assimilation (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). Some Algonquians still maintain an essentially animistic world view, while Iroquois following the Longhouse religion adhere to modified aboriginal beliefs and principles. Traditional beliefs and values tend to remain strongest among those who regularly speak the native language. A revitalization of selected aspects of traditional cultures, particularly arts and crafts (*see* INDIAN ART) but also dances and rituals, as well as a greater political awareness (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM), have served to reinforce identity and esteem after over 3 centuries of cultural erosion.

CHARLES A. BISHOP

Northwest Coast

Territory and Natural Environment The Canadian portion of the Northwest Coast is a region of extremes in topography, from wide beaches to deep FJORDS and snowcapped mountains. Temperatures are moderate, the Jan mean above freezing and July less than 18°C. The northern coast and outer islands receive 155-655 cm of rain annually, and the protected south coast 65-175 cm, mostly in winter. Heavy coniferous forests thrive, and beaches and streams are lined with dense undergrowth (*see* VEGETATION REGIONS).

In the precontact period, food was plentiful: black-tailed deer, bear, elk and mountain goat were available locally, and sea mammals (seals and porpoises) as well as vast quantities of fish and shellfish were found everywhere. Most important of all were the great runs of Pacific salmon, which arrived in regular annual migrations and were eaten fresh or dried for yearround use.

Major Language and Tribal Groups Of all the aboriginal regions in Canada, the Northwest Coast exhibits most diversity in language. The Inland TLINGIT of the northwest tip of BC and the southwest Yukon are an interior branch of the Tlingit of the south Alaska coast. On the QUEEN CHARLOTTE IS are HAIDA. Both Tlingit and Haida are language isolates, unique languages with no proven relationship to any other. Along the Nass and Skeena rivers and adjacent coast are people speaking 3 languages of the TSIMSHIAN language family, which may be remotely related to several other language families, collectively called Penutian, spoken from Oregon southward. Strung along the coast from Tsimshian territory to NE Vancouver I are Haisla (KITAMAAT), Heiltsuk (BELLA BELLA), Oowekyala (Rivers Inlet) and Kwakwala (Southern KWAKIUTL). They in turn are related to Westcoast (NOOTKA) and Nitinat, languages spoken on the west coast of Vancouver I and Makah on Cape Flattery in Washington. All of these languages belong to the Wakashan language family. The remaining coastal people of BC speak languages of the large Salishan family. In the north, surrounded by Heiltsuk and Haisla, are the BELLA COOLA. In Georgia Strait, below the Southern Kwakiutl, are speakers of 7 mutually unintelligible Coast Salish languages: Comox, Pentlatch (extinct) and Sechelt, together referred to as NORTHERN GEORGIA STRAIT COAST SALISH, and Squamish, Halkomelem, Nooksack (now only in Washington state) and Straits Salish, together called CENTRAL COAST SALISH.

In summary, there are 19 mutually unintelligible languages spoken on the Northwest Coast of BC, and these in turn belong to 5 separate units among which no relationship has yet been clearly established (*see* NATIVE PEOPLE, LANGUAGES).

Historical Summary Although the earliest settlement of the Northwest Coast occurred probably 10 000 years ago (*see* PREHISTORY), the first contact with Europeans came late in the 18th century, when Spanish and British explorers opened the way for traders seeking rich stocks of sea-otter pelts. All tribes eagerly adopted firearms, iron tools and other European goods, but permanent trading posts awaited establishment of a series of forts by the HUDSON'S BAY CO, which by 1850 controlled the trade.

Discovery of gold on the Fraser R in 1857 brought a rush of miners and settlers to the newly established colonies (*see* GOLD RUSHES). Towns were few, but Indians were attracted to them from afar for trade goods. Contagious diseases, particularly smallpox, wrought havoc among the Indians, who were reduced to a minority within the population by 1885.

Gov James DOUGLAS made a few small treaties with Indian villages on Vancouver I between 1850 and 1859 (*see* INDIAN TREATIES). This recognition of Indian title was less clear when BC entered Confederation in 1871. Commissions were established in 1876 and 1912 and charged with creating and confirming INDIAN RESERVES. Neither commission had authority to make treaties or deal definitively with Indian grievances. Though reserves were imposed unilaterally and did not always meet Indian requests, they did provide minimal protection for many village sites as the influx of strangers continued.

The unsettled land question and government oppression, including an anti-POTLATCH clause in the INDIAN ACT in 1884, led to protests by local groups. Organized pan-tribal associations emerged later with formation of the Allied Tribes of British Columbia in 1915 and the Native Brotherhood of British Columbia in 1931 (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

From earliest contact with outsiders, coastal Indians traded willingly and worked as labourers, boatmen and house servants. Those living in dispersed locations with viable subsistence economies were ideal seasonal workers in the early stages of resource development. However, as mechanization and centralization of the fish and timber industries proceeded, participation of Indians as workers and independent small producers diminished. Resource industries still dominate Indian occupational patterns, but by the 1960s unemployment and underemployment in coastal communities was chronic (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS).

Traditional Culture Throughout the North-



Interior of a Clallam Winter Lodge (1851-56), oil on canvas, by Paul Kane. Huge winter dwellings of post-and-beam construction were created in distinct regional styles — in this case a Salishan people (*courtesy National Gallery of Canada/John Evans, 1959*).

west Coast the material bases of life were similar. Carpentry was men's work, and with blades of stone and shell, wooden wedges and stone hammers they fashioned the myriad items of everyday use. Huge winter dwellings of post-and-beam structure covered by split cedar planks were created in distinct regional styles (*see* HOUSE). So too were dugout CANOES, which provided transportation along rapid streams and on the open sea.

It fell mainly to women to spin twine required for fishnets and lines and to weave items from cedar bark and roots — large storage containers, open-work collecting baskets and exquisite, finely decorated hats. Mats fashioned from cedar bark or rushes provided furnishings and lined houses for additional warmth. Women also twined cedar-bark skirts and cloaks for everyday wear. Elaborately decorated CHILKAT BLANKETS of twined cedar bark and mountain-goat wool were worn on special occasions by people in northern tribes. Among Coast Salish, mountain-goat wool supplemented by dog wool was twilled into heavy blankets with decorative borders. These were items of daily wear in cold weather. Everywhere on the coast, fur cloaks supplemented this simple stock of clothing.

Fishing, hunting and gathering were the means of subsistence on the Northwest Coast. Resources from the sea were of first importance. Fishing devices were adapted to suit specific conditions of sea and stream and local occurrence of fish species; techniques included trolling and jigging with baited hooks, harpooning and spearing, use of nets, and construction of tidal traps, or weirs, in streams. Land mammals were taken with bow and arrow, snares, deadfalls and nets; sea mammals with harpoons at sea and with clubs or nets wherever animals came ashore. The abundant waterfowl fell prey to a variety of ingenious nets. Gathering of shellfish, berries, edible roots, bulbs and green shoots provided additional nutritious foods.

None of these varied resources was evenly distributed in all regions, and coastal tribes followed a pattern of moving or dispersing from winter villages to outlying sites as the season came round for each resource, and then returning to the main base.

While fishing and hunting were mainly the work of men, and women did most gathering of plant and beach foods, the division of labour was complementary and often co-operative. Both men and women made the tools necessary for work. Because almost all foods were produced at times in quantities greater than immediate need, they were preserved. Men did most of the initial production of fish and game, but women did the cooking and preservation (*see* SMOKEHOUSE).

The primary unit of society everywhere on the Northwest Coast was a large group of kinsmen who usually shared a common ancestor. Among northern peoples, membership in the kin group was passed down through women, but in the south membership could be claimed through either the male or the female lines. In both areas the result was a core of close kin with in-married spouses living together in a house or house cluster under the direction and guidance of capable leaders. These leaders held formal titles or prominent names hereditary within the family line and acted as managers of family property, including nonmaterial possessions such as names, ritual performances, special songs or secret knowledge. The foundation, however, was ownership of real property such as house sites, berry patches, hunting territory, seal rookeries and fish-trap sites. While some territory and waters were open to general use, more productive harvesting places were privately owned.

Real property, combined with skillful management of family labour and individually owned capital equipment, enabled kin groups and their chiefs to achieve high productivity and accumulate tangible wealth. Property was the basis and vehicle of the Northwest Coast system of rank and class. In some tribes there was precise status with internal ranking; in others, flexible categories. An upper-lower distinction of some form was universal, as was the institution of SLAVERY. Slaves were acquired in war or by purchase and, although they lived in owners' houses, lacked full civil rights and were required to perform menial chores.



Haida village on the Queen Charlotte Is, BC (*courtesy Geological Survey of Canada/255*).

Villages were always close to navigable water, with houses ranged parallel to the beach facing the water. Although united by kinship, dialect and common interest in territory, villages had no government except that effected by powerful lineages. During the early historic period, among Coast Tsimshian and Northern Westcoast (Nootka), strong village leaders emerged and began to extend their influence through the confederation of villages. These alliances were the only form of tribal organization.

Feuding occurred in response to injury or trespass, and occasionally escalated into warfare. Acquisition of property, including slaves, was also a motivation for conflict. The small size and divisiveness of village units, and the practice of restituting wrongs with gifts, helped to limit the scale of warfare.

High-ranking individuals from separate kin groups and villages found common cause in class membership and ritual associations, often termed secret societies. Most important of all were bonds of marriage and gift exchanges which accompanied them. Marriages were contracted between people of different kin groups, often in widely separated villages. In order to validate lineage rights and maintain class position, assemblies of people from many kin groups were convened to witness claims. Guests were fed and given gifts at these potlatches. Barter and trade occurred, but gifts and feasts were major means of distribution and exchange.

All tribes conducted serious religious rites in winter and viewed summer as more appropriate for games, feasts and naming activities. There was no strict segregation of the sacred and secular, as the sacred was implicit in all thought and action. Belief in potent spirits identified with animate objects and forms was fundamental. Spirits could interfere in human affairs, but by self-purification an individual might induce them to become personal helpers. They were a source of power for religious practitioners or shamans, but also endowed ordinary folk with special competence or good fortune, and in some areas became hereditary privileges. This awareness of power in the animate, nonhuman sphere was consistent with widespread use of prayers and welcoming ceremonies to foster continuation of annual runs of fish.

The course of each person's life brought changes of status as puberty was attained, names received or marriage made. Taboos and elaborate ritual and feasting accompanied these events. Illness, while associated with physical causes, was also ascribed to soul loss or intervention of spirit forces, and shamans were called upon for diagnosis and corrective treatment. All tribes believed in life after death and in ghosts that could be harmful to the living. Funeral and memorial ritual served to separate the living and the dead and to sustain, honour and placate the dead.

Music and decorative arts were associated with both sacred and secular activities. Spirit helpers conferred songs, and secret society or family tradition was transmitted through songs which often accompanied masked reenactments of mythic events. There were songs for all occasions — soothing infants, playing games, expressing love and sorrow. The voice was the only melodic instrument, although a variety of percussive devices, whistles and horns was used as accompaniment.

Sculptural and decorative art was also part of daily life, applied to tools, houses, baskets, clothing and items associated with the supernatural. Wood sculpture and painting, notably TOTEM POLES, are the most renowned features of Northwest Coast culture. Archaeological evidence suggests that art has a long history in the area and that regional styles share basic similarities of form with an earlier tradition. In the N the art is highly formalized and often depicts family crests on property. Wakashan sculptors excelled in creating MASKS for dramatic performances. The Salish put emphasis on religious implements with little concern for crests. In all areas ownership of sculptural and decorative art was indicative of wealth and denoted class position (*see* NORTHWEST COAST INDIAN ART).

Culture Change Though early acceptance of European clothing and tools brought visible changes to Northwest Coast cultures, villages,

often on ancient sites, still retain their original orientation to the sea and traditional foods are favoured in the diet. Enforced Westernization was the policy of missionaries and government administrators until recent times. Compulsory education in centrally located boarding schools, where native speech was forbidden, had devastating effects on community structure, Indian socialization and languages (*see* NATIVE PEOPLE, EDUCATION). Several Northwest Coast languages now have only a few fluent speakers and are in danger of extinction, despite efforts to reverse the trend with formal language-teaching programs. Pentlatch, for example, is already extinct.

Despite the ban on the potlatch from 1884 to 1950, feasts and ceremonious exchange, especially among the Southern Kwakiutl, never completely ceased and have experienced revival in recent decades. The few Coast Salish villages where spirit dancing survived have served as centres for a dramatic religious revival that has continued to attract followers. These institutions remain private to the Indian communities, where they strengthen Indian identity and self-esteem (*see* SHAKER RELIGION).

The population of Northwest Coast tribes has continued to increase since a low point in 1915 (see NATIVE PEOPLE, DEMOGRAPHY). In 1983 there were about 35 000 registered Indians and perhaps as many again who are nonregistered descendants of coastal tribes (*see* INDIAN). Isolated villages have lost residents as unemployment and educational opportunity induced people to move to urban centres (*see* NATIVE PEOPLE, URBAN MIGRATION). More than one-third of the registered population are off-reserve residents.

Northwest Coast Indians have remained steadfast in objecting to policy and practice that have reduced ABORIGINAL RIGHTS and left LAND CLAIMS unsettled (*see* NATIVE PEOPLE, GOVERNMENT POLICY). They have been strong supporters of provincial and national Indian associations.

MICHAEL KEW

Plains

Territory and Natural Environment The Plains Indian culture area extended from southern Manitoba and the Mississippi R westward to the Rocky Mts, and from the N Saskatchewan R south into Texas. This was a region of continental climate — hot and dry summers and very cold winters. High grass covered the rolling prairies in the east; short grasses, sage and cacti the arid high plains to the west. Flat land and rolling hills extend in all directions. Flowing eastward, rivers have cut deeply into the land, and provide practically all the scarce available water. Tree growth on the high plains is restricted to these valleys, becoming rapidly more noticeable toward the margins of the area (*see* VEGETATION REGIONS).

Plains Indian culture was based primarily on the immense herds of BISON or buffalo which roamed over and fed upon these grasslands until the early 1880s. Bison herds shared these resources with pronghorn antelopes, elk, mule deer, jack rabbits, prairie dogs and a range of small herbivores, grouse, prairie chicken, geese, ducks and cranes. This wildlife was preyed upon by wolves, coyotes, grizzly bear, mountain lion, eagles, other birds of prey and man.

Major Language and Tribal Groups The languages spoken by the various Plains tribes belong to 6 linguistic families, of which 3 were represented on the Canadian Plains. Algonquian languages were spoken by the BLACKFOOT, Gros Ventre (Atsina), Plains CREE and Plains OJIBWA; Siouan languages were those of the ASSINIBOINE, STONEY and DAKOTA Sioux. Athapaskan was spoken by the SARCEE. Languages from 2 families were as divergent as German is from Chinese, and within each family languages were as different as English from Dutch. This linguistic diversity and the high mobility of the nomadic population on the Plains encouraged the development of communication by means of hand gestures or sign language (*see* NATIVE PEOPLE, LANGUAGES).

Before epidemics in the early 1800s reduced the population, the northern Plains Indians numbered an estimated 33 000. Tribal populations in that region ranged from about 700 for the Sarcee to about 15 000 for the 3 Blackfoot tribes.

Historical Summary Small bands of nomadic hunters roamed the Plains some 10 000 years ago (*see* PREHISTORY). Most of these people, however, slowly drifted southward to be succeeded by other migrants. About 200 AD a horticultural population from the Mississippi Valley spread northwestward, ultimately reaching, temporarily, the southern parts of Saskatchewan and Alberta(*see* CLUNY EARTHLODGE VILLAGE). They settled in semipermanent villages near their gardens along the rivers. Through their contacts with more elaborate cultures in southeastern N America, these gardeners played an important role in the northwestern expansion of certain religious ideas and rituals. The prehistoric hunters and gardeners established the general cultural patterns basic to the Plains Indian culture of the historic period.

Spanish colonists from Mexico introduced horses to the southern Plains in the 16th century. By intertribal trade and raiding, the animals spread northward, reaching the Canadian Plains by the 1730s. The use of horses altered hunting techniques and enabled the people to transport larger and more comfortably furnished dwellings. Their obvious improvement of the life of the nomadic hunters caused the development of HORSE raiding as the most common form of intertribal warfare. Warfare was a dangerous game, as ritualized as medieval knighthood in Europe, with social prestige and wealth as its goals. Small war parties would raid enemy territory, run off the horses and sometimes kill a few people.

At approximately the same period that horses were moving north, fur traders arriving from the East introduced firearms. From 1730 to 1870 the Plains Indians played an important role in the FUR TRADE, which in turn profoundly changed their way of life. Adjusting their hunting to the demands of the traders, the Indians gradually gave up their original independence for the amenities offered by the fur trade.

Traditional Culture Women gathered edible roots and berries whenever they were available but the main source of food came from hunting by the men, especially buffalo hunting. The Plains Cree and Plains Ojibwa added fish to the diet, but fish was unimportant elsewhere on the Plains. Animal-skin disguises were used to get close enough to the game for the effective use of bows and arrows. Buffalo herds were driven into pounds or corrals and killed, or were stampeded over steep cliffs (*see* BUFFALO HUNT). While acquisition of the horse greatly facilitated buffalo hunting, muzzel-loading guns proved inferior to bow and arrows, which were given up only after shorter breechloaders were introduced by the 1860s.

When men hunted, women were busy processing the results of this activity, particularly in preserving (through drying) foods. Some meat was cooked and eaten immediately, but most was sliced and sun-dried for the winter, or ground and mixed with fat and berries to make PEMMICAN. Buffalo hides were used for robes, tent covers, MOCCASINS and shields; tools and utensils were made of the bison's horns, hooves, hair, tail, bones and sinew; buffalo dung was used as a fuel on the treeless plains. Skins of antelope and elk were preferred in the manufacture of clothing: breechcloth, leggings and shirts for men, long dresses and leggings for women.

The family property was transported on a TRAVOIS (a triangular frame of poles) dragged along by dogs. Travois also provided the framework of the conical dwelling called TIPI, which was covered with buffalo skins sewn together (*see* HOUSE). After the introduction of the horse, larger travois and tipi were constructed. SNOWSHOES were used during the winter by some tribes on the northern Plains.

Many utilitarian articles manifested the rich yet tribally distinct artistic temperament of the Plains Indians. They ranged from skin tattoos, clothing painted or embroidered with dyed porcupine quills, paintings on tipi covers, shields and rawhide containers, carvings on wooden bowls, horn spoons and stone pipes, the extensive use of feathers in ceremonial regalia, to large boulder monuments laid out on the ground (*see* INDIAN ART). Certain individuals were known and approached for their exceptional ability in a specific craft, but, even for them, craft production was not a permanent or exclusive occupation. Most of the colourfully decorated Plains Indian artifacts seen in museums were made by women. Men produced equipment for the hunt, war and ceremonial activities.



Assiniboine Hunting Buffalo (nd), oil on canvas, by Paul Kane. The main source of food for the Plains Indians was the buffalo hunt, which was greatly facilitated by the acquisition of the horse (*courtesy National Gallery of Canada*).



Cree camp on the prairie, south of Vermilion, Sept 1871. The conical tipi was covered with buffalo skins *(courtesy Public Archives of Canada/PA-5181).*

The adjustment of the native way of life to the natural environment, and in particular to the movements of the buffalo herds, was reflected in their social organization. Most tribes consisted of loosely organized and independent bands. Band chiefs had the respect and support of their followers as long as they were successful in the quest for food and in defence against enemy attacks. Chiefs were advisers rather than rulers; their decisions were based on unanimous approval reached in the council of elders. Public shame and ridicule were the principal means of social discipline. Most of the year the bands moved around independently of each other. In lean periods even the band might have to split up into smaller groups that would have a better chance of finding sufficient food. Only in midsummer, when the buffalo were concentrated in large herds, would the bands come together for a few weeks in one large tribal encampment. Then the people joined in the celebrations of their ceremonial and military societies, which were the principal means of tribal cohesion. After the performance of the SUN DANCE and possibly a tribal buffalo drive, the bands separated again; in the fall they moved to well-protected campsites in river valleys, foothills and parklands, where they spent the winter.

Religious ideas and practices permeated all aspects of daily life. Fundamental to Plains Indian religion was the belief that animals and other natural phenomena possessed spiritual power that could, under proper circumstances, be manipulated to personal advantage. The individual seeking such power went to a lonely spot where he fasted and prayed until a spiritual guardian appeared to him in a dream (vision quest). The difference between ordinary men and ritual leaders was a gradually developing one, primarily based upon the amount of spiritual power acquired either by personal visions or by ritualized purchase from other individuals. Mystical experiences gave rise to cults that either disappeared when the initiator died, or became increasingly popular. All tribal rituals had their origins in such individual cults.

Culture Change The normally slow and gradual rate of societal change accelerated rapidly for the Plains Indians after they came into contact with European civilization. Though distinctly native in character, historic Plains Indian culture would have been impossible without the European horse and the European trader. The introduction of metalwares made native pottery, stone chisels and arrowheads obsolete in the mid-18th century; glass beads gradually replaced quillwork after 1830; cloth became as common as skin for clothing after 1850. For more than a century the fur trade was the sole medium of contact between Euro-Canadian society and the northern Plains Indians. During this period the native people were generally free to accept or reject whatever the European had to offer, and as such the fur trade provided a measure of adjustment that prepared the Indians for the more intensive culture change later forced upon them. The MÉTIS, descendants of European-Indian parents, trace their origins to the early trading period. However, the fur trade did not bring only greater material wealth; epidemic diseases of European origin swept the northern Plains in 1781, 1819, 1837, 1845, 1864 and 1869 (*see* NATIVE PEOPLE, HEALTH). Each time thousands of Indians died, and the survivors were left with their world views and beliefs undermined. During this period the consumption of alcohol became widespread, particularly after the arrival of American whisky traders in the 1860s (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). In these years also, the depletion of the buffalo herds became noticeable, owing to indiscriminate overhunting for profit, especially after the completion of a transcontinental railway in the US.

In response to the increasing violence in the region, the newly formed North-West Mounted Police came west in 1874 and enforced law and order within a short time. However, they could neither halt the disappearance of the buffalo herds nor stop the settlers from establishing farms and villages all over the plains. In 1870 the federal government purchased the North-West from the HUDSON'S BAY CO, and, in a series of treaties between 1871 and 1877, the Indians surrendered their lands (*see* INDIAN TREATIES). In 1880 the total population of the Canadian plains reached 120 000, in which the approximately 30 000 Indians had become a minority. Most Indians were then living on reserves (*see* INDIAN RESERVE), where government agents tried to introduce them to new means of subsistence, primarily agriculture. Years of scarcity and starvation followed, in which the people depended upon the frequently inadequate rations of the government. Throughout this difficult period of social and economic adjustment, missions of various Christian denominations played a major role in providing a new education system, frequently acting as mediators between the natives and white society.



Ju-Ah-Kis-Gaw, [Ojibwa] Woman with her Child in a Cradle (1835), oil on canvas by George Catlin *(courtesy National Museum of American Art, Smithsonian Institution/Gift of Mrs Joseph Harrison, Jr).*

Life on the reserves slowly improved until the GREAT DEPRESSION of the 1930s, when the trend towards larger mechanized farming brought disillusionment and defeat for many tribal groups. On all reserves large areas were leased to white farmers, but the rapidly increasing population since the 1930s and the lack of employment have become chronic problems over the years. After 1940 growing numbers of Indians left the reserves and moved to nearby cities (*see* NATIVE PEOPLE, URBAN MIGRATION). On the reserves, various economic programs have been initiated and government agents have increasingly transferred their administrative responsibilities to elected chiefs and tribal councils. Accurate population numbers are hard to obtain, but in 1980 there were at least 60 000 Indians living on the Canadian plains: 18 000 in southern Alberta, 22 000 in southern Saskatchewan; 20 000 in southern Manitoba. TED J. BRASSER

Plateau

Territory and Natural Environment The Plateau culture area is named after the geographically defined Columbian Plateau. In Canada this area consists of the high plateau between the BC coast range of mountains and the Rockies. Scholars over the years have suggested a variety of northern borders for the Plateau culture area. In 1932 Diamond JENNESS referred to this area as "The Cordillera," extending as far N as TAHLTAN territory. Other scholars have taken the SEKANI homeland or CARRIER country as the limit. The most recent anthropological consensus affiliates all of these peoples with the subarctic cultural area and uses the northern boundary of Shuswap territory as the northern border of the Plateau.

Hot, dry summers and cold winters are typical throughout the Plateau. This climate creates an environment well suited to mule and white-tailed deer, caribou, black bear, grizzly bear, elk and mountain sheep, as well as smaller animals including coyote, fox, lynx, wolf, raccoon, porcupine, marten, weasel, beaver, marmot and hare. The major rivers supported annual runs of PACIFIC SALMON and other fish, which were the mainstay of subsistence.

Major Language and Tribal Groups The linguistic families represented by this culture area in Canada are the Athapaskan (NICOLA-SIMILKAMEEN, now extinct), Salishan (Interior Salish — Shuswap, Lillooet, Thompson, Okanagan; *see* SALISH, INTERIOR) and Kutenai (KOOTENAY). *See also* NATIVE PEOPLE, LANGUAGES.

Historical Summary Archaeologists postulate that about 9000-10 000 years ago, not long after the glaciers from the most recent ice age receded, the BC Plateau was populated by native people who had migrated northward from more southerly areas of this same Plateau, where the glaciers had receded earlier (*see* PREHISTORY). Gradually there emerged a culture adapted to the forested mountains, sage- and cactus-covered hills, and riverine resources of the area.

The Plateau's abundant natural resources were the major stimulus that attracted non-Indians to this area. At first it was furs — the lure of furs brought the explorer Alexander MACKENZIE into contact with the Northern Shuswap people in 1793, and David THOMPSON into Kootenay country in 1807. In 1808 Simon FRASER explored the entire length of the river that now bears his name. All of these explorers were received hospitably by the Plateau Indians. One chief took Fraser by the arm and directed him to shake hands with every one of the 1200 Indians assembled at Lytton to meet him.

By the 1820s, fur-trading posts were established throughout the Plateau. With the introduction of firearms and metal implements, the hunting of fur-bearing animals became much more efficient, and soon their numbers dwindled. At the same time, diseases such as measles, influenza and smallpox swept through the native settlements, killing thousands of Indian people (*see* NATIVE PEOPLE, HEALTH).

Gold was the impetus for the next wave of non-Indians to overrun the Plateau. The discovery of gold in 1857 on the Fraser R attracted almost 30 000 fortune seekers of many ethnic backgrounds (*see* GOLD RUSHES). Not surprisingly, violence erupted immediately.

In an effort to restore peace and protect Indian lands from further encroachment, the new governor of BC, James DOUGLAS, began working out a policy of native rights. He decided the best way to handle the problem of land ownership was to extinguish Indian rights to their lands through treaties and compensation. The native people would then live on INDIAN RESERVES. On the Canadian Plateau, no INDIAN TREATIES were signed and no compensation was paid, although reserves were surveyed and allotted. By the late 1880s all of the Plateau Indian peoples had been assigned to live on scattered, small reserves.

Traditional Culture We have only an incomplete record of what Plateau life was like before it was affected by the presence of Euro-Canadians. When the first detailed studies of these people were made in the late 1880s and early 1900s, the traditional ways had already changed dramatically. The summation that follows from the works of pioneer ethnographers James TEIT, Franz BOAS, George Mercer DAWSON and Charles HILL-TOUT, supplemented by the work of contemporary researchers, reflects our gaps in knowledge of traditional Plateau life.

In this region groups of related people worked and travelled together in the spring, summer and fall, then joined with other such groups to winter in relatively permanent winter villages. Plateau society was egalitarian and communal in most respects, although men were the major decision makers. Within each village there were a number of chiefs or headmen who organized economic activities; eg, there was a salmon chief for fishing, and so on. The advice of these men was taken seriously, but every adult male took part in gatherings to discuss the general concerns of the group. There were no formal councils; when confronted with an issue affecting the group at large, a man invited other males to discuss it. Often it was the advice of the old people or the most experienced that was accepted.

The division of labour was based on gender. Men were responsible for hunting, trapping, fishing and manufacturing implements from bone, wood and stone, and also for warfare. Women's responsibilities included preparing food for meals and for winter storage, harvesting plants, maintaining the home and caring for small children. There was little formal specialization of roles. Those men who had acquired certain physical and spiritual abilities during their adolescent training became "professional" hunters of bear and mountain goat. All men were expected to be competent deer hunters.



Contemporary Okanagan dancing. The Winter Guardian Spirit Dance was practised in Canada mainly by the Okanagan (*photo by Dorothy Kennedy*).

Land was considered communal property, with a few exceptions. Some salmon-fishing stations were privately owned, while others were owned by village groups. Hunting grounds and root-harvesting grounds were generally open to all those who spoke the same language, and consent to use these areas was sometimes extended to others.

Food was shared liberally among all villagers. At salmon-fishing stations, a weir or net was used to catch fish for the entire village, and men with harpoons caught fish for their individual families' needs. As the Plateau economy was based on hunting, fishing and gathering, all seasonal and unreliable activities, much time and effort was spent smoking food or drying it for storage. The entire community, children and adults, was involved in this activity. Food was not always plentiful — there were occasions when the salmon runs failed, certain animals were not available, or root and berry crops did not materialize. At such times the people had to travel farther and work harder to survive. Each spring the appearance of the first run of salmon and the first fruits or berries was celebrated with a special ceremony.

Transportation on the Plateau was by means of dugout CANOES made from red cedar or cottonwood, or bark canoes from white pine or birch. SNOWSHOES were commonly used — their designs were specially suited to the varying conditions of snow and terrain. In early times dogs were used as pack animals as well as in hunting deer. By the 1730s the HORSE was introduced into the Canadian Plateau from farther S and dramatically improved the mobility of native peoples. It is likely that the Kootenay were the first Plateau group in Canada to obtain horses.

The 3 main house types found on the Plateau were the semisubterranean pit house, the tule-mat lodge and the TIPI. The pit house most often consisted of a circular excavated pit protected by a conical roof of poles covered with brush and earth. Variation was found from area to area — the pit could be circular or square, the roof conical, pyramidical or almost flat, and the entrance either a hole (which also served as an exit for smoke) in the centre of the roof or a door at the side of the roof. Sometimes tunnels acted as entrances or connected several pit houses together. Although pit houses were most commonly used as winter dwellings, recent information suggests they were sometimes used at other times of the year.

Lodges covered with bark, or mats of tule or grass, were employed throughout the Plateau. There were 3 main ground plans: rectangular, parallel sides with rounded ends, or rectangular with one end rounded. For winter use these lodges were banked around their bases with dirt and snow. One or more fires were positioned in the centre of the lodge. In the Kootenay area of the Plateau, hide-covered tipis were used in addition to the other dwelling types. The Kootenay tipi was of the 4-pole-foundation type, with about 15 supplementary poles. Lean-tos of poles and brush were also used for shelters at temporary camps. Other structures included a SWEAT LODGE for men and a menstrual isolation place for women. Traditional-style dwellings were generally last used in the Canadian Plateau around the mid-to late 1880s, although in some areas their use extended into the early 1900s.

Plateau peoples felt a deep connection with the inanimate beings that inhabited their environment. Everything around them was imbued with special powers, even rocks and trees. This spiritual relationship with nature permeated all aspects of daily life (*see* NATIVE PEOPLE, RELIGION).

During adolescence, every individual underwent special training to receive guardian-spirit power from a nature-helper. The spirit came to the person when he or she was in a trancelike state, told the recipient how to use the gift, and provided a "power song." Shamans who trained longer and more intensively received special powers enabling them to cure the sick or cause harm to others and were both respected and feared. They used their guardian-spirit powers in curing performances (*see* SHAMAN).

The Winter Guardian Spirit Dance, the major ceremony of most Plateau peoples in the US, was practised in Canada mainly by the Okanagan. The dance was likely celebrated in former times by the Shuswap, Thompson and Lillooet as well, although in a slightly different manner. Some Canadian Okanagan people still participate in winter dances today, in both BC and the US. The winter dance was hosted by shamans, who used the occasion to communicate their spirit powers in public. After one or several nights of dancing and administering to the needs of the sick, the host or hostess presented the guests with gifts. Other Salishan groups in the Plateau held similar ceremonies, marked by the singing of spirit songs, at any time of the year.

Among the Kootenay, a ceremony was held which united a spirit power and its possessor for such purposes as predicting future events and finding lost objects. This ceremony, along with the SUN DANCE, points to the relationship of the Kootenay people with the Plains Indians.

Clothing for the Plateau peoples was sewn from the tanned hides of animals and woven from local grasses or from the pounded bark of bushes. MOCCASINS were common; most often they were made from deer hide, but occasionally from salmon skin. Winter clothing consisted of the thick skins of fur-bearing animals. Among some groups clothing was decorated with dentalia shells, ochre paint, porcupine quills or native-made beads or seeds. Mats and baskets woven for utilitarian purposes were often beautiful as well. Tattooing and nose and ear piercing were common but not universal.

Songs were important in traditional Plateau life, and were used by individuals to summon religious and magical powers. Singing was sometimes accompanied by bird-bone flutes, rattles of deer hooves, and sticks being struck on boards, but mainly by hide-covered wooden-frame drums. One type of song still known and widely performed today is the stick-game song, sung while playing an indigenous gambling game involving 2 opposing teams.

The extensive Plateau oral literature that once occupied the long winter evenings now fills only the pages of books. A complex cycle of



Kutchin man's summer costume of tanned caribou-skin decorated with beads, dentalia (highly prized shells obtained in trade with Northwest Coast tribes) and red ochre (*courtesy National Museums of Canada/National Museum of Man/K75-954*).

tales, frequently with humorous and bawdy episodes, involved the trickster-creator known as Coyote.

Culture Change Hudson's Bay Co officials and early missionaries tried to introduce literacy and calendars to the Plateau peoples, but it was a Catholic missionary, Father Le Jeune, who had the most success. Contemporary attempts to teach native people to write the various Plateau languages have not yet proved as successful as Le Jeune's work at the turn of the century, when more than 2000 Interior Salish became literate.

For a time, Plateau groups universally adopted Christianity, but there has been a resurgence of the old religions. Since the establishment of Indian reserves in the late 1800s, Plateau Indians have played a major role in struggles relating to native LAND CLAIMS in BC. The influential Indian organization, the Allied Tribes of British Columbia, was initiated at Spences Bridge in the Canadian Plateau in 1915 by several Interior Salish Indians assisted by ethnographer James Teit. This organization was active for 12 years.

Since the early 1970s some younger Plateau Indians have made a conscious attempt to reinterpret traditional ways, resulting in a "pan-Indian" native movement that is becoming more widespread (*see* PAN-INDIANISM). The mid- to late 1970s saw the establishment of powerful Indian tribal councils in the Canadian Plateau, organized along linguistically defined lines and consisting of several bands (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM). Both the bands and the tribal councils are strong advocates of Indian government, economic development of reserve lands (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS; NATIVE PEOPLE, SOCIAL CONDITIONS), educational opportunities for Indians (*see* NATIVE PEOPLE, EDUCATION), cultural and linguistic survival, and equitable settlement of the long-standing land-claims issues with both federal and provincial governments.

DOROTHY KENNEDY AND RANDY BOUCHARD

Subarctic

Natural Environment The area of Subarctic cultures lies largely within the 5-million km^2 zone of northern or boreal coniferous forest that extends from the arctic tundra to the mountains, plains or deciduous forest in the S and across N America from Labrador nearly to the Bering Sea. Three-quarters of the area lies on the Canadian Shield, Hudson Bay and Mackenzie R lowlands. It is dotted with many lakes and crossed by innumerable rivers. The rest consists of western mountain ranges, plateaus and the Yukon R lowlands. Winters are long and harsh but forest cover and snow provide shelter for peoples and animals. Temperatures often reach minus 50 in winter but can rise to plus 35 in summer (*see* VEGETATION REGIONS).

Mammals commonly found in the area are moose, caribou, black bear, Dall sheep (northwestern mountains), beaver, hare ("rabbit") and either marmot or ground hog, which were important for materials and subsistence; and wolverine, otter, marten, mink, weasel, muskrat, lynx, wolf, coyote, fox and others which, together with some of the subsistence species, provided furs for trade. Musk-oxen, bison and wapiti also were available at a few localities. Fish abound in the rivers and lakes, and include several species of whitefish, pike, lake trout, grayling, and suckers in the Arctic drainage and salmon in the Pacific and, to a lesser extent, Atlantic drainages. Migratory waterfowl pass through the Subarctic seasonally in great numbers.

Major Languages and Tribal Groups Most peoples of the Eastern Subarctic speak languages of the Algonquian family; those of the Western Subarctic, Athapaskan languages. Northern Subarctic Algonquians, including the ATTIKAMEK and MONTAGNAIS-NASKAPI of Québec and Labrador, speak dialects of the Cree language, and Algonquians to the south of them speak dialects of Ojibwa. The BEOTHUK of Newfoundland spoke a language of uncertain affinity. Linguists have identified more than 20 different Northern Athaspaskan languages within the Western Subarctic (including Alaska). *See* NATIVE PEOPLE, LANGUAGES.

Most Indians of the Subarctic were not organized politically as tribes, but they can be divided into named groups of people, members of contiguous bands (local populations exploiting defined territories) who spoke the same language dialect and were related by kinship and common traditions. Within each of the 2 major language families, neighbouring groups often shared similar lifeways. Perhaps because the Western Subarctic is physically more diverse than the East, there was more linguistic and cultural diversity among the Athapaskans than the Algonquians.

Historical Summary Contact with Europeans changed Subarctic cultures profoundly. The effects of contact differed according to time and place. Early contact during the 17th century caused extensive migration of Subarctic people such as the CREE and brought about new and different intertribal relationships. The 19th century was characterized by direct contact between native people and Europeans engaged in the FUR TRADE. Different tribes experienced the effects of contact with greater or lesser severity. In Newfoundland, loss of habitat and killing by whites led to complete extinction of the native Beothuk by 1829. By contrast, the neighbouring Montagnais-Naskapi developed a trapping economy and systematic trade relations with Europeans. They adapted successfully to contact conditions because Europeans needed them to trap furs and had no immediate use for their hunting territories. Other Indians such as the Cree became fur-trade middlemen between the HUDSON'S BAY CO and Subarctic Athapaskans to the west. Following Alexander MACKENZIE'S voyages of exploration along the Peace and Mackenzie rivers in the 1790s, the rival NORTH WEST CO established trading posts that gave them direct contact with the Athapaskans. In 1821 these posts were taken over by the HBC, which has remained an important influence in the area.

The 20th century has increasingly seen a period of industrial-resource development in the North and the movement of non-natives into the Subarctic. These conditions have motivated contemporary Subarctic natives to press for LAND CLAIMS settlements and increased control over their own affairs.

Traditional Culture All natives of the Subarctic lived by hunting, fishing, trapping and gathering wild plants. Indigenous farming was not practical within their territory (crops successfully grown in the North today did not reach contiguous areas until after European contact). Men did most of the big-game hunting, while women snared hare, fished, cut and dried meat, and processed hides. Some hunting techniques such as drives and the construction and operation of corrals involved most adult members of a BAND (*see* BUFFALO HUNT).

Since game animals were thinly distributed over vast territories in the boreal forest, or were available only locally or seasonally, Subarctic human population densities were among the lowest in the world. Some scholars estimate that the entire area may have supported as few as 60 000 people, although others believe that before the introduction of European diseases, populations could have been larger.

Subarctic natives lived typically in local bands of 25-30 people. Each band moved frequently from one place to another within an overall territory as game supplies changed from season to season and from year to year. A group's size and the nature of its annual economic cycle were strongly influenced by the availability of local resources. The TUTCHONE, Athapaskans of the Yukon Plateau, and others west of the Rocky Mts, gathered along rivers during the summer to catch and dry salmon. The CHIPEWYAN, Athapaskans living north of Lk Athabasca, moved to the edge of the barren grounds to follow the caribou herds. Montagnais and Naskapi spent their summers near the Atlantic, Gulf of St Lawrence or James Bay coasts and their winters inland. A single band often did not have exclusive access to its territory since adjacent bands frequently obtained hunting rights, especially if they faced food scarcity, or certain peripheral areas were used in common. However, rich sites such as lakes or rivers where fish could be taken regularly were usually exploited by the same band year after year. During the summer, when food was abundant, several local bands often resided together.

Most Subarctic bands did not have formal chiefs before European contact. People aligned themselves with persons who manifested leadership abilities and took the initiative for undertaking specific tasks such as trading, war, or communal hunting, including the necessary prior preparations. Aside from the prestige and respect this brought them, their authority did not generally extend beyond these tasks. White fur-traders, however, attempted to establish chiefs and to endow them with considerable power to better control the Indian population tied to the trading post.

Most adult men and women had a part in making decisions that affected the band. Families or individuals who did not agree with a particular decision were free to join another band, camp or act for themselves for a time. Subarctic people were noted for the value they placed on personal autonomy as well as for the flexibility of their social organization. These characteristics helped them respond to the opportunities and limitations of their environment.

Ties of kinship, reckoned primarily matrilineally among Pacific drainage Athapaskans, bilaterally among those of the Mackenzie drainage, and both bilaterally and patrilineally among the Algonquian speakers, joined people together. Normally, people who had regular contacts used kinship terms, in part structured according to generation (eg, the eldest people become grandfather or grandmother), to address and refer to one another. Kinship relations often determined membership in groups and regulated marriages. In addition, tribes west of the Mackenzie R were organized into clans, and also in some cases by dual divisions (moieties) adopted from West Coast tribes. These divisions served primarily to insure hospitality and protection to clan members who might be visiting from other camps or tribes, to fulfil certain largely ceremonial obligations to the opposite division (cremation of the dead and reciprocal feasts, for instance), and to regulate marriage through the requirement of clan exogamy.

Since their food quest necessitated mobility, natives of the Subarctic had limited material possessions. They travelled light and preferred to make heavier tools and implements as they were needed rather than carry them from place to place.

Success in hunting depended on accurate knowledge of animal behaviour. Children were taught to be self-reliant, observant and resourceful. They were expected to learn the habits of game animals and to find their way through large areas of difficult terrain. They were assisted in these skills by listening to long hours of practical narrative accounts and mythological tales and by learning special trapping and hunting songs and innumerable riddles. Those who made stupid mistakes from failure to be observant were the butt of ridicule.

Northern forest Indians made MOCCASINS, leggings, skirts, shirts and coats of soft tanned hides from which the hair had been removed by scraping. Unique among the Athapaskans was the short V-tailed summer slipover caribou skin cloak, highly ornamented with dyed porcupine quills, dentalium and beads made from seeds (later glass trade beads). This exquisite cloak was worn with trousers with moccasins attached. For wear during the coldest months, rabbit skins were cut into strips, twisted and woven into parkas and sleeping robes, and 2-piece suits were made from caribou hides with the hair left on and turned inside. Several different styles of moccasins lined with rabbit skin or dried grass were used.

Hunting implements included bows, various types of arrows, and a variety of ingenious traps, snares, deadfalls, and such devices as the caribou drift fence and pound. People caught fish with dip and gill nets, traps, spears, and hook and line. They dried berries in the fall or stored them in baskets in pits in the ground. Often the berries were mixed with fat and fish to make "Eskimo ice cream" in the far northwest, or were mixed with pounded dried meat and grease to make PEMMICAN. Women were skilled in preparing meat for drying, hide tanning and sewing, and making cooking and storage containers of skins, and birchbark or coiled spruce root basketry.

Men made SNOWSHOES, TOBOGGANS, sleds and hunting implements. Survival depended on being able to travel long distances. Snowshoes were essential for winter travel. Heavy loads were transported on toboggans and, in the far northwest, sleds pulled both by dogs and people. Aboriginally, few dogs were available for traction. During the summer, people and their belongings were moved along rivers and lakes by canoe.

Because of their mobile existence, northern forest people built shelters constructed of easily transported bark or skin covers and of locally available materials. Dwellings varied considerably depending on local materials and traditions, but in all areas they were designed to be heated and lit by a single fire. They did not usually accommodate more than 2 families. Among the northern OJIBWA, summer dwellings were bark TIPIS or dome-shaped lodges also covered with birchbark. Many of the Arctic drainage Athapaskans lived in conical shelters covered with hides, similar to the Plains tipi. Among the KUTCHIN and HAN of the Yukon, as well as in northern Alaska, the conical tent was replaced by a domed or hemispherical one. Double lean-to structures covered with hides and brush also were used in the Arctic (Mackenzie) drainage and the northwestern mountain and plateau region. At fishing camps in the Cordillera there were unchinked "smokehouses" that resembled roughly built log cabins. In order to provide added warmth in winter dwellings, the hair was left on the hide coverings of conical and domed tents which, although bulky, nevertheless were portable. Some Athapaskans of the Mackenzie District and Cordillera as well as Indians of the eastern Subarctic wintered in conical log structures chinked with moss and partially covered with dirt and snow. The Han near Dawson, as well as many Alaskan groups, built rectangular pit houses that were heavily banked with turf to withstand the cold, while far to the south in BC, groups such as the CHILCOTIN made pit houses similar to those used in the Plateau.

Considerable effort was taken to cache food and equipment not needed for the season at hand, in specially prepared pits, strong cribbed and conical structures and cairns, or on racks and platforms in trees.

Myths and legends taught about a time when animals had great power and could assume human form. Many Subarctic people tell stories about a "culture hero," the first person to become powerful. For them, power and knowledge were one. They said someone with power "knows something." The culture hero demonstrated the personal knowledge and self-reliance that were recognized as important survival skills, and could outwit evil medicine persons and overcome dangerous animals of the myth time, and thus make the world a safer place in which humans could live. Beliefs about the interdependence of people and nature, embodied in myth, helped Subarctic natives interpret their environment.

Religious leaders were people who used their powers for the benefit of others, though to some people they sometimes used their power for evil. Among many Algonquians, these SHAMANS, or medicine people, conducted the SHAKING TENT ceremony in which distant spirits of people or animals were conjured for curing and prophecy in a special tipi. Elsewhere, shamans performed under a blanket or dressed in a special manner as a signal of their office. Western Athapaskan medicine men and women charged high prices for their services and asserted prerogatives or took liberties among their people, for which reason some of them were feared and hated. Among the Naskapi, certain men and women told about the trail ahead by scapulamancy, a form of divination done by interpreting the pattern of cracks on a caribou shoulder blade heated by fire. The BEAVER of the Peace R region had prophets called Dreamers — people who had experienced death and flown like swans to a spirit land beyond the sky. They were healers and leaders in religious dances based on songs they brought back from their journeys to heaven. Like many other Subarctic people, they sang to the accompaniment of single-headed hand drums. Most people, however, had certain varying amounts of medicine power. In addition, there was a body of belief and practices, proscriptions (taboos), prescriptions and minor rituals which existed apart from shamanism, divination and curing. Among these customs were the special observances taken prior to and after killing animals, as in bear ceremonialism and that attendant to the deaths of humans.

Culture Change Contact with Europeans presented a challenge to native peoples of the Subarctic. Many quickly became dependent on trade goods such as guns, knives, axes, cooking pots and clothing, and eventually food, since they turned from harvesting animals for food and skins to trapping those species desired in European markets. Bands moved to within travelling distance of trading posts, and the traders endeavoured to control the Indians. Trading chiefs who could negotiate with the Europeans became as important as the earlier hunt leaders. The fur trade had a considerable impact on Subarctic ecology. Many species of game and fur-bearing animals were depleted. European diseases such as smallpox, tuberculosis, measles and influenza killed large numbers of people (*see* NATIVE PEOPLE, HEALTH). Other people died of starvation during periods of disease and game scarcity. Native people adopted many elements of Christianity but also retained many of their own spiritual traditions, sometimes covertly. The ability to assimilate new techniques and ideas is a typical attribute of the Subarctic native culture.

In modern times, large-scale resource development and settlement of the North by large numbers of outsiders have threatened the native economy of trapping and subsistence hunting. In 1975 the Grand Council of the Cree signed the James Bay and Northern Quebec Agreement accepting compensation for social and ecological impacts of the James Bay Hydroelectric Project (*see* JAMES BAY AGREEMENT). Natives of the western Subarctic in the District of Mackenzie, organized politically into the DENE NATION, are seeking a settlement that recognizes their right to a certain degree of self-determination within the Canadian national context.

ROBIN RIDINGTON

Reading: H.A. Dempsey, *Indian Tribes of Alberta* (1978); P. Drucker, *Indians of the Northwest Coast* (1955); W. Duff, *The Indian History of British Columbia* (1964); L.M. and J.R. Hanks, *Tribe Under Trust: A Study of the Blackfoot Reserve of Alberta* (1950); H.B. Hawthorn et al, *The Indians of British Columbia* (1958); D. Jenness, *The Indians of Canada* (1932); T. McFeat, ed, *Indians of the North Pacific Coast* (1966); D.G. Mandelbaum, *The Plains Cree* (1979); A. Ray, *Indians in the Fur Trade* (1974); V.F. Ray, *Cultural Relations in the Plateau of Northwestern America* (1939); W.C. Sturtevant, gen ed, *Handbook of North American Indians*, vol 15: *Northeast*, ed B.G. Trigger (1978) and vol 6: *Subarctic*, ed J. Helm (1981), other volumes are forthcoming; J.W. Vanstone, *Athapaskan Adaptations: Hunters and Fishermen of the Subarctic Forests* (1974); M. Zaslow, ed, *A Century of Canada's Arctic Islands 1880-1980* (1981).

Native People, Communications After the late 19th century a few periodicals were published for native audiences by non-Indian missionary organizations, notable examples being the Chinook-language *Kamloops Wawa* (1891-1905) and the Inuktitut-language Oblate publications of the 1940s and 1950s. Among the few purely Indian journals was the Hagersville, Ont, *Indian* (1885-86). Native journalism in Canada is not well documented, except for the Indian impersonators Grey Owl (A.S. BELANEY) and BUFFALO CHILD LONG LANCE who published extensively on native issues in the 1920s and 1930s.

Rapid progress in communications technology in the 1960s, coupled with increased exposure to radio, TV and newsprint, has caused INDIAN, INUIT and MÉTIS leaders to become more aware of the power of mass communications as a means of influencing the political process. Convinced that the mass media was intended for the non-native audience and controlled by non-native interests, many native organizations, at the BAND, provincial and national levels, started to publish their own newsletters and newspapers in the 1970s. These publications

were concerned mainly with advocacy on native issues, with little space allotted to news or human-interest features. Many later publications reflect a wider range of audience interests.

In the mid-1960s, working with seed money from the province of Alberta, Eugene Steinhauer, a Cree who later became president of the Alberta Indian Assn, purchased a tape recorder and some rudimentary editing equipment and started producing news and public-affairs items for broadcast on the CBC outlets in Alberta. By 1968 Steinhauer's one-man communications operation had become the Alberta Native Communications Society, a nonprofit organization funded by the province and the federal secretary of state, which eventually expanded beyond radio into TV production and the publication of a tabloid newspaper, *The Native People* (1968-82). It took as its slogan, "From Smoke Signals to Satellites." Other native communications societies, all funded at least in part by the secretary of state through the Native Communications program of its Native Citizens' Directorate, and some partially funded by provinces, sprang up in various parts of Canada.

By 1984 there were 13 native communications societies: Indian News Media Inc (S Alta); Native Communications Society of British Columbia (Vancouver); Ye Sa To Native Communications Society (YT); Inuvialuit Communications Society (Inuvik), Native Communications Society of the Western Northwest Territories (Yellowknife) and Nunatsiakmiut Society (Frobisher Bay); Okaalakatigik-Labrador Inuit Communications Society (Postville, Labrador); Native Communications Inc (Thompson, Man); Wa Wa Ta Native Communications Society (Sioux Lookout, Ont); Taqramiut Nipingat Inc (Sugluk, Qué) and James Bay Cree Communications Society (Val D'Or, Qué); Saskatchewan Native Communications and Whetamatouin Corporation (Regina); and Native Communications Society of NS (Membertou Reserve, Sydney). The secretary of state had plans for expansion of its native communications program to include societies in other parts of Canada where native people expressed an interest and capability in operating a society.

From its inception, the secretary of state program was based on the principle that the societies should serve both status and nonstatus audiences and should not be controlled or unduly influenced by native political organizations, extending the "free and independent" press tradition of the non-native society. This principle was accepted by some native leaders, but strongly rejected by others. This rejection was particularly strong in Saskatchewan and NB, where most native leaders adopted the position that there could be no native communications societies unless they were part of or strongly influenced by the native political organizations and served separate status or nonstatus audiences. In Dec 1982 both the province and the secretary of state ceased funding the Alberta Native Communications Society because of management and financial problems. In March 1983, however, the newly formed Aboriginal Multi-Media Society of Alberta was funded to serve the same audience.

Casual or unlicensed broadcasting in native languages had been carried out since the earliest days of northern radio. Perhaps one of the most important developments in native communications in the early 1980s was a decision by the CRTC to license the Inuit Broadcasting Corp in Frobisher Bay to produce television programs for the mainly Inuit audience in northern Québec and the eastern Arctic and to link them via the CBC's satellite channel. Another development was the licensing of CANCOM, a privately owned satellite transmission company, to provide satellite TV and radio service to "underserved" areas (*see* COMMUNICATIONS IN THE NORTH; SATELLITE COMMUNICATIONS). By April 1984 native communications groups in various northern locations, including Whitehorse, Yellowknife and Sioux Lookout, Ont, were establishing native radio networks which would use satellite distribution. All of these were funded by secretary of state under its Northern Native Broadcasting Access Program.

ROBERT J. RUPERT

Native People, Demography Although estimates vary of the native population of Canada at the time of the arrival of Europeans, anthropologists give a tentative figure of about 1 million, excluding INUIT. Thereafter, the number of native people declined dramatically owing to disease, starvation and warfare. By 1867, it is thought that between 100 000 and 125 000 Indians remained in what is now Canada, along with approximately 10 000 MÉTIS and half-breeds in Manitoba and 2000 Inuit in the Arctic. The native population of Canada continued to decline until 1920 (*see* NATIVE PEOPLE, HEALTH). Since then, however, it has increased at a rate faster than that of the general population. The annual INDIAN population growth rate, eg, peaked in the late 1950s at slightly under 4% (the postwar Indian "baby-boom"), and since then has gradually declined to about 1.5%.

In 1981, according to Statistics Canada, there were in Canada 293 000 status Indians, 25 000 Inuit, 98 000 Métis, and 75 000 nonstatus Indians, comprising a total population of 491 000, or 2% of Canada's total population. Indian and Inuit population figures are generally accurate but those for Métis and nonstatus Indians are problematic. Difficulties in census enumeration in remote areas and the absence of acceptable and consistent definitions of "Métis" and "nonstatus Indian" for demographic purposes may have depressed Statistics Canada figures for these native groups. Other Canadian government and academic surveys estimate the Métis and nonstatus Indian population to be between 700 000 and 1 million, thus raising the native population to about 5% of the total Canadian population.

Native people comprise 58% of the total population of the NWT and 18% in the Yukon. Among the provinces, they range from 6% of the population in Manitoba and Saskatchewan to 3% in Alberta and BC to 1% in the eastern and Atlantic provinces. Ontario, however, has the greatest number of native people (110 000), followed by BC (83 000), Alberta (72 000), Manitoba (66 000), Saskatchewan (59 000) and Québec (52 000).

Of the total Indian population of Canada, 65% live in rural or remote areas of the country and 35% live in urban or semiurban areas. The proportions are comparable for the Métis and nonstatus Indian population. Among the provinces, BC, Saskatchewan and Manitoba have the highest proportion of native people living in rural or remote areas, while Ontario, Québec and the Atlantic provinces have the highest proportion living in urban and semiurban areas. Inuit, Indians and Métis in the Yukon and NWT live almost entirely in rural and remote regions.

Since the mid-1960s an increasing number of native people have moved away from their reserves (Indians) or home communities — usually to urban centres (*see* NATIVE PEOPLE, URBAN MIGRATION). This migration stems primarily from the lack of economic opportunity in or near INDIAN RESERVES and native communities. The Dept of INDIAN AFFAIRS AND NORTHERN DEVELOPMENT estimates that 28% of the total Indian population now lives off-reserve, compared to just 18% in 1960. Inuit communities are relatively stable in comparison to native communities in southern Canada.

DAN GOTTESMAN

Reading: T. Berger, *Northern Frontier, Northern Homeland* (1977); H. Hawthorne, *A Survey of the Contemporary Indians of Canada* (1966-67); *Indian Conditions: A Survey* (1980).

Native People, Economic Conditions Aboriginal economies were based primarily on *sharing* (a familistic, egalitarian pooling of resources) in the 26 simple or BAND-level societies to the north; on *reciprocity* (a calculated, give-and-take exchange) in the 17 intermediate or "tribal" level societies to the south; and on *redistribution* (a centralized and politically organized administration of the economy) in all 11 developed chiefdoms of the Northwest Coast.

No native societies had true money or any medium of exchange with high "liquidity," by which one thing such as coins could buy a wide variety of goods and services. There were no true markets where prices were primarily set by the supply and demand of goods. There was no such thing as employment for wages. During the FUR-TRADE period, however, the elements of a barter/wage economy infiltrated many native communities.

To the degree that native people in Canada today participate in their aboriginal economic heritage, they have problems in integrating with the general Canadian economy. A native trying to get into business has to learn details of a new and complex system involving such things as accounting, bidding, contracts, licences, loans, unions and taxes.

Three factors have been particularly important in patterning modern native economies: the specific evolutionary heritage of each of the surviving traditional societies; the extent to which individuals were drawn in the past into the money, market and wage economy; and the federal governments's role in the support and administration of the economies of native communities.

In general the more socially and politically complex aboriginal societies adapted most successfully, at the time of contact, with the non-native economy, and this holds true of their participation in the modern economy. Natives with a heritage that goes back to the chiefdoms of BC or to the southern tribes, such as the BLACKFOOT, MOHAWK or HURON, have higher incomes than the INUIT, DENE and northern Algonquian peoples with a band heritage. Historical differences in participation in the modern economy have shown up in the same societies; the CREE and OJIBWA, eg, who moved onto the prairies with the fur trade, made economic advances over those who remained in their homelands in northern Québec and Ontario. This economic boom made Cree and Ojibwa the largest and second-largest native societies in Canada, respectively.

After WWII, and especially in the 1960s, the federal government began to play a more active role in the delivery of social, educational and economic development services to native communities (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). The annual federal expenditures on native programs were estimated (1983) to be $2.6 billion ($1.9 billion on status Indians), with the following approximate distribution: community affairs 35%, education 32%, health 13%, administration 6%, economic development 5%, employment 5%, policy and research 1%, and other areas including housing, native associations and sports 3% (*see* NATIVE PEOPLE, SOCIAL CONDITIONS).

The greatest economic advantage that native people have is that they do not pay income tax, provincial tax or certain excise taxes when they reside and work on their reserves (*see* NATIVE PEOPLE, LAW). In some respects the 576 INDIAN bands are like municipalities in that they have many

Employment and Dependency	*Indians*	*National*
Employed	18%	37%
Dependants (young/infirm)	44%	34%
Nonparticipating and unemployed	30%	29%
Traditional economy	8%	0

Occupational Representation	*Indians*	*National*
Fisherman, trappers, hunters	17%	1%
Farmers and farm workers	19%	12%
Loggers	12%	2%
Labourers	14%	6%
Other, mostly indoor work	38%	79%

powers of self-administration. They may levy property taxes or manage businesses that can operate on reserves without paying taxes. Also important in the economy of Indian reserves is the fact that most of their costs of education, health and welfare are paid for by the federal government.

Native people are caught in a swirl of choices. In the traditional communities, a high value is placed on such noneconomic values as the maintenance of proper family and social relations and a tolerant acceptance of individual life-styles, often with strong elements of aesthetics and spirituality. Natives often live in a material state that most Canadians would despise and call "poverty." Native politicians play up this sympathy for native poverty to win material programs for their communities, but most natives have visited the cities of Canada and still prefer to live in their own rural communities (*see* NATIVE PEOPLE, DEMOGRAPHY).

We expect that all people who choose to live in rural areas will have fewer modern conveniences than urban people simply because of the high costs of delivering those services to highly scattered locations. In Canada about 60% of all houses in rural, summer cottage and remote bush areas have running water, sewage disposal and indoor plumbing, but only about 40% of the native houses in rural and remote communities have all of these facilities. Part of the answer to this discrepancy is that there are many very remote native communities: 48% of the band areas are "remote" or "inaccessible," which means that they cannot be reached by roads — only by foot trails, by water or by aircraft; 23% are considered rural; and only 29% are semiurban or urban.

The land base of the 2242 INDIAN RESERVES, the 85 crown-land communities, and other northern settlements tends to be quite small, so the native population has few resources to work with. The land base is only about 13 ha per status Indian in Canada, compared with 62 ha per person for Indians in the US. Most of the land is suitable only for primary production such as fishing and forestry. About 20% of Indian land has good agricultural potential, but this land is located largely in southern Canada where natives already have access to other forms of employment.

Statistics for the 1979 labour force indicate a high level of dependency and a level of wage employment that is only half that of the national average. A significant number of natives still harvest fish and game for subsistence purposes in the traditional style. Native people are strongly represented in outdoor and seasonal work, though these occupations pay less than such indoor and year-round work as professional, technical, managerial, clerical, sales and service occupations.

The low incomes, poverty and unemployment of native people are, to a considerable degree, the result of cultural heritage, choice of occupation, and residence far from the main centres of the economy; by comparison, racial discrimination and education are secondary factors. Almost all native people now complete elementary school, most have some secondary education, and a small percentage are going on to complete college or university (*see* NATIVE PEOPLE, EDUCATION). On average, the formal education of native adults is only about 2 years below the national average; and the gap is closing, with nonnative rural students and native students spending roughly the same number of years in school. Anti-Indian discrimination is not generally severe enough to influence economic matters except in some communities in the Prairie provinces and northern Ontario.

Indications of a prosperous future are seen in several current Indian enterprises. There is a national distribution of small businesses in native communities — retail stories, beauty salons and barber shops, laundromats, tourist camps and leasing of cottage lots; in NS, the Abenaki Motor Inn; in Québec, manufacturing of canoes and lacrosse sticks, a fish-packing plant and a shopping centre; in Ontario, manufacturing of shoes and fur coats, an industrial park, a ski resort, a large cranberry farm and over 125 tons of WILD RICE production per year; in Manitoba, 2 bush airlines, a shopping centre and honey production; in Saskatchewan, farming and ranching; in Alberta, manufacturing prefabricated houses, petroleum production and cattle ranching; in BC, fish farming and packing, forestry and lumber milling, mining services and office rentals; in the NWT, Inuit Development Corporation investments in mining, a hotel and office buildings. Although many of these enterprises are heavily subsidized by government and band funds, they are hopeful signs of the growth of an independent native entrepreneurial system.

The national unemployment rate for adult Métis and nonstatus Indians is around 32%. Those who are employed have an average income 16% lower than the national average. They live generally in the same regions as Indians, with a greater tendency for urbanization. Eight Métis communities in 5 areas in Alberta live on provincially established reserves and are involved in fishing, farming and logging. In some provinces the Métis have separate rights and regulations from other native people. Alberta and the NWT, eg, permit them to do general subsistence fishing, and Ontario and NB have special Métis provisions for certain fishing areas.

In Ontario there are 50 000-90 000 culturally active Métis and nonstatus Indians, depending upon the criteria used. In 1978-79 a core of 5444 politically active Métis in 66 communities was surveyed and it was found that 23% of the adults in the work force were unemployed, about 3 times the provincial unemployment rate at the time. However, 60% owned their own home, which is just slightly lower than the Ontario general rate of 66%, and housing facilities were found to be fairly good for a largely rural population: 94% had electricity, 85% had running water and 82% had sewers.

The arctic economy is still primarily based on government programs, such as those of northern development and defence. An oil pipeline is being constructed from Zama, Alta, to Norman Wells on the Mackenzie R and employs over 100 northern natives. The sale by Inuit of sculptures, prints, tailored clothing and furs has become important in the economy (*see* INUIT CO-OPERATIVES).

JOHN A. PRICE

Reading: DIAND, *Indian Conditions: A Survey* (1980); Ministry of Culture and Recreation of Ontario, *Metis and Non-Status Indians of Ontario* (1980); Native Council of Canada, *Native People and the Constitution of Canada* (1981); John A. Price, *Indians of Canada: Cultural Dynamics* (1979) and *Native Studies: American and Canadian Indians* (1978).

Native People, Education Traditional education among most INDIAN and INUIT was by observation and practice, family and group socialization, oral teachings, and participation in tribal ceremonies and institutions. With these methods children learned the values, skills and knowledge considered necessary for adult life. This style of education continues today, but its importance to many Indians has been overshadowed during the past 350 years by the introduction of a formal European-American classroom style of education.

Formal European education of Indian children began in the early 1600s in NEW FRANCE, in mission schools operated by French religious orders such as the Recollets, Jesuits and Ursulines. These schools established a pattern of church involvement in Indian education that dominated until after WWII. The major goals of these mission schools were the "civilization" and Christianization of Indians. In the late 1700s and early 1800s Protestant churches also became active in the education of Indian children in what is now Canada.

From 1763 to 1830 the imperial government dealt with "Indian Affairs" through the military; provision for education for native peoples was minimal. After 1830, when administration was transferred to the secretary of state for the colonies, some money was diverted to education by means of donations to church organizations. This funding allowed the building of schools on some reserves. During this same period various colonies began to provide limited resources for the education of tribal groups within their boundaries.

From the 1830s the churches, mainly the Roman Catholic and Anglican denominations, in co-operation with the colonial governments and later the federal government, began to establish residential (boarding) schools for Indians. By 1900 there were 64 residential schools in Canada. Staffed by missionary teachers who gave vocational and manual as well as religious instruction, these schools were seen as the ideal system for educating Indians because they removed children from the influences of traditional family life. They complemented the prevailing policy of assimilating Indians into white society. Indian parents saw residential schools as necessary evils; necessary because many Indians saw Christianity as a new and positive force in their lives, or because they recognized the need for European skills; but evil because they removed children from their homes and family ties. Most Indians regarded the regime in residential schools as harsh and cruel: children were physically punished for disobedience, and most school staffs forbade the use of native languages by students and made the children feel ashamed of their native identity.

After 1867, education for native peoples fell into 2 categories: education for status Indians became a federal responsibility under the constitution and the treaties; that for nonstatus Indians, Inuit and MÉTIS a provincial or territorial responsibility. By 1900 there were some 226 federally funded day schools in INDIAN RESERVES; the majority of teachers were missionaries and the curriculum included a large proportion of religious instruction. By the 1930s the curriculum began to be more closely patterned on that of the non-Indian provincial schools.

By 1940 statistics revealed that few status Indian children were benefiting from their formal education experiences. Many children were repeating 3 or 4 grades in elementary school, and only a small percentage were graduating from elementary school and going on to high school. During the 1940s the federal government, in cooperation with provincial education authorities, established a policy of integration: federal funds would be provided to enable Indian students to attend provincial elementary and high schools. The expectation was that by removing Indian students from the poorly staffed, inadequately equipped, heavily church-oriented day schools, assimilation would be accelerated and the performance of students improved.

Enrolments in provincial schools rose rapidly and by 1960 there were about 10 000 Indian students attending off-reserve provincial schools. Numerous problems became evident in the program, which led to its re-evaluation by Indian parents and political leaders. Although the



Story hour at an Inuit school at Repulse Bay, NWT (*photo by Fred Breummer*).

qualifications of provincial teachers were superior, they lacked specialized training to teach Indian students. Indian parents criticized the removal of children to boarding homes as well as the daily commuting by bus to attend provincial schools. Most Indian students were not achieving success: in 1967 only 200 Indian students were enrolled in Canadian universities out of a total native student population of some 60 000.

In 1972 the National Indian Brotherhood produced a policy on Indian education, "Indian Control of Indian Education," which was subsequently adopted by the Dept of Indian Affairs and Northern Development (DIAND) as federal policy. It identified the importance of local community control to improve education, the need for more Indian teachers, the development of relevant curricula and teaching resources in Indian schools, and the importance of language instruction and native values in Indian education. Since the presentation of this policy several changes have occurred. By 1983 over 200 schools on reserves were operated entirely or in part by band councils. Over 80 reserve schools offer native language classes, and 38% of native children attending school are given some form of native language instruction. Several programs to increase the number of native teachers have been established in universities in Ontario, Manitoba, Saskatchewan, Alberta, BC and NB. In an effort to improve teaching materials for and about native people, DIAND and the Museum of Man have co-operated in the preparation of dictionaries, grammars and reading texts.

Trent U in Peterborough, Ontario, was the first Canadian university to establish a native studies program, followed since 1969 by similar programs in 9 other universities. A unique approach to post-secondary education is under way at U of Regina, where an Indian Cultural College is part of the university federated system.

Although some Inuit were educated in mission schools in Labrador as early as the 1790s, formal education for Inuit began on a national scale only in the 1950s with the construction of elementary and residential schools throughout major settlements in the Arctic. The decrease in residential schools in the Arctic paralleled the decrease in residential schools for Indians and led to a school-construction program by the federal government in most Inuit villages by 1970. Education for Inuit has been impeded by similar problems to those encountered by other native students.

Statistics are not available for Métis and nonstatus Indian students, but studies generally indicate that, owing to poor socioeconomic conditions and the absence of a federal responsibility, they do not profit as they should from classroom education.

For native people to benefit from their formal education, several changes are necessary. Indian bands, through their boards, will have to exercise more control of policy, budgeting, teacher hiring and school programs. Teaching resources and curricula will need to incorporate and reinforce the culture and values that native children acquire within the family. Greater consideration must be given to instructing native children in the primary grades in the language of the home and community, particularly in areas where the native language is in danger of becoming extinct (*see* NATIVE PEOPLE, LANGUAGES). It is clear from past experience that efforts to alienate native people from their culture have not promoted learning in the formal education process.

HARVEY MCCUE

Native People, Government Policy For the most part, government policy towards native people has meant INDIAN policy. The INUIT were barely touched by government until the 1940s, while special responsibility for MÉTIS and nonstatus Indians has been largely denied. The early history of Indian policy in Canada is characterized by the presence of both France and Britain as colonizing powers. Post-Confederation policy was largely based on the Upper Canadian model, although there have been significant regional differences.

The very scientific and social revolution that made European expansion overseas possible made it more difficult for Europeans to coexist with the preindustrial peoples they encountered throughout the world. The European technological society sought to conquer nature and shed traditional values — in sharp contrast with native cultures, which were based on very close relationships with nature and on strong reliance on tradition. When the 2 societies had to share the same territory, the differing outlooks were irreconcilable. European states attempted to solve the problem by assuming dominance. They claimed by right of "discovery" the less populated lands around the world and declared indigenous people living there to be subject to the colonizing power. However, the material and practical dependence of the Europeans who first came to N America upon the more numerous and better-adapted native people led to Indian-white trading and military alliances. During the period of alliances, which lasted until the early 19th century, Indian policy was diplomatic and military in orientation because native people were considered in some sense to constitute sovereign and independent nations (*see* NATIVE PEOPLE, LAW).

French contacts with Indians involved trade, war and missionary work. Official French policy had 2 objectives: to evangelize the Indians and to assimilate them into French society. Although a few Indian groups settled on church-controlled agricultural reserves near the French, the vast majority continued to live apart as independent nations. By the 1690s, the failure of large-scale assimilation of Indians was accepted even by missionaries and government officials. Fur traders had always discouraged it as being bad for trade (*see* FUR TRADE). Since the French settlements did not expand extensively into Indian territory and displace the inhabitants, the French never recognized formally that Indians had rights in the land and no land cession treaties were ever made. The more populous English colonies, however, expanded towards the West. Although some of them had made treaties with the Indians whom they displaced, they posed a constant threat to neighbouring tribes.

Conflicting alliances between native groups and Europeans dated from the early 17th century when Champlain built an alliance with the HURON and hence alienated the Huron's enemies, the IROQUOIS. Throughout the next 2 centuries the French and British each attracted Indian allies in their competition for trade, land and empire in N America. With the collapse of French imperial power after the SEVEN YEARS' WAR (1756-63), France's erstwhile Indian allies faced the threat of unobstructed British expansion. Indian resistance was expressed in a series of risings associated with the OTTAWA chief, PONTIAC. The Imperial authorities responded by issuing in the Royal PROCLAMATION OF 1763 an assurance to the Indians that they would not be disturbed in their territories beyond the settled colonies. Indian land could only be surrendered to the Crown and at a general assembly of Indians. This principle formed the basis of the later treaty system (*see* INDIAN TREATIES).

Within 20 years, the successful revolt of Britain's Thirteen Colonies revived alliances as Indian nations vainly strove to protect their territory from American expansion. Britain willingly used their assistance in its own diplomatic and military endeavours to protect its Canadian conquests. Indian support proved valuable to the British in the WAR OF 1812.

This twilight of the alliance period overlapped with the beginning of the second stage of Indian policy extending through Confederation to the mid-20th century. Its characteristic features were the imposition by European governments of treaties, reserves and paternalistic social policies, all intended to promote Indian assimilation to the general population. As land was needed for settlement in Upper Canada, treaties were made to "extinguish" ABORIGINAL RIGHTS to the soil according to the principles of

the Royal Proclamation of 1763. By contrast, land cession treaties were not made in the older colonies of the Maritimes or in Québec even when new areas were opened to settlement.

As the non-Indian population increased, Indians ceased to be treated as independent nations and were settled on reserves (*see* INDIAN RESERVE). There, Indian "bands" were organized under the supervision of Indian Dept superintendents or agents. No longer military diplomats, but local managers of reserve land and BAND affairs, they encouraged Indians to farm, become self-supporting by nontraditional means, and generally live like the surrounding population. Schools and churches were usually provided. These activities were organized by a civilian Indian Dept, which replaced the military authority in 1830. The establishment of common property in reserves and band funds, special legislation and treaty rights led to the development of the legal concept of Indian status. Some persons of Indian ancestry — the Métis and nonstatus Indians — never qualified for Indian status or lost it in a variety of ways. Apart from land or scrip grants and special hunting rights for Métis in certain areas, the government has denied any special responsibility towards these people. They are, however, mentioned in the new CONSTITUTION ACT, 1982. The ultimate goal of Indian policy in most of the post-Confederation period was to eliminate all Indian status by assimilating Indians and encouraging them to apply for ENFRANCHISEMENT. This legal process has never been popular with Indians and has failed in its overall objective.

At Confederation, responsibility for Indians was allocated to the central government in Ottawa. This did not affect the general direction of Indian policy, which remained largely unchanged until at least the mid-20th century. As the Dominion prepared for the settlement and development of new territories, the treaty system continued to be used as an expansionist arm of Indian policy. Where the land was not yet wanted, Indians were left without treaties. This situation has given rise to comprehensive LAND CLAIMS in northern Canada. While the federal government made treaties on the Prairies where it controlled the land, it could not do so in BC where there was also a provincial interest in Indian lands. Hence, aboriginal rights and a unique type of reserve claim remain to be settled there. The distinctive course of Québec policy led to the special arrangements embodied in the JAMES BAY AGREEMENT. The administrative arm of Indian policy also continued with little change after Confederation. The Indian Dept became a federal office in 1868 and has continued under various titles until the present day. Indian legislation was consolidated into one INDIAN ACT in 1876. The diversity among Indian people and the regions of Canada, combined with the differences in historical experience, however, led to variations in regional administration. In the more settled regions, Indian administration was linked by the common goals of interim protection and ultimate assimilation. In the remoter regions, prudence and economy dictated neglect.

A 1939 court decision ruled that Inuit were a federal responsibility, but they have not been subject to the Indian Act. Separate programs of economic development and services were applied to them, especially since the 1950s as development increasingly invaded their homeland and disrupted their way of life.

Prior to WWII, Indian policy was made by government without consulting Indians and with little public attention. By the 1940s this began to change. Indians became politically more active and less willing to accept their marginal position in society or to have others make decisions for them. Public opinion became more informed and disturbed about Indian poverty and marginality. Policy reflected this changing situation through new and expanded programs. The government sought to promote economic development and to provide equality of services to Indians, particularly through agreements with the provinces (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS).

The Indian Act was revised in 1951, but the quickened pace of change soon required a further revision. Consultation meetings (1968-69) with Indian representatives created the expectation of participation in the proposed revision. Indians made it clear that they wanted their special rights honoured and their land and treaty claims settled before Indian Act revision. Indian expectations were dashed with the release of the government's policy proposals (White Paper) in June 1969, which seemed to ignore all of their stated priorities. The proposals suggested a phased abolition of the Indian Dept and of the Indian Act within 5 years, eliminating Indian status. The importance of Indian treaties and aboriginal claims was downplayed. The Indian response to the proposed government policy was hostile and sustained. A comprehensive network of Indian political organizations was formed and made counterproposals of their own concerning a wide range of claims. The government, facing an awakened public conscience, retreated from its proposals and then provided funding to support Indian efforts to clarify their demands. Indian people nevertheless remain suspicious that the White Paper policies remain the goals of government even yet (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

Since the White Paper, Indian political activity has greatly increased awareness of Indian problems and goals among the general public and the Indian population itself. Most Indian political organizations with whom governments deal obtain their support and validity from a strong community base. An experienced Indian leadership has emerged capable of meeting the government's stated willingness to negotiate issues, which resulted in the inclusion of aboriginal and treaty rights in the Constitution Act, 1982, and in the first amendment to the Act (1984). Negotiations are also proceeding on recommendations of the House of Commons Special Committee on Indian Self-Government (the Penner Report) released in 1983. These would provide Indian communities with options for new forms of band government replacing the present limited structures under the Indian Act. Recognizing that Indian nations were self-governing before the period of dependency and paternalism, the report recommends the establishment of Indian governments as another order of government separate from the federal and provincial.

A third stage of Indian-government relations appears to be emerging from developments of the recent past. Present policy aims to replace paternalism with self-determination, assimilation with cultural development, and destitution with personal and community well-being.

JOHN LEONARD TAYLOR

Reading: H. Cardinal, *The Unjust Society* (1969); P.A. Cumming and N.H. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); R. Fisher, *Contact and Conflict: Indian-European Relations in British Columbia, 1774-1890* (1977); J.E. Hodgetts, *Pioneer Public Service* (1955); C.J. Jaenen, *Friend and Foe: Aspects of French-Amerindian Cultural Contact in the Sixteenth and Seventeenth Centuries* (1976); R.J. Surtees, *The Original People* (1971); B.G. Trigger, *The Indians and the Heroic Age of New France* (1977); L.F.S. Upton, *Micmacs and Colonists: Indian-White Relations in the Maritimes, 1713-1867* (1979); S.M. Weaver, *Making Canadian Indian Policy* (1981); M. Zaslow, *The Opening of the Canadian North 1870-1914* (1971).

Native People, Government Programs In Canada, government programs for native people have been implemented by the federal government and some of the provinces. Historically, the Government of Canada has recognized special program responsibilities and obligations only toward status Indians (*see* INDIAN), and INUIT. MÉTIS and nonstatus Indians have been denied federal government recognition as native people with special rights. Their needs have been left to be met by whatever programs provincial governments might implement from time to time. Limited federal funding of Métis and nonstatus Indian organizations for political and cultural development finally began in 1970, but economic, social and health programs for these native people remain with the provinces or do not exist at all (*see* NATIVE PEOPLE, GOVERNMENT POLICY).

Since Confederation, the INDIAN ACT has been the major piece of legislation through which the federal government has defined its administration of Indians and Indian lands. From the 19th to the mid-20th century, Canada's Indian policy had twin contradictory goals: protection of Indians from white society and assimilation of Indians into white society. These goals were implemented by the government through a program of strong managerial control which, by the 1960s, led to much public criticism. These goals were expressed in political, economic and cultural programs aimed at destroying the traditional basis of Indian life. An integral part of this exercise was the ENFRANCHISEMENT, or loss of legal Indian identity, of over 20 000 Indians between 1876 and 1974 by the government. Enfranchisement, along with the denial of native recognition and rights to the Métis, created a native population abandoned by the Canadian government to the fate of assimilation.

In practice, a substantial shift in federal policy and program orientation has occurred since the early 1950s. Native cultures are allowed free expression; native political organizations are recognized and funded; Indian bands and Inuit organizations have taken over responsibility for some government program administration; residential schools and missionary teachers have given way to a mixed system of federal, provincial and Indian/Inuit-run schools funded by the Dept of INDIAN AFFAIRS AND NORTHERN DEVELOPMENT (DIAND); the paternalistic caretaker role of Indian agents and bureaucrats has become a technical and professional role, though by no means to the extent that Indians prefer.

In spite of these improvements, some attitudes and practices have changed very little. The Canadian government continues to minimize its responsibilities and obligations toward Indians and other native people and, consequently, seeks to transfer to provincial or Indian BAND authorities its expenditures on programs and services. In 1978-79 total federal expenditures for Indians amounted to $829 million, or only 1.7% of the federal government's annual budget — a percentage unchanged between 1970 and 1980. (Total expenditures for non-Indian native programs amounted to an additional $40.5 million.) Growth in Indian and Inuit Affairs Program (IIAP) expenditures for Indian programs and services, 1970-80, was two-thirds less than the growth in expenditures for non-Indian social programs in Canada. In real terms, IIAP expenditures for Indians during this time period increased by approximately 15% per capita, while federal expenditures for non-Indians grew by 128% per capita. All the while, by the government's own reckoning, socio-economic conditions in Indian communities are actually growing worse.

Compounding the problem of Indian and native program underfunding is the allocation of scarce funds within the IIAP budget to various types of programs. Approximately 94% of all IIAP appropriations are directed to "maintenance and remedial programs." In contrast, about 6% of the budget is directed to job-creation and economic development initiatives. In 1978-79, 22.3% of the IIAP budget went for so-

cial assistance, while only 6.6% went for economic development. In 1981-82, the figures were 27% and 7.5%, respectively. Outside of education (which represents about 40% of the annual IIAP budget), the greatest proportion of program funds goes to what can only be described as welfare dependency programs.

In addition to the programs of DIAND, the Canadian government provides funding, services and programs to native people through 5 other federal departments. These include National Health and Welfare, Secretary of State, Regional Economic Expansion, Employment and Immigration, and the CANADA MORTGAGE AND HOUSING CORPORATION. The following are the main areas of program activity for these departments.

Health Since 1945, public health services have been provided to Indian bands by the Medical Services Branch of National Health and Welfare, with DIAND funding program administration at the band level. Increasingly, public health programs, health liaison workers and public health nurses are being managed by Indian band health committees. In 1978-79, Indian health care expenditures amounted to $100 million (*see* NATIVE PEOPLE, HEALTH).

Housing DIAND funds the construction of houses on-reserve, the purchase of houses off-reserve, road construction, water, sewer and electrical services. However, the role of CMHC in funding on-reserve housing is increasing. Under its rural native housing and rehabilitation programs, CMHC accepts Indian bands, tribal councils, Métis, and nonstatus Indian and Inuit organizations as nonprofit housing societies for funding purposes (*see* INDIAN RESERVE).

Education DIAND provides comprehensive support for the education of Indian children through secondary school. Schools on-reserve are run by the department or by Indian bands directly; off-reserve, provincial schools receive tuition subsidies from the department for each Indian student enrolled. Support for Indian students in university and professional programs is provided, but has been cut back in recent years. Overall, in 1978-79, DIAND expenditures for education amounted to $266 million (*see* NATIVE PEOPLE, EDUCATION).

Social Support With provincial support unavailable to status Indians (except in Ontario), DIAND provides social assistance to those in need of basic income support. This funding is usually administered directly by Indian bands. In addition, child-care, adult-care and counselling services are sometimes purchased for Indians by DIAND from provinces. In 1978-79, DIAND spent $147 million on social support programs (*see* NATIVE PEOPLE, SOCIAL CONDITIONS).

Economic Development The economic development of Indian communities is supported primarily by DIAND, DRIE and Canadian Employment and Immigration Commission (CEIC). DIAND provides nonrepayable grants to cover basic economic development project costs, as well as loans for additional capital needs. DRIE, through Special Agricultural and Rural Development Act grants and other agreements, funds various sorts of Indian and native economic development projects. CEIC, through its Canada Works, Manpower Training and Youth Employment programs, provides short-term jobs, vocational training and employment services for native people (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS).

Communications The Native Citizens Directorate of Secretary of State supports native newspapers, newsletters, and radio and television programming through its Native Communications Program and its Northern Native Broadcast Access Program. Their combined budget in 1982-83 was approximately $8 million (*see* NATIVE PEOPLE, COMMUNICATIONS).

Political Organizations The Native Citizens Directorate of Secretary of State, through its Native Representative Organizations Program, funds basic organizational, administrative and developmental costs for national and provincial native associations and organizations. In 1982-83 this amounted to $13.5 million (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM).

Cultural and Urban Support DIAND and the Native Citizens Directorate fund cultural development programs, Indian-operated cultural centres, native women's organizations, individual native artists and cultural projects. The NCD also funds an extensive network of native FRIENDSHIP CENTRES, which provide cultural support, social and informational services to native people in urban centres.

Land Claims Through its research branch, DIAND funds research into treaty rights and LAND CLAIMS undertaken by Indian bands, tribal councils or provincial organizations.

Indian-Government Consultations Regional, provincial and national native organizations receive funding from DIAND and Secretary of State to assist in preparing for meetings and negotiations on major policy developments, such as revising the Indian Act and patriation and amendment of the Constitution.

Decisions on what programs and services to provide to native people and at what levels they should be funded are primarily influenced by the overall political and economic agenda of the federal government. Native priorities and needs are an important, but secondary influence on policy and program development. Increasingly, native people are demanding the right to design and implement their own programs to make them effective and efficient in meeting their needs.

DAN GOTTESMAN

Reading: J.E. Chamberlin, *The Harrowing of Eden* (1975); DIAND, *Indian Conditions: A Survey* (1980); H. Hawthorne, *A Survey of the Contemporary Indians of Canada* (1966-67); *Indian Self-Government in Canada: Report of the Special Committee* (1983); Thalassa Research Associates, *The Economic Foundation of Indian Self-Government* (1983); S.M. Weaver, *Making Canadian Indian Policy* (1981).

Native People, Health From the 16th to the 19th century, both permanent and seasonal (whalers, fishermen, fur traders) immigrants to Canada brought with them infections that had long been established in the Old World but were rare or nonexistent among the native populations of N America. Lack of acquired resistance caused minor viral infections such as "colds" as well as measles, influenza and smallpox to become deadly epidemics, spreading in waves through the INDIAN and INUIT tribes, reducing most groups to a fraction of their original number and wiping some out completely. Those not killed by acute viral epidemics suffered from depressed immunity against other infections for a period of weeks or months. Tuberculosis became the "white death," the main scourge of native people in the S and E from the mid-18th century and in the W and N of Canada since 1850.

Exposure to infection was increased by crowding on reservations and permanent settlements with poor housing, sanitation and water supply (*see* NATIVE PEOPLE, SOCIAL CONDITIONS). Resistance to disease was further lowered by famines or malnutrition resulting from loss of traditional food supplies and by alcohol abuse. The continued physical and socio-cultural decline was such that Diamond JENNESS wrote in the early 1930s that most Indian and Inuit groups in Canada would disappear as distinct peoples within a few decades.

The numerical decline came to a halt for southern Canadian Indians in the 1920s and 1930s and for Indians and Inuit of northern Canada after WWII. Gradually acquired resistance to the new infections, improved medical care, effective drug treatment, and massive efforts by the Canadian government to improve housing, sanitation and nutrition on INDIAN RESERVES and in northern settlements helped to turn the tide and save most native tribes from complete physical extinction — the fate of their brethren in Newfoundland (BEOTHUK) and Southampton I (SADLERMIUT). Indians and Inuit became in the 1950s and 1960s the fastest growing sector of the Canadian population by a natural increase, respectively, of 3 and 4% annually, thereby regaining and in recent years exceeding maximal numbers estimated to have existed in precontact times (*see* NATIVE PEOPLE, DEMOGRAPHY). Infant mortality, although by the late 1970s still double the rate of other Canadians, had been reduced to 25 and 15% of rates recorded for Indians and Inuit, respectively, 20 years earlier. Life expectancy doubled for Canadian Indians between 1950 and 1969, when the gap in relation to other Canadians had narrowed to approximately 10 years.

The physical, mental and social well-being of modern Indians and Inuit is not the success

Government programs provide support to Indian-operated cultural centres, such as this art centre at Cape Dorset, NWT (*courtesy National Film Board/Photothèque*).



story that these biostatistics might suggest. While acute and chronic infections have been effectively eliminated as main causes of death, an increasing proportion of deaths are now caused by violence, suicides and accidents, most of them related to alcohol abuse. The majority of these accidents kill and cripple adolescents and young adults, and grave concern is expressed by natives and non-natives about this indirect "genocidal" process. In recent years, this extraordinary high loss of life has interrupted and partially reversed some of the previous gains in life expectancy.

Less dramatic, but also of increasing danger for the well-being of Indians and Inuit, is the loss of their previously superb physical fitness and the emergence of insidious diseases of modern man such as obesity, gallbladder problems, sugar-diabetes, high blood pressure, heart infarcts and other arteriosclerotic diseases.

OTTO SCHAEFER

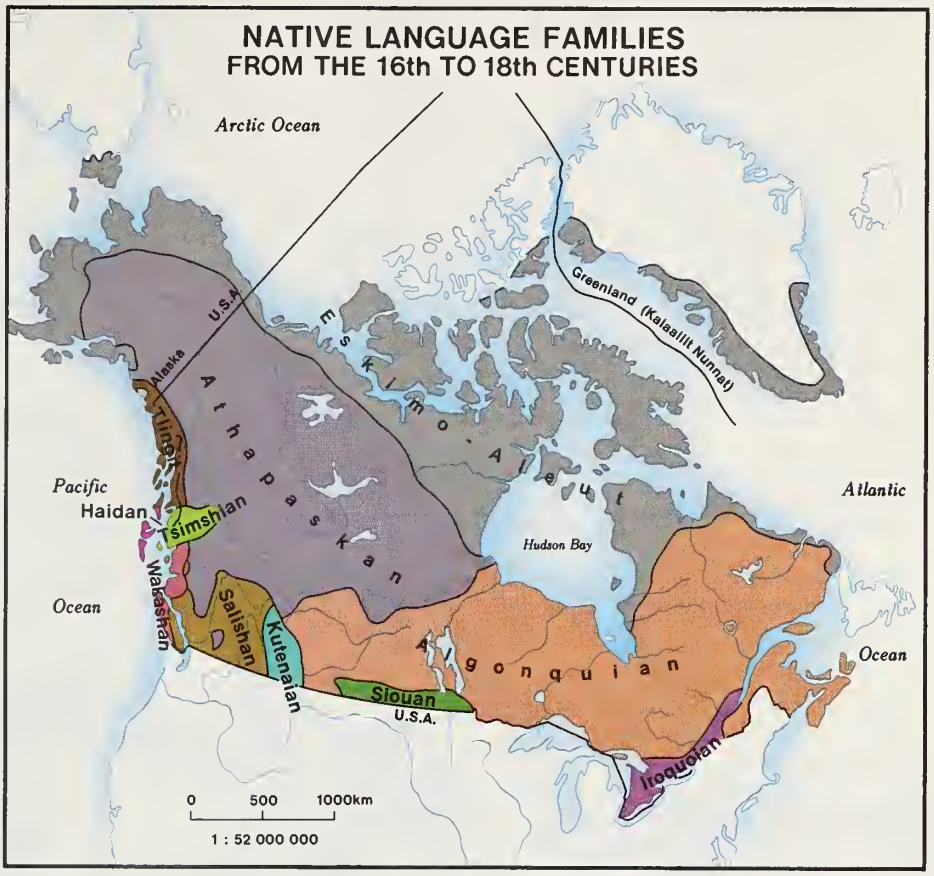
Reading: G. Graham-Cumming, "Health of the Original Canadians 1867-1967," *Medical Services Journal Canada* 23 (1967); Otto Schaefer, "The Changing Health Picture in the Canadian North," *Canadian Journal of Ophthalmology* 8 (1973); O. Schaefer et al, "General and Nutritional Health in Two Eskimo Populations at Different Stages of Acculturation," *Canadian Journal of Public Health* 71 (1980).

Native People, Languages As nearly as can be determined, 53 distinct indigenous languages are spoken in Canada. These languages fall into 11 separate families. Three of the families consist of only a single language, for which the term *isolate* is used. Of the remaining 8 families, some are groupings of languages as closely related as those comprising the Romance, Germanic or Slavic families of Indo-European, while others are more ramified groupings on the order of Indo-European as a whole. In a few cases the indigenous language families of Canada and the rest of N America have been found to be genetically related, although far more proposals of relationship have been advanced than have actually been proven. In the light of present knowledge the majority of indigenous language families of N America appear to be as independent from one another as Indo-European is from Uralic, Sino-Tibetan or Japanese. N America is unquestionably one of the most complex linguistic regions in the world.

Many of the 53 indigenous languages of Canada are spoken in several more or less mutually intelligible dialects, particularly when the language is distributed over a large area. Thus, Cree is a single language spoken in 6 recognized dialects (Plains, Swampy, Northern, Woods, Moose and East) in dozens of communities and reserves from the Rockies across central Canada and well into Québec; and Ojibwa, whose local dialect variants go by such names as Ottawa, Mississauga, Chippewa, Algonquin and Saulteaux, is found in many communities throughout central Canada. Such dialects grade into one another to form chains whose members may approach mutual unintelligibility at the geographic extremes. Nevertheless, these chains are considered single languages for purposes of classification. Cree and Ojibwa are 2 of the 9 Algonquian family languages spoken in Canada; some of these and still others are spoken in the US.

In the early 1980s there were an estimated 154 000 speakers of Canadian indigenous languages, a figure which suggests that slightly less than one native person in 2 then retained knowledge of his mother tongue.

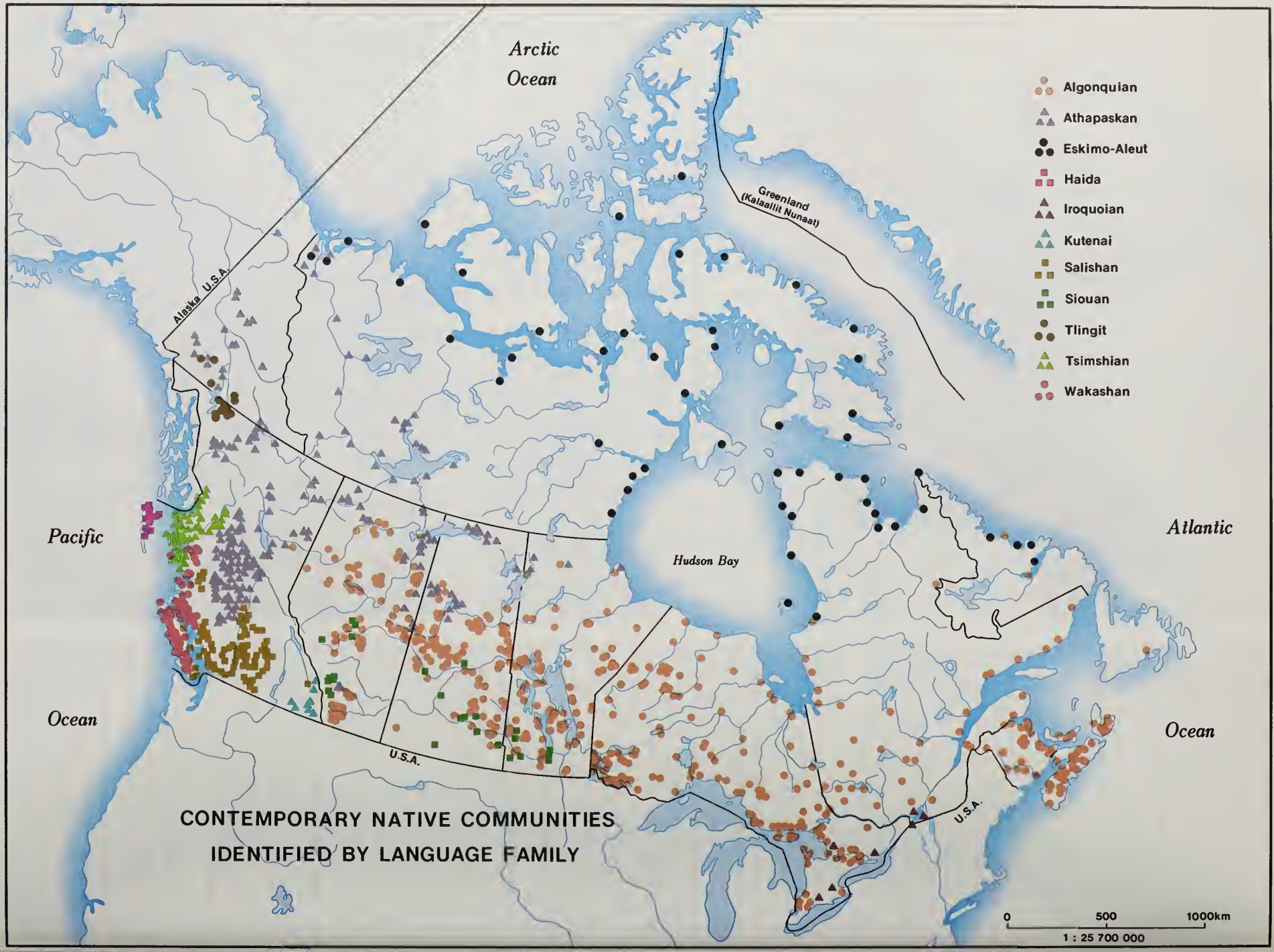
Geographic Distribution of Canadian Indigenous Language Families Not one of the Canadian indigenous language families falls exclusively within Canada and most of them straddle the US-Canadian border. Eskimo-Aleut extends not only into the US (Alaska) but also into Siberia on the west and Greenland on the east.



Within Canada, the indigenous language families concentrate in the West. Except for Eskimo-Aleut, whose Eskimo branch stretches across the entire Canadian Arctic, only 2 language families are found east of Lk Winnipeg, Algonquian and Iroquoian, and only the latter is found exclusively beyond this point. Siouan, Algonquian and Northern Athapaskan are present in the prairies, although the latter 2 belong primarily to the Boreal Forest area; and Northern Athapaskan and Tlingit are spoken in a number of communities in the BC interior. Along the West Coast and its inland waterways are found large numbers of Salishan, Tsimshian, Wakashan and Haida communities. The isolate Kutenai is located in southeastern BC near the lake and river of that name (Kootenay). Nine of the 11 language families are spoken within BC alone. This concentration of families has suggested to students of Indian history that the West is a linguistically old area and the most likely staging area for successive migrations of speakers to the south and east, a view which accords quite well with archaeological and ethnological findings. By contrast, central and eastern Canada are dominated by the Algonquian

Indigenous Language Families of Canada

Family/Isolate	*Approx Number of Speakers in Canada*	*Language Spoken in Canada (with principal dialects in parentheses)*
Algonquian	100 000	9 languages in Canada: Abenaki (Western dialect), Blackfoot, Cree (Plains, Swampy, Northern, Woods, Moose and East dialects), Delaware (Munsee dialect), Maliseet, Micmac, Montagnais-Naskapi, Ojibwa (Algonquin, Ottawa [Odawa], Mississauga, Chippewa, Saulteaux dialects), Potawatomi
Athapaskan (Northern)	17 000	15 languages in Canada: Beaver, Carrier, Chilcotin, Chipewyan, Dogrib, Han, Hare, Kaska, Kutchin, Sarcee, Sekani, Slave, Tagish, Tahltan, Tutchone
Eskimo-Aleut	16 000	1 language in Canada: Inuktitut (as many as 6 dialects)
Haida	150	Language isolate (Skidegate and Masset dialects)
Iroquoian	2 700	6 languages in Canada: Mohawk (2 dialects), Oneida, Onondaga, Cayuga (2 dialects), Seneca, Tuscarora
Kutenai	30-40	Language isolate
Salishan	3 000	10 languages in Canada comprising Coast and Interior divisions, each with further subdivisions: Bella Coola, Comox (Sliammon), Halkomelem (several dialects), Lillooet, Okanagan (2 dialects), Sechelt, Shuswap, Squamish, Straits (several dialects), Thompson
Siouan	5 000(?)	1 language in Canada: Dakota (Santee, Teton or Lakota, and Assiniboin dialects)
Tlingit	100(?)	Language isolate (inland dialect spoken in Canada)
Tsimshian	2 300	3 languages, all in Canada: Coast Tsimshian, Nass-Gitksan, Southern Tsimshian
Wakashan	3 400	5 languages in Canada belonging to North and South Branches: Haisla, Heiltsuk, Kwakwala [Kwakiutl], Nitinat, Nootka


Arctic
Ocean
Greenland
(Kalaallit Nunaat)
Alaska U.S.A.
Algonquian
Athapaskan
Eskimo-Aleut
Haida
Iroquoian
Kutenai
Salishan
Siouan
Tlingit
Tsimshian
Wakashan
Pacific
Ocean
Hudson Bay
Atlantic
Ocean
U.S.A.
U.S.A.
CONTEMPORARY NATIVE COMMUNITIES
IDENTIFIED BY LANGUAGE FAMILY
0
500
1000km
1 : 25 700 000

family and particularly by the 2 languages Cree and Ojibwa. This situation suggests far more recent language spread relative to the West.

Classification of Indigenous Languages Linguistic classification involves both the question of internal relationships among members of the same family, and the question of external links between families in still larger groupings, termed *stocks* or *superstocks* depending upon how comprehensive they are. While the membership within families of all of the 53 languages spoken in Canada today is well known and adequately established, higher order groupings of families into stocks are far less certain. It is an interesting feature of the development of linguistic research in N America that students of Amerindian languages were once considerably more daring about external classification than they are now.

The high-water mark of indigenous language classification was achieved by Edward SAPIR in a famous paper published in the *Encyclopaedia Britannica* in 1929, a paper which set the directions of indigenous language research for decades afterwards and which still provokes lively discussion. In this classification the numerous families of N America were first grouped into 12 middle-level stocks considered reasonably assured, and then — far more speculatively — into 6 far-reaching superstocks considered possible though far from proven. All but one of the Canadian indigenous language families were subsumed under 4 superstock headings: Algonquian-Wakashan (Algonquian, Kutenai, Wakashan, Salishan, plus 3 families in the US); Na-Dene (Athapaskan, Haida and Tlingit); Penutian (centered in California and Oregon, with Tsimshian as the sole Canadian member); Hokan-Siouan (numerous families in the western US and some in Mexico, with the Siouan and Iroquoian families spilling over into Canada). One family, Eskimo-Aleut, was regarded then, as today, as constituting a separate stock. In recent decades there has been a steady retreat from this and other massively integrative classificatory schemes, back at least to the middle-level stocks. In some cases additional middle- or lower-level links have been proposed even as the higher order links have come undone through continuing research. Thus Eyak, a language isolate in Alaska, has been joined with Athapaskan during the same recent period which has seen the dismantling of the Na-Dene superstock as a whole; and the link between Siouan and Iroquoian, while problematic, is on firmer footing today than in 1929, although little remains of Sapir's Hokan-Siouan superstock in which both families were originally placed.

Structural Diversity of Indigenous Languages Early descriptions of the indigenous languages of N America tended to cast all of them in the same mold as "polysynthetic" or "holophrastic" in order to capture a tendency found in a number of them toward great complexity of the word, particularly the verb. It was found that many of the formal elements expressed in familiar European languages by separate words or word endings were, in the majority of Amerindian languages, combined as chains of prefixes or suffixes surrounding basic roots, or both. Certainly there are families such as Eskimo-Aleut, Iroquoian and Algonquian where the term polysynthesis can be said to characterize the verb, but such general typological labels leave a spurious impression of structural uniformity and obscure important differences sometimes found even among languages belonging to the same family. Moreover, there are Amerindian languages which are as "analytic" as English, and others which are as "inflective" as Latin and Greek, so that it is impossible to speak of all the indigenous languages of this hemisphere as fitting a single structural type or set of types.

In addition, virtually every grammatical category known from the languages of the Old World (systems of person, case, number, gender, tense, mode, aspect, voice) is found among the languages of N America, and there are some unusual categories which have been the focus of considerable interest in indigenous language research: verb stems to denote categories of shape and motion, sets of demonstratives to indicate whether an object mentioned by the speaker is visible or invisible to him, verb modes to indicate whether what the speaker is saying can be verified from his immediate experience, even different sets of numerals to count different classes of objects. One particular line of research, which has developed around the so-called world-view problem, has attempted to determine if, and how, such categories influence habitual thought patterns among speakers.

Amerindian languages exhibit great diversity in their sound systems. In some families, such as Iroquoian and Eskimo-Aleut, the inventory of basic sounds is limited; in others, such as those located in the Plateau and on the Pacific Coast, the inventories of basic sounds, particularly in consonant series, are quite large. *See also* COMMUNICATIONS IN THE NORTH; CREE SYLLABICS; NATIVE PEOPLE, EDUCATION.

MICHAEL K. FOSTER

Reading: L. Campbell and M. Mithun, eds, *The Languages of Native America* (1979); J.K. Chambers, ed, *The Languages of Canada* (Part I: "The Native Languages") (1979); Michael K. Foster, "Canada's First Languages," *Language and Society* 7 (1982), 7-16; [Map of] "Indian and Inuit Communities and Languages," *National Atlas of Canada*, 5th ed (1980); *International Journal of American Linguistics*; T.A. Sebeok, ed, *Linguistics in North America* (1973).

The Status of Proposed Distant Genetic Relationships of Canadian Indigenous Language Families

Family	*Proposed Larger Group Affiliations*	*Stocks, Families or Isolates Included*	*Status of Groupings and Links in Current Research*
Algonquian	Algonquian-Ritwan (Algic)	Algonquian + Ritwan (Wiyot and Yurok of NW California)	Widely accepted as established. Wiyok and Yurok may not form a separate subgroup as the term Ritwan implies.
	Algonquian-Wakashan	Algic (as above) + Mosan (Wakashan, Salishan and, in the US, Chimakuan) + Kutenai + possibly Beothuk (the extinct language of Newfoundland	The overall hypothetical construct considered doubtful; some links (Kutenai with Salishan and/or Algonquian) considered possible. Link with Beothuk now discounted
	Macro-Algonquian (Algonquian-Gulf)	Algic + Gulf grouping in SE US (Muskogean, Natchez, Tunica, Chitimacha, Atakapa)	The status of the Gulf grouping uncertain, that of the larger construct even more so
Athapaskan	Athapaskan-Eyak	Athapaskan (Northern, Pacific and Southern) + Eyak (Alaska)	Widely accepted as established
	Na-Dene	Athapaskan-Eyak + Haida + Tlingit	Tlingit possibly remotely related to Athapaskan-Eyak, Haida now thought not to be. No relationship yet found between Haida and Tlingit
Eskimo-Aleut		Eskimo-Aleut + Chukotan (Siberia)	The connection with Chukotan, now generally accepted, makes Eskimo-Aleut the only indigenous language family of N America with a proven Old World connection
Haida	Na-Dene	*See* Athapaskan	*See* Athapaskan
Iroquoian	Macro-Siouan	Iroquoian + Siouan + Caddoan (central US)	The Iroquoian-Siouan link is firmer than the postulated Siouan-Caddoan and Iroquoian-Caddoan links
Kutenai	Algonquian-Wakashan	*See* Algonquian	*See* Algonquian
Salishan	Mosan	*See* Algonquian	*See* Algonquian
Siouan	Macro-Siouan	*See* Iroquoian	*See* Iroquoian
Tlingit	Na-Dene	*See* Athapaskan	*See* Athapaskan
Tsimshian	Penutian	15 families and isolates mostly found in California and Oregon	Penutian grouping postulated but not proven. The relationship with outliers like Tsimshian especially tenuous
Wakashan	Mosan	*See* Algonquian	*See* Algonquian

Native People, Law Owing to Canada's complex social and constitutional history, the special legal rights of Canada's native peoples vary from one part of the country to another and in their application to different groups. Under Canadian law, there are no longer special disabilities attached to native status. Earlier rules (eg, those preventing Indian people from voting, making some types of contracts or leaving reserves without permission) are now extinct; other discriminatory laws are unlikely to be enforced. The one thing native people cannot legally do is bargain away their ABORIGINAL RIGHTS, treaty rights or reserved lands to anyone other than the Crown in right of Canada. This concept, that natives enjoy all the usual rights of citizenship and additional native rights, has been described as "Citizenship Plus." In order to claim these special rights, however, native status must be shown — and proof of status has been an awkward issue.

Native Status Section 35 of the CONSTITUTION ACT, 1982, defines "the aboriginal peoples of Canada" as the INDIAN, INUIT and MÉTIS peoples. Much discussion will be devoted to the definition of these 3 groups, particularly if their rights are not equivalent or if the federal government does not accept similar responsibilities for each of them.

In our early history, people who followed the Indian way of life and lived among Indian communities were recognized as Indians. Not until 1850 was a bloodline requirement prescribed in Lower Canada to define who could occupy reserve lands. Since Confederation, fed-

eral law has elaborated upon the original definition, mainly by adding exclusionary rules and assigning status by patrilineal descent rather than by racial or social relationships. The best known is the rule depriving an Indian woman of her status if she marries a non-Indian (*see* INDIAN ACT).

Government has been embarrassed by widespread criticism of the way Indian status is defined. Many Indian groups oppose government definition of their membership, and they are likely to gain greater control over such definition in future.

The courts have held that Parliament's power in relation to "Indians" includes legislative control over Eskimos or Inuit, but there is no "Inuit Act," possibly because there have not been "Inuit reserves" to regulate. Inuit status is likely to be defined legally as LAND CLAIMS are negotiated and the question of "beneficiaries" is addressed. For northern Québec Inuit this process was accomplished by an initial enrolment of beneficiaries with future additions on the basis of descent, marriage or adoption.

Métis, however, is a term of uncertain application, used variously to describe everyone of mixed native/non-native blood, or those who took land scrip rather than treaty (*see* INDIAN TREATIES); those entitled to Métis lands under the MANITOBA ACT, 1870; those requested under the Alberta Métis Betterment Act; or the francophone segment of the mixed-blood communities of the Northwest. Depending on which definition is used and through how many generations it is extended, estimates of the Métis population range from 100 000 to 1 million. Generally, no continuing Métis rights are recognized under federal law, and in the constitutional discussions in 1984 federal government representatives took the position that Métis, unlike Indians and Inuit, were not under federal legislative jurisdiction. Some provincial laws do make special provisions for Métis communities within their boundaries. If Parliament does have parallel jurisdiction over Métis and their lands, these provisions could generate constitutional confusion.

Land Rights of Native People Parliament also has the power to make laws in relation to "lands reserved for the Indians," and the federal government has the power to bargain with native groups for the release of native land rights. Under Canadian CONSTITUTIONAL LAW, once such a release is given those lands are subject to the general provincial ownership of crown lands and natural resources and the federal government loses all rights to deal with such lands on behalf of the natives. Even the clear provisions of the Indian Act dealing with federal management of surrendered Indian reserve lands cannot operate unless there is a federal-provincial agreement in place concerning the status of the surrendered lands.

Such agreements have been made with NS, NB, Ontario and BC, and by the Statute of Westminster, 1931, which affects Alberta, Saskatchewan and Manitoba. There are no special arrangements with Québec, PEI or Newfoundland; none are required for the territories which are under federal jurisdiction.

The land rights of native peoples are largely undefined, but they have been described as "usufructuary," referring to a Roman law right to use land owned by another; in this case it is the native right to use lands technically owned by the Crown. Native rights to land as defined by the Indian Act are communal in nature, belonging to the group rather than the individual member, and cannot be bargained away except by the group to the Crown in right of Canada (*see* INDIAN RESERVE).

Laws of General Application Native people are subject to the general law of the land, together with other Canadians, unless there is some aboriginal, treaty or other provision affording special protection. If a law conflicts with native life-style or culture, and there is no special protection, the courts will apply that law to natives.



Jim Igloliarte, Inuk judge at Nain, Labrador (*photo by Karl-Heinz Raach*).

Laws of general application can be provincial laws or federal statutes such as the Criminal Code or the Fisheries Act.

In the field of social services there have been many disputes, not because the provincial laws do not apply to natives, but because provinces are reluctant to provide such services without compensation from the federal government.

Hunting and Fishing Rights Many of the Indian treaties included promises that hunting and fishing would not be disturbed. In those areas where there are such treaties, the courts have held that hunting and fishing can be regulated by the federal government, as they have been by the Fisheries Act (1970) and the Migratory Birds Convention Act (1970). In the Prairie provinces, in order to consolidate treaty promises, the BNA Act, 1930, guaranteed Indians the right to hunt and fish for food, free of provincial regulation, on unoccupied crown lands and other lands to which they have a right of access. Métis have failed in their attempt to claim these rights.

Where there are no treaty rights, however, as in most of BC, provinces can regulate native hunting and fishing. In the territories there are special exemptions in the Yukon Act and the Northwest Territories Act permitting Indians and Inuit to hunt for food.

Legal Status of Native Communities While native rights are regarded as communal, the formal legal status even of Indian bands is not clearly defined in Canadian law: bands may not be able to sue or be sued in their own names or limit financial liability for debts to communal assets. Some groups avoid this by incorporation, a legal procedure to acquire certain rights and immunities; others avoid incorporation because it entails the loss of tax exemptions relating to Indian status.



Native representatives from the James Bay region discuss the administrative structures governing control over aboriginal lands (*courtesy Canapress*).

Inuit and Métis groups have incorporated political and development associations (*see* NATIVE PEOPLE, POLITICAL ORGANIZATION AND ACTIVISM) and formed co-operatives (*see* INUIT CO-OPERATIVES), but do not as communities have statutory powers under federal law. Indian bands and BAND councils are given limited powers under the Indian Act. One of the goals of Indian self-government is to enhance and constitutionally recognize the legal rights and powers of bands.

Customary and Cultural Practices Canadian law has recognized certain native traditions. One example is the early recognition courts gave to customary marriages, although without a parallel recognition of customary divorce. The Indian Act refers to "customary adoptions," without explanation, and the courts have recognized these adoptions not only in Indian, but also in Inuit communities, on the basis of recognition of indigenous customary law. Similarly, because the election provisions of the Indian Act are not mandatory, band leaders who are chosen by customary means can exercise the statutory powers of a chief and council.

It is likely that the catalogue of legally recognized customary practices will increase in future. The CANADIAN CHARTER OF RIGHTS AND FREEDOMS, for example, refers to customary language rights and these rights may apply to native languages (*see* NATIVE PEOPLE, EDUCATION; NATIVE PEOPLE, LANGUAGES).

Taxation Under the Indian Act the interest of an Indian or a band in reserve lands, and the personal property of Indians or bands situated on a reserve, are exempt from taxation. Complex questions have arisen in applying this provision to sales and income taxes.

The federal government takes the position that income taxes are not payable by Indians if their income is payable on a reserve. Federal sales tax, which is a hidden tax, is generally paid by all native people regardless of where they live. The same is true of provincial sales taxes in most jurisdictions, although some provinces recognize specific exemptions for reserve residents or for on-reserve purchases by Indians.

There is no special exemption from customs and excise duties, notwithstanding provision in JAY'S TREATY (1794) and the TREATY OF GHENT (1814) that Indians could cross the Canada-US border freely with their goods. In the *Francis* case (1956) the Supreme Court of Canada held that these were not Indian treaties and that, while they were international treaties, they had not been given legislative force within Canada.

Native groups can be expected to advocate extended tax exemptions in the course of constitutional and land-claims negotiations.

Equality before the Law Democratic theories of majority rule and equality before the law often give insufficient regard to minority rights, and this inherent tension has found its way into native cases. The 1960 Canadian Bill of Rights affirmed the right to equality before the law and, in the DRYBONES CASE (1969), the Supreme Court of Canada held that an Indian had been unfairly discriminated against on the basis of race by being convicted under an Indian Act provision that made it an offence for an Indian to be intoxicated off reserve. The Indian Act provision which imposed slightly heavier penalties, was struck down since it denied the accused equality before the law.

In a later case, the court did not apply the Canadian Bill of Rights. Its decision in the LAVELL case (1973) was based on reasoning that if the court struck down a discriminatory mem-

bership provision of the Act, it might effectively repeal the whole statute that discriminates on the basis of race. The court's decision in *Lavell* was widely criticized.

This potential conflict between minority rights and equality before the law is apparent in the Canadian Charter of Rights and Freedoms, where specific provision is made that none of the guarantees, including that of equality before the law, shall be construed so as to diminish aboriginal or treaty rights.

Summary Following the Constitution Act, 1982, the constitutionally recognized legal rights of native peoples are of 3 types: those determined to be "existing" for the purposes of constitutional protection; those acquiring constitutional protection by way of land-claims settlements; and those given constitutional or statutory recognition as the result of negotiations between native groups and governments.

WILLIAM B. HENDERSON

Reading: P. Cumming and N. Mickenberg, *Native Rights in Canada* (2nd ed, 1972); K. Lysyk, "The Unique Constitutional Position of the Canadian Indian," *Canadian Bar Review* 45 (1967); D. Sanders, "Indian Hunting and Fishing Rights," *Saskatchewan Law Review* 38 (1973-74); J.C. Smith, "*Regina* v. *Drybones* and Equality before the Law," *Canadian Bar Review* 49 (1971); W.S. Tarnopolsky, "The Canadian Bill of Rights and the Supreme Court Decisions in *Lavell* and *Burnshine*: A Retreat from *Drybones* to Dicey?" *Ottawa Law Review* 7 (1975).

Native People, Political Organization and Activism Since the arrival of Europeans in Canada, political organization among the native peoples has been influenced to a great extent by their relations with the institutions and agencies of Euro-Canadian society. Their political aims for more than 300 years have been to protect their lands, communities, and right to exist as socially and culturally distinct peoples.

Economic relations formed between Indians and Europeans during the early stages of the FUR TRADE created partnerships and rivalries that gave rise to military alliances between European and native nations. The League of the Iroquois (later the Five Nations, and then Six Nations, Confederacy), whose formation pre-dated the establishment of NEW FRANCE, played an essential part in the 17th and 18th century struggles between France and Britain in N America (*see* IROQUOIS WARS). Indians' alliances with European powers were constructed with a view towards protecting their territories and ways of life from being overrun by the newcomers. These motives were especially evident in the PONTIAC uprising of 1763 and the involvement of Indians on the side of the British in the WAR OF 1812.

With the cessation of colonial hostilities, the need for military alliances between Indians and Euro-Canadians disappeared. As agricultural settlement overtook the fur trade, relations between native peoples and settlers underwent a further transition. No longer required as partners or allies, indigenous peoples came to be seen by whites as potential obstacles to settlement. With the reduction or loss of subsistence hunting and trapping activities, Indians were obliged either to retreat into areas not suited for agricultural settlement or to submit themselves to new forms of government Indian administration erected in the 19th century to protect, "civilize" and, ultimately, to assimilate them into Euro-Canadian society (*see* NATIVE PEOPLE, GOVERNMENT POLICY).

The paternalistic form of Indian administration introduced in Upper and Lower Canada and extended to the West following Confederation featured the establishment of reserves where, under the tutelage of government agents, missionaries and educators, Indians were supposed to be transformed into Christians and self-sufficient agriculturalists (*see* INDIAN RESERVE). The reserve system diminished Indians' political autonomy and separated them into individual bands that were both geographically and politically cut off from one another. In consequence, political activism among Canada's Indians since the latter part of the 19th century has largely reflected their attempts to organize political associations beyond the BAND level in order to pursue their common interests.

One of the earliest of these Indian associations, the Grand General Indian Council of Ontario, was the outcome of missionaries' efforts to establish a council of OJIBWA nations prior to Confederation. In existence from the 1870s until 1938, the council pursued a cautious and conciliatory course in its dealings with federal Indian administrators. The Plains CREE, in contrast, in the 5 years prior to the NORTH-WEST REBELLION of 1885, began to form a political alliance to force the federal government to honour what Indians viewed as treaty commitments (*see* INDIAN TREATIES). Though limited in scope and largely unintended, Indian participation in the rebellion pre-empted a previously scheduled gathering of Indian leaders from across the Prairies to decide how they might best press for desired changes in federal Indian policy and administration. The rebellion led to a tightening of government control of reserves and further erosion of Indian autonomy. While political organization and activism were severely constrained by the terms of the INDIAN ACT and by the fact that most Indians were not entitled to vote in federal and provincial elections until after WWII, the struggle to realize their various aims continued.

In the 1890s the Nishga in BC began their campaign to obtain government recognition of their aboriginal land rights, while in 1906 the chief of the Capilano Band travelled to England to place a LAND CLAIMS petition before King Edward. A new organization, the Allied Tribes of British Columbia, was formed in 1915 in an unsuccessful attempt to force a judicial decision on land claims by the British Privy Council. Following the government's rejection of the Allied Tribes' land claims in 1927, the organization folded, only to be succeeded in 1931 by the Native Brotherhood of British Columbia, an organization that represented Indians along the northern coast and that arose out of Indian labour-oriented activities in coastal industry.

Attempts to create a national political organization for Indians first began in Ontario and Québec during WWI when the American-based Council of Tribes began a short-lived but energetic campaign to expand into Canada. In 1918 the League of Indians of Canada was formed in Ontario by F.O. Loft, a returning veteran and member of the Six Nations Reserve who advocated resolution of a set of grievances common to Indians across Canada: loss of reserve lands and the failure to recognize aboriginal land rights; restriction of native people's hunting and trapping rights; educational policies and administrative practices that sought to eliminate Indian languages and customs; and the generally poor economic and health conditions on reserves. Loft's efforts in the early 1920s to bring western Indians into the league were surprisingly effective, despite the opposition he encountered from senior officials of the Dept of Indian Affairs who attempted, among other measures, to revoke his legal status as an INDIAN. In view of the logistical difficulties entailed in uniting geographically separated and ethnically, linguistically and religiously divided bands in a national Indian organization, the league's eventual failure was less remarkable than its initial success.

During the late 1930s and 1940s there was an increase in native political organization, especially at the regional and provincial levels, with the formation, for example, of the Indian Assn of Alberta in 1939 and the Saskatchewan Indian Assn in 1944. The creation of the North American Indian Brotherhood in 1943 by Andrew PAULL, a BC Indian leader, was another attempt to establish a national organization of Canadian Indians, but failed, partly because of the suspicion it was an organization primarily for Catholic Indians.

Public concern over the anomalous social, economic and legal status of Indians in Canada led to the convening of special parliamentary inquiries into the administration of Indian Affairs 1946-48 and 1959-61. Both inquiries prompted the formation of a number of associations that sought to speak on behalf of regional and provincial Indian constituencies. In Saskatchewan, for example, the merger during the 1940s and 1950s of a number of small organizations, including the Protective Assn for Indians and their Treaties, Saskatchewan Indian Assn, Union of Saskatchewan Indians, and Queen Victoria Treaty Protective Assn, led to the creation of the Federation of Saskatchewan Indians, an association which since the late 1950s has served as the principal representative organization of Indians in that province.

The extension of the federal franchise to Indians in 1960 and of the provincial franchise to Indians in Alberta in 1965 and Québec in 1969 erased a major political distinction between Indians and other Canadians. Nevertheless, many Indians were and continue to be reluctant to exercise their right to vote partly for fear of compromising their special legal and constitutional status. Since 1962 a steadily declining proportion of eligible Indian voters has cast ballots in federal elections; by 1979 their rate of participation in federal elections was less than half that of non-Indians. Participation in Indian band elections, however, remains at a high level, suggesting a lack of faith on the part of Indians that normal federal and provincial political channels and processes can satisfy their interests.

The federal government's 1969 proposals to abolish both the Indian Act and the Dept of Indian Affairs and to transfer administrative responsibility for Indians to provincial governments sparked a dramatic increase in the scope and intensity of political organization and activism among Canada's native peoples. Opposition to the government's proposals led in the early 1970s to the creation of several new provincial associations and the transformation of some existing ones into active political organizations that began to receive political recognition from governments as the appropriate representatives of their people. Provincial and territorial associations also received public funds to operate a variety of research, liaison and service programs on behalf of native peoples. The special legal and administrative interests of registered Indians led them in most cases to keep their organizations separate from those established by the MÉTIS and nonstatus Indians.

Beyond the provincial level, the National Indian Brotherhood (which became the ASSEMBLY OF FIRST NATIONS representing 90% of chiefs across Canada in 1982) and the NATIVE COUNCIL OF CANADA (representing Métis and nonstatus Indians) pursued changes in government policies with respect to ABORIGINAL RIGHTS, economic development, education and many other fields (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). Between 1978 and 1982 Indian, Métis and nonstatus organizations, along with the INUIT TAPIRISAT OF CANADA, intervened in the repatriation of the Canadian constitution in order to ensure legal enshrinement of their aboriginal rights. Since the 1970s Canadian native leaders have also become leading participants in international minority-indigenous-peoples organizations such as the Inuit Circum-Polar Conference and the World Council of Indigenous People, founded at a conference in Pt Alberni, BC, in 1975, whose international secretariat was located in Lethbridge, Alta, and moved to Ottawa in 1984.

In addition to native people's involvement in provincial, national and international representative organizations, a variety of other, often short-lived, special interest groups have appeared: Canadian Indian Youth Council (1960s), Saskatchewan Native Youth Movement (1970s), Calgary Urban Indian Treaty Alliance (early 1970s), Canadian Native Communications Society (1960s-1970s), Indian Rights for Indian Women (1970s), and National Native Women's Assn of Canada (1970s). The National Alliance for Red Power (1960s, early 1970s) and the American Indian Movement (1970s), organizations that advocated more radical programs of action than those adopted by offically recognized provincial and territorial organizations, also received limited support from native people in Canada.

The political activism of Canada's native peoples since WWII has afforded them increasingly greater access to various levels of political decision making and has substantially altered some aspects of their situation. Notwithstanding the election of native candidates to parliament, provincial legislatures and territorial councils on several occasions, however, native activism has for the most part been conducted outside the bounds of electoral politics. Since 1969 considerable effort has gone into establishing communication channels and negotiating mechanisms to facilitate dealings between native peoples and governments. The leaders of native organizations have also discovered a number of effective political tactics, including the use of the mass media to communicate their concerns to potentially sympathetic non-native audiences in Canada and elsewhere in the world who may in turn apply pressure on Canadian political leaders.

Native leaders have tended to eschew threats of violence but have become adept at mounting symbolic protests; one example was the mounting of the "Constitutional Express" that took large numbers of native people to Ottawa by train during the constitutional negotiations so they might personally convey their opposition to the government's position. Yet while native political organizations have become publicly prominent and have succeeded in changing government policy in a number of fields, their dependence on government financing serves indirectly to limit their political autonomy. Nevertheless, limited autonomy has been a feature of the political situation of native peoples for more than 100 years.

In coming years, native political organizations will be confronted both by internal and external challenges. Native people represent only a small minority within the overall population of Canada. The political influence that native leaders have exercised during the past 2 decades to persuade governments to extend special treatment to their people has been largely contingent upon a general level of affluence and tolerance within Canadian society. How native people will be treated by governments in the future remains to be seen. Equally important, however, will be the determination of native people at the community level to insist that their organizations continue to defend the political values and objectives that have long guided political organizations and activism among indigenous peoples in Canada. NOEL DYCK

Reading: A.L. Getty and A.S. Lussier, eds, *As Long as the Sun Shines and Water Flows: A Reader in Canadian Native Studies* (1983); DIAND, *Indian Conditions: A Survey* (1980); G. Manuel and M. Posluns, *The Fourth World: An Indian Reality* (1974); E.P. Patterson, *The Canadian Indian* (1972); A. Tanner, ed, *The Politics of Indianness: Case Studies of Native Ethnopolitics in Canada* (1983); D. Whiteside, *Historical Development of Aboriginal Political Associations in Canada*, 1 (1973).



Giver of Life by Jessie Oonark *(courtesy Sanavik Co-operative, Baker Lake, NWT).*

Native People, Religion Indian and Inuit religions consist of a complex set of social and cultural customs for dealing with the sacred and the supernatural. There are rich traditions of religious mythology and ceremonial in most areas. Spectacular religious manifestations are found on the Northwest Coast (KWAKIUTL, HAIDA, TSIMSHIAN), the northern Great Plains (BLACKFOOT, PEIGAN, BLOOD, SARCEE) and the Central and Eastern Woodlands (OJIBWA, CREE, HURON, IROQUOIS). In general, the subarctic Athapaskan groups and the arctic Inuit have less elaborate religious ceremonials, but are rich in mythic tradition (*see* INUIT MYTH AND LEGEND).

While their mythologies defy simple classification, 3 main types of myths, features of which often occur in combination, are particularly important in the religion of native peoples. The first group consists of creation myths that describe the origins of the cosmos and the interrelations of its elements. Here belong the Earth Diver myth, in which either the Great Spirit or the Transformer dives or orders other animals to dive into the primeval water to bring up mud, out of which he fashions the Earth (Eastern Woodlands, Northern Plains); the Trickster myths, which frequently but not always represent the Transformer as a comical character who steals light, fire, water, food, animals or even mankind and loses them or sets them loose to create the world as it is now (RAVEN among the BELLA COOLA, Tsimshian, Haida; Hare, NANABOZO or Nanabush among the Ojibwa; Frog in the Columbian Plateau; Coyote among the Blackfoot); and the Culture Hero myths, in which the Transformer appears as a human being of supernatural powers who brings the world into its present form by heroic feats (GLOOSCAP of the MICMAC, MALISEET, ABENAKI). Especially in the Columbian Plateau and the Great Plains, there are said to be 2 Transformers (more precisely, a Transformer and a companion who is a brother, sister or other relative). They try to outdo each other in feats of strength, ability or cunning that result in the formation of the world as it now exists.

Many myths tell of the origin of the moon, the sun and the stars. In these myths there is usually a tension between the heavenly bodies; eg, the cool moon by night is said to be necessary to counteract the burning of the Earth and the killing of people by the heat of the sun. An Inuit myth tells of the sun and moon as brother and sister, but since they have engaged in incest in their human lives they are doomed to eternal separation. Among many forms of myth about human origins are those that tell of the Transformer changing various animals into people. Others tell of the origin of death. The second group of myths is the institutional myths, which tell of the origins of religious institutions, such as the SUN DANCE (northern Plains), sacred MEDICINE BUNDLES (Blackfoot, Cree, Ojibwa, Iroquois), winter ceremonies (Coast SALISH, NOOTKA, Kwakiutl) and the Green Corn Ceremonial (Iroquois; *see also* FALSE FACE SOCIETY).

Where there is a belief that primordial times were very different from the present, the pattern in which the ancient mythic beings arranged their social and religious institutions becomes the norm for people now. Myths of the third group, the ritual myths, serve as detailed texts for the performance of ceremonials and rituals by which cosmic order is dramatically represented (Plains Sun Dance, Ojibwa MIDEWIWIN ritual and the Iroquois Green Corn Ceremonial). Fertility, birth, initiation and death rites are often clearly stipulated in mythology. Shamanic performances may also be described (*see* SHAMAN). Ceremonials are often preceded by stringent purification rites, such as sweat baths (eg, Salish, Blackfoot, Eastern Woodlands), fast-



Bone carving by sculptor Stanley Hill depicting the traditional Iroquoian myth of creation *(courtesy Stanley Hill).*

ing and sexual abstinence (*see* SWEAT LODGE). Feasting is a common feature of ceremonial performance.

The use of hallucinogenic drugs such as peyote appears to be limited and relatively recent in religious observances among Canadian native people, although trance states seem to be reasonably common (eg, in Salish winter dancing, shamanic performances among many groups, and perhaps in the SHAKING TENT rituals).

Some myths appear to have lost their religious sacredness and, while considered to be basically true accounts of true mythic beings, have become folktales recounted for entertainment or instruction. All religious myths and many folktales have a moral or ethical dimension in which behaviour patterns are prescribed, prohibited, commended or condemned.

Myths of the Orpheus type are prominent in the Eastern Woodlands (Huron, Ojibwa, MONTAGNAIS-NASKAPI, Iroquois, OTTAWA), the Northwest Coast (Salish, Kwakiutl, Nootka, Haida, Tsimshian, TLINGIT) and the Columbian Plateau (Thompson, Okanagan, CARRIER; *see* SALISH, INTERIOR). They tell of the Culture Hero or other prominent religious figure making a perilous journey to the realm of the dead to bring back a deceased loved one. These myths contain detailed characterizations of the land of the dead, and are important to an understanding of such diverse phenomena as the Plains Ghost Dance, concepts of the soul and many aspects of shamanism.

Among societies that have practised agriculture at some time in their history, many groups believe in a senior Great Spirit or Great Mystery (*Wakan Tanka* of the Plains societies and *Kitchi Manitou* of the eastern Algonquians). In general, supernatural mystery or power is called *Orenda* by the Iroquois, *Wakan* by the Plains peoples and MANITOU by the Algonquian societies, and is potentially beneficent, though it can be dangerous if treated carelessly or with disrespect. This mystery or power is a property of the spirits, but it also adheres to the Transformer, Trickster, Culture Hero, or spirit figures. Shamans, prophets and ceremonial performers are endowed with it. The spirits of all living things are powerful and mysterious, as are many natural phenomena and ritually significant places. Ritual objects such as rattles, drums, MASKS, medicine bundles and ritual sanctuaries are filled with mystery (*see* CALUMET; MEDICINE WHEELS).

Most Northwest Coast groups consider time to be divided into the present and a remote mythological period when things were different from now, and believe that the state of things in the present was brought into being by the Transformer. Concepts of the future are developed principally as they refer to the death of the individual and his afterlife. The world of the dead is usually believed to lie at a great distance from the world of the living, often beyond a great river, on islands far out at sea, in the remote mountains or in the underworld. It can only be reached after a difficult journey by the dead, or a very perilous one for the living (eg, shamans, the spirit figures of the Orpheus myth). The world is believed to have a circular surface covered with a domelike overworld. These levels are joined by a "cosmic axis" which may be represented by a "world tree," a "rainbow bridge" or the "backbone of the worlds" (the Milky Way). Religious myths of the Star Husband (Temagami Ojibwa), the Chain of Arrows (Tlingit) or the Stretching Tree (CHILCOTIN) tell of contacts made between humans and the world beyond via this axis. Ceremonially, such elements as columns of smoke, central house posts or the central pole of the Sun Dance lodge represent this axis. Whirlpools or caves may represent the way to the underworld. Many groups tell of a primeval sea or world deluge. Most recognize at least 6 cardinal directions (the 4 corners of the world, plus the zenith and the nadir). Northwest Coast societies such as the Kwakiutl divide the year into 2 major seasons: the summer ("profane") time and the winter ("supernatural") time, in which most religious ceremonials take place. Agricultural societies such as the Iroquois have more complex ceremonial calendars organized around the harvest times of various food plants, with a life-renewal ceremonial usually held in midwinter.

A key concept among Indian and Inuit societies is the notion of the Guardian of the Game, a supernatural person who is said to control or hold stewardship over one or all of the animal species, especially those hunted by man. Typical examples are to be found in the Bear ceremonial of the Abenaki and Montagnais-Naskapi, the Spirit of the Buffalo in Plains societies, and Sedna the sea goddess and Guardian of the Seals among the Inuit.

Of several religious figures, shamans are the most notable. They function as healers, prophets, diviners, custodians of religious mythology, and are often the officiants at religious ceremonies. In some societies, all these functions are performed by the same person; in others shamans are specialists. Healing practitioners may belong to various "orders," as in the Midewiwin or Great Medicine Society of the Ojibwa, or to secret or closed societies (Kwakiutl, Blackfoot). The Ojibwa Midewiwin was a closed society containing 4 (sometimes 8) orders of men and women who could be consulted at any time of sickness or communal misfortune and who performed the annual Midewiwin world-renewal ceremonial in late summer. Shamans were coordinators of the Plains Sun Dance (Blackfoot, Sarcee), which was also a world-renewal ceremonial. Closed, or even secret, shamanic societies played an important role in the Winter Ceremonial of the Kwakiutl, Nootka and other Northwest Coast societies. Shamans were associated with powers generally thought to be beneficial to the community, but were believed in some cases to use their powers for sorcery. Shaman-prophets and diviners were concerned with predicting the outcome of the hunt, relocating lost objects and determining the root causes of communal discontent and ill will. Blackfoot, Cree, Ojibwa and other societies had diviners who made their prophecies (perhaps in trance states) in the dramatic Shaking Tent ceremony. Shamans in Cree, Blackfoot and Ojibwa societies were custodians of the sacred medicine bundles containing objects and materials endowed with great mystery and power.

Natural causes were recognized for many diseases, especially physically curable ones; others were commonly believed to be the result of intrusion into the body of objects placed there by sorcerers. The shaman-healer's treatment of such diseases was dictated by his tutelary spirit, but usually consisted of the shaman ritually sucking the disease agent out of the body, brushing it off with a bird's wing, or drawing it out with dramatic gestures. Illness could also result from "spirit loss." The shaman-healer's action was then directed to recovering the patient's spirit (either his soul or his guardian spirit power, or both) and reintroducing it to the body. Personal or communal disorders were often held to be the result of disrespectful behaviour toward game animals, tribal sacred objects or natural phenomena.

The Guardian Spirit Quest once occurred throughout most of the tribal groups of Canada; it is undergoing a revival in Northwest Coast tribal religions, especially among the Coast Salish. Males, especially at puberty but also at other times of life, made extended stays in remote areas while fasting, praying and purifying themselves by washing in streams and pools. The goal was to seek a vision of, or actual encounter with, a guardian spirit — very frequently an animal, but also a mythological figure. Establishment of contact with a guardian spirit was held to make an individual healthy, prosperous and successful, particularly in hunting and fishing. The guardian spirit could be hinted at (Salish) or even directly represented or dramatized (Kwakiutl) in songs, masks, TOTEM POLES, house paintings, facial and body painting, or in personal religious regalia (*see* INDIAN ART; INUIT ART; NORTHWEST COAST INDIAN ART; PICTOGRAPHS AND PETROGLYPHS).

Seasonal ceremonials and "life-crisis" rituals are very common. Among the seasonal rituals are "firstfruits" and harvest ceremonies, and New Year life- and creation-renewal rites (Ojibwa Midewiwin ceremony, Plains Sun Dance, First Salmon rites of the Northwest Coast). Among the life-crisis rituals are ceremonies at birth or the giving of a name, at puberty, marriage and death, all of which are normally accompanied by some solemnity. The 17th-century Huron Feast of the Dead may have incorporated features of both seasonal and life-crisis rituals.

Contact with European religious systems has produced several types of religious reactions among native peoples, although it has brought change in some way to all aboriginal religious forms. Some Indian religions eventually rejected European forms and turned to "nativistic movements," which seek to revive previous religious practices and beliefs (eg, the Iroquois HANDSOME LAKE RELIGION). "Syncretistic religions" seek to combine traditional native forms with European observances (eg, the SHAKER RELIGION of the Salish area and the Native American Church of the Plains). Other religious movements radically opposed European forms (eg, the 19th-century Ghost Dance of the Sioux and other Plains tribes).

Indian and Inuit religious institutions should be understood in the context of the kinship, political and social-control institutions with which they are intricately interrelated.

DEREK G. SMITH

Reading: F. Boas, *Kwakiutl Ethnography* (1966); I. Goldman, *The Mouth of Heaven* (1975); A. Hultkrantz, *Belief and Worship in Native North America* (1981), *Prairie and Plains Indians* (1973) and *The Religions of the American Indians* (1982); P. Radin, *The Trickster* (1956); C.E. Schaeffer, *Blackfoot Shaking Tent* (1969); S. Thompson, *Tales of the North American Indians* (1966); R. Underhill, *Red Man's Religion* (1965); E.H. Waugh and K. Dad Prithipaul, *Native Religious Traditions* (1979).

Native People, Social Conditions The social conditions of native people in Canada are affected by the federal Dept of INDIAN AFFAIRS AND NORTHERN DEVELOPMENT (DIAND), the various native organizations and the BAND administration of INDIAN RESERVES. The minister of Indian affairs and northern development has responsibility for exercising the duties and functions of the INDIAN ACT on behalf of the federal government. Indian organizations are representative associations at the national, provincial and tribal or band levels and often have mandates that include the improvement of social conditions both on and off reserves. The band administration, as the elected body, has direct responsibility for the operation of the reserve and the social conditions of the band members.

Nonstatus Indians and MÉTIS are not subject to the Indian Act, and therefore are not eligible for assistance by DIAND (*see* INDIAN). Legally, the provinces are responsible for social assistance for these groups. They obtain some support from the federal Dept of the Secretary of State and have national, provincial and local associations that are concerned with their social conditions. INUIT, although not covered under the Indian Act, were included in the term "Indian" in the Constitution Act, 1867, and are thus subject to federal responsibility. They receive assistance from DIAND, and from the provincial governments of the NWT, Québec and Newfoundland.

Social conditions of Canada's native people must be discussed as a set of interconnected phenomena including geographical location, income level and cultural factors. Place of residence may be an isolated northern community or reserve and for others a large urban centre (*see* NATIVE PEOPLE, DEMOGRAPHY). There has been a major shift of natives to urban centres over the last 20 years, particularly among the young (under 40) southern native. The Clatworthy Study (1981) reported that over 1000 natives moved to Winnipeg each year (*see* NATIVE PEOPLE, URBAN MIGRATION). In the Far North, Inuit live in settlements ranging from a few dozen people to several thousand in size, although many still depend to a large extent on trapping, hunting and fishing. Over 50% of food is "country" food, harvested directly by native people.

Employment rates for natives are the lowest of any ethnic group, income per family often falling at or below one-half of that of the general city population (*see* NATIVE PEOPLE, ECONOMIC CONDITIONS). Up to 70% of natives are therefore dependent on some form of social assistance. Population increase of Indians is reported at 53% in the period 1961-81. Although no accurate figures are available for the Métis and nonstatus Indian, it is thought to be about the same. The Inuit population increase in that period was 115%. This increase has resulted in greater demands for social assistance, health services and jobs (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS).

Cultural factors interact significantly with social conditions. They may support and protect the family, or they may limit its success and be viewed as obstacles in the process of acculturation. Perhaps the most debated of the cultural patterns is the importance placed upon sharing. Historically, sharing was necessary to survival: a successful hunter shared food with the group and could expect others to share with him when he had need. In the contemporary cash economy and nuclear family, sharing can create problems; a family living in a small apartment is disrupted if another family moves in to share the proceeds of income and living quarters.

Housing Adequate housing in native communities and Indian reserves continues to be a major problem. One of every 3 Indian families lives in crowded conditions. Although the number of houses on Indian reserves increased 64% between 1958 and 1977, need has outstripped production and in 1977 there was a need for 11 000 new units. Houses built in the past were often inadequate or poorly constructed and now require major repair. The need for major repair increased tenfold to 24% in the years 1960-77. Inuit housing is largely supplied by governments of each jurisdiction on a rental basis keyed to income. Although early housing was inadequate, new designs have been developed in consultation with Inuit.

Utility services in native communities and Indian reserves, with the exception of electricity, are far below the national average. Running water is found in only about 50% of Indian homes, with greater percentages in the Maritimes, Québec, Ontario, Alberta and BC and less in Saskatchewan, Manitoba and in the North. Sewage service is also lacking in over half of the Indian homes (55%), distribution being similar to that of running water. Most arctic communities have trucked water and sewage systems, and many have "utilidors," encased aboveground piped water and sewage services.

Inadequate fire protection for Indians living on reserves is related to the extremely high rate of fire deaths. This rate in 1978 was 28 per 100 000, as compared to the national level of 4 per 100 000. In 1975 about 11% of the bands owned and operated their own fire-protection units; an additional 20% were dependent on outside municipal units under contract. Many arctic settlements have small water trucks and pumps, but few have formal fire-protection equipment.

Road construction on Indian reserves has increased in recent years; in 1977-78, eg, 360 km of new road and over 640 km of reconstructed road were completed. This increase appears to be related to resource development.

Health Native death, illness and accident rates are 2 to 4 times the national average, reflecting poor health conditions such as inadequate nutrition, housing, sewage disposal, potable water supplies and access to health services. The highest death, illness and accident rates are in the infant, youth and middle-aged populations. Better prenatal care and improved health conditions are lowering infant mortality. Deaths from one to 45 years of age are caused mainly by violence — motor vehicle accidents, suicides, burns and fire, firearms and drownings. It is estimated that 50-60% of accidents and deaths are alcohol related. Indians surviving to 65 years have a greater life expectancy than the national average. The federal government provides health-care services for Indians and Inuit in both the Yukon and the NWT. *See* NATIVE PEOPLE, HEALTH.

Antisocial Behaviour The incidence of crime among the native populations of Canada is several times that of the general population. Crime, however, is not an isolated phenomenon: it is related to poverty, crowding, alcohol and cultural disintegration. It is estimated that over half of all crimes committed by natives are alcohol related. Native representation in penitentiaries in 1977 was 280 per 100 000, as compared to the non-native figure of 40 per 100 000. Prison rates are highest on the Prairies and in the North (over 40% of inmates are natives), followed by Alberta and BC (under 30%), and lowest in the Atlantic and central provinces (under 10%). Natives commit different crimes from whites and are more likely to be involved in violent offences against other persons than against property. They tend to be given shorter sentences than non-natives, which may reflect an understanding of the social conditions by the courts or the fact that the violence is of a more minor kind. Arctic correctional facilities emphasize traditional activities such as seal hunting and other innovative measures. The rapid increase in natural-resources employment for Inuit during the 1970s seems to have contributed to an increase in alcohol problems and related offences such as assaults. Increasingly, native people play an active role in their own policing services. Inuit-operated alcoholism-prevention and -treatment programs combat what Inuit see as a critical problem. In the 1970s and 1980s Indians began to develop their own police forces. RCMP and other police forces have added native constables to their staffs, and Indian bands and native communities have upgraded local constable skills and equipment.

The Indian juvenile delinquency rate is alarmingly high in Canada: 353 per 100 000, as compared to the national average of 128 per 100 000. This rate in part reflects the fact that fewer native juveniles are let off with a warning (15%) as compared to non-native (46%). The difference is still significant, even when the number of warnings is taken into consideration, and probably reflects the number of children living in care outside their homes, social conditions of their home communities, and the breakdown of the traditional family unit and support group. It seems unlikely that the crime and juvenile delinquency rates for natives will improve before major changes are made in the social conditions of native communities.

Family Life Formal Indian separations and divorces increased at a faster rate than for non-Indians in the 1971-76 period, but were still only one-half the rate for non-Indians in 1976. This figure, however, reflects the costs of court divorces for an economically depressed population as much as anything else. The proportion of children born outside of marriage is typically some 5 times the national average, but this fails to take account of customary (ie, common-law) marriage. It is believed that the rates for Métis, nonstatus Indians and Inuit are comparable.

The number of children taken into care by social agencies increased fivefold between 1962 and 1977, a result of increased migration to urban areas and attendant social problems, notably alcohol abuse, the decline in the effectiveness of extended families under rapidly changing conditions, and the extension of non-native child-care agency services to Indians on reserves. Native groups, both Indian and Métis, have responded by developing their own agencies, and in the early 1980s Indian organizations contracted with DIAND and the provincial governments to assume responsibility for dependent and neglected children. The rate of adoption of native children by non-native — over 80% of such adoptions — is expected to drop, and Child and Family Services has attempted to locate and return to native communities many of the children previously placed in non-native homes; the courts, however, have considered continuity of placement in a stable situation to be more important than cultural factors. The number of children in care will also likely decline, given the native emphasis on treatment within the family rather than the non-native stress on apprehension and agency guardianship. The Inuit adoption rate has always been high, ranging from 15 to 70% of children born in arctic communities, because of the desire of older people for children; and the extended-family recognition of responsibility. Since the 1950s, traditional Inuit adoption practices have been formally recognized by the courts.

ART BLUE

Reading: DIAND, *Indian Conditions: A Survey* (1980); H.B. Hawthorn, *A Survey of the Contemporary Indians of Canada* (1967); J.A. Price, *Indians of Canada: Culture Dynamics* (1979).

Native People, Urban Migration Native people are the most rural ethnic population in Canada and there are strong antiurban, prorural traditions within native society. Two-thirds of a million native people are tied to the bush and rural country by heritage, by inalienable rights in a rural land base, and by a broad range of community services paid for by the federal government. These conditions are supported by the CONSTITUTION ACT, 1982, a legal guarantee that is unique in the world for an aboriginal population with a predominantly hunting heritage (*see* ABORIGINAL RIGHTS).

The modern market system and other features of Canadian culture have penetrated most native communities to such an extent that the traditional subsistence way of life is being redefined as socially inferior, as "unemployment" and "poverty." Thus, with the added factors of an increase in native population and the depletion of game in some areas, people leave hunting, fishing and fur trapping to find "real employment" and the more materialistic way of life in the towns and cities.

A semiurban life in large villages was indigenous among the agricultural HURON and IROQUOIS in the E and the coastal SALISH, NOOTKA, KWAKIUTL and TSIMSHIAN in BC. This heritage prepared people from these societies to live in cities somewhat better than natives with a seminomadic hunting heritage. Some 11% of the population of registered INDIAN bands have become urbanized because they are located adjacent to or within urban centres. The general level of urbanization of a province also affects the urbanization of the Indians who live there. Thus the level of off-reserve migration is high in Ontario and BC, moderate in the Prairies and

low in Québec, the Maritimes and the NORTH. The high rates of migration have come from the Indian bands that are of smaller size, have a tradition of working off the reserve, have poor on-reserve opportunities, higher education levels, more racially integrated schools and a poorly developed BAND government (*see also* INDIAN RESERVE).

While 28% of the status Indians officially live off the reserve, in fact the figure seems to be about 38%: 16% rural nonreserve, 11% in towns and small cities and 11% in cities greater than 100 000 in population (1979). The approximately 400 000 people who have a significant "self-identity" as MÉTIS or nonstatus Indians (which is more relevant than the broader category of Indian biological heritage) seem to have a similar rural-urban distribution to the off-reserve status Indians.

In moving off the reserve the Indian is leaving the jurisdiction where services are supported primarily by the Dept of INDIAN AFFAIRS AND NORTHERN DEVELOPMENT (DIAND), and moving into the jurisdiction of dozens of other federal and provincial agencies. All of the federal ministries, except Defence and External Affairs, now have Indian programs, and 21% of the billion-dollar federal budget for native programs is spent outside DIAND. The SECRETARY OF STATE in particular funds off-reserve Indian programs, providing several million dollars annually to support native political associations, urban Indian FRIENDSHIP CENTRES across the country, women's associations, and social and cultural associations (*see* NATIVE PEOPLE, GOVERNMENT PROGRAMS). The urban Indian centres provide valuable social functions and help to integrate the diverse social services available to Indians in cities. The Ontario Task Force on the Needs of Native People in an Urban Setting (1981) surveyed 232 people across the province in educational, political and social service positions, 87% of them native, 65% female and 53% with a university degree. Their ranking of the 10 most important services currently available to urban native people was as follows: drug and alcohol therapy; education; cultural awareness; employment and housing; family and children's services; justice and social welfare; youth services; recreation; women's services, health care and nutrition; and senior citizen's services.

Indian women tend to go further in school and take lower paying but steadier jobs than the men, and make up 54% of the urban Indian migrants nationally. A 1978 survey by the Ontario Native Women's Assn of 1094 Indian women showed only slight differences in the activities and attitudes between the women who lived on and off reserves. Most of the off-reserve Indians live in towns and the smaller range of cities, and continue to maintain strong kinship and friendship ties with those who live on reserves.

Social-workers' statistics often make urban Indian life look bleak and depressing, and ignore the warmth, humour and good times of daily life. Toronto, for example, has an estimated 30 000 Indians and ethnically active Métis scattered across the metropolitan area from a wide range of tribal backgrounds and income levels. An important cultural creativity can be seen in the new kind of Indian society that is developing in urban Canada. The evolution of urban Indian institutions (Québec has a unique, more assimilating, urban pattern) has generally been in 4 stages: urban bar cliques and welfare services provided by non-Indians; normal family-oriented kinship-friendship networks as the Indians themselves take over social services such as court work, therapy for alcoholics, and social work with poor single-parent families; an elaboration of artistic, educational, political, recreational and religious voluntary associations; and the development of academic, entrepreneurial and professional services by Indians. While it is normal to find elements of all stages present in a single city, one stage will usually be predominant at any particular time. Individual Indian migrants make an easier adjustment when they migrate to cities with a more mature Indian ethnic institutional system.

Features of Indian Life in Four Cities, 1979 (percent)

	Vancouver	*Edmonton*	*Winnipeg*	*Toronto*
Return home regularly	66	72	81	85
Speak an Indian language	62	70	73	62
Membership in an Indian organization	26	9	25	22
Education of grade 10 or higher	59	33	37	52
Receive social assistance	15	64	46	39

Studies across the country show that Indians usually make an initial urban migration to find a job when they are young. At first they correspond and return regularly to their reserves for visits and vacations, but gradually they settle into a stable life with a job, family and house in the city and make fewer return visits. Successful urban adaptations are related to several factors: the cultural background of individuals according to the traditional evolutionary level of their native social heritage; historical elements such as the length and intensity of white contact; ecological elements such as the urban proximity of their communities; the local quality of white receptivity such as the extent of anti-Indian racism; and the maturity of urban Indian ethnic institutions in the city they move to. A regional ranking of successful urban adaptations starts high with Québec, where few Indians leave reserves but are relatively well received when they do move; next are southern Ontario, southern Alberta and Vancouver, which are high on evolutionary level, urban proximity and mature ethnic institutions; then BC, the Yukon, the NWT and the Maritimes; and, finally, northern Alberta, Saskatchewan, Manitoba and northern Ontario, which have the poorest urban adaptations on account of widespread anti-Indian RACISM, simply organized band societies, low urban proximity and relatively immature urban Indian ethnic institutions.

Urbanization across the Arctic, from Siberia to Greenland, has been a process of concentration from hundreds of very small seminomadic aboriginal hunting groups into dozens of permanent villages, and a few large towns such as INUVIK and FROBISHER BAY. Since INUIT, mixed-bloods and whites must live co-operatively in the same communities, people get to know each other and there is less racial prejudice and discrimination than in the northern part of the Prairie provinces, where Indians and Métis tend to live in reserves or other communities segregated from the white towns. Social problems in the Arctic tend to develop in the large towns, or where there is a high turnover of southern workers in boomtown conditions, as at TUKTOYAKTUK, the base for the oil exploration in the Beaufort Sea.

JOHN A. PRICE

Reading: D. McCaskill, "The Urbanization of Indians in Winnipeg, Toronto, Edmonton and Vancouver: A Comparative Analysis," *Culture* (1981); J.A. Price, *Native Studies: American and Canadian Indians* (1978) and *Indians of Canada: Cultural Dynamics* (1979).

Native-White Relations Europeans first visited N America in their quest for fishing grounds. By the late 17th century they had penetrated into the northern half of the continent in search of furs. Over several centuries and across half a continent, many kinds of individual and group relations between native people and whites were established. The situations of contact changed over time, the pattern of change from S to N and from E to W reflecting the movement of Europeans. The BEOTHUK and the MICMAC were among the first Indians of Canada to meet the Europeans. The Beothuk, a small group, were treated as enemies and as wild animals to be destroyed. They responded with resistance and flight. Most were killed or died off as a result of economic, social and physical disruption of their lives. The Micmac, however, became allies and partners of the French.

Peaceful and friendly relations, linked to common goals such as the FUR TRADE, were maintained when they suited the needs of the parties involved. These ties sometimes led to marriages and personal friendships and to greater cultural understanding. When there was no basis for co-operation and material aid, there was likely to be competition, friction and violence. Prejudices and stereotypes were aggra-



The Red Lake chief making a speech to the governor of Red River at Ft Douglas, 1825; coloured lithograph by Peter Rindisbacher. The vast majority of Indian groups continued to live as independent nations into the 19th century. Fur traders discouraged assimilation as being bad for trade (*courtesy Public Archives of Canada/C-1939*).

vated and reinforced by economic conditions and the desire by the whites to acquire more and more Indian land.

The fur trade, at which the native people were adept because of the nature of their economy and technical skills, dramatically affected the organization of Indian societies. In exchange for pelts, the Europeans offered new, decorative and often useful goods, eg, weapons and utensils that were longer lasting and more efficient than some of the native people's own stone, bone, wood and hide artifacts.

Like the Indians, the Inuit generally received the Europeans with an initial attitude of curiosity and cordiality. The Inuit had their earliest European contact with explorers (in the 16th century) and whalers (by the early 18th century). Inuit hunted food for the whalers and were hired as sailors and harpooners, and they traded pelts for European goods. European diseases, introduced first by whalers, spread among the Inuit in epidemic proportions. By the late 19th and early 20th centuries whalers had depleted the whale population, first in the eastern Arctic waters and then in the western Arctic. By this time the Inuit in those areas had become dependent on European trade goods.

The experience of each people that came into contact with the Europeans was unique, but the overall effect of such contact was similar. The technology and economy of native culture began to change even before face-to-face contact had taken place, because the items that the Europeans traded frequently preceded the Europeans themselves. Native people moved from their aboriginal territory to pursue the pelt-bearing animals, and this altered their economy and sometimes led to conflict with the previous occupants of an area. Native people also became overspecialized in their economic dependence on the fur trade and European goods, neglecting their aboriginal technology and in some cases their traditional food base. When the fur trade moved deeper into the interior, it left the native people dependent upon European goods and upon new forms of employment, eg, as canoeists, mercenaries, food suppliers, guides and translators. As the traditional economic base deteriorated, many native people became destitute. At the same time, disease decimated their populations. The HURON and PETUN populations were reduced by 50% in one decade (1630s) as a result of EPIDEMICS. The HAIDA on the Queen Charlotte Islands declined from a population of about 8000, in the early 19th century, to about 800 by the late 19th century.

From the mid-17th century to the late 19th century, this population decline led many Europeans to believe that native people would disappear. The autonomy of the native people first in the economic and technological spheres, then in the social, political, demographic, religious and even artistic spheres, was increasingly eroded as the Indians moved from a position of collaboration and partnership with the fur traders to a condition of dependence and then subjection. Missionaries, messianic religions and revitalization movements contributed to or reflected the collapse of traditional systems of social and religious organization. Cultural survival was sought in Indian-based religions, some of which borrowed and adapted elements of Christianity. Responses to the missionary appeal varied among native people from acceptance to rejection; some native people believed the power of the newcomer might be drawn upon by the Indians (*see* NATIVE PEOPLE, RELIGION).

By the middle or late 19th century, relations between Indians and Europeans had entered a new phase because hundreds of thousands of Europeans had settled in the Maritimes and in central Canada. The new dominant economy — agriculture — pushed the Indians to the sidelines and backwaters of social and economic life. In the same year as the Royal PROCLAMATION OF 1763, PONTIAC organized an armed resistance of more than a dozen tribes in the Ohio Valley and Great Lakes area against the British takeover from the French after the Seven Years' War and the encroachment of British colonial settlers across the Appalachian Mountains. TECUMSEH, like Pontiac, tried to resist white settlement; his alliance with the British was intended to help achieve this goal, but after the War of 1812 the Great Lakes Indians were no longer important military or economic allies. As the European population became a larger and larger majority, European culture came to dominate N America.

The Royal Proclamation gave the imperial government the sole right to alienate lands from the Indians and initiated the procedure of signing land-surrender treaties between the British and Indians in N America. In the late 18th and early 19th centuries, there followed, in Upper Canada [southern Ontario], a series of land surrender treaties that confined Indians to small holdings and made large tracts of land available to settlers. Indians were relieved of their lands, through treaties of land surrender, through designation of reserves, and through expropriations of reserve lands. In the Maritimes, Québec, most of BC, the Yukon and parts of the northern territories, where treaties were not signed, the Indians were nevertheless obliged to give up large areas of land. It is very doubtful that Indians and whites had the same understanding of the land surrender treaties. In most Indian cultures, land was not regarded as a commodity that could be bought and sold. Evidence from Indian testimony shows that Indians understood these agreements to be matters of sharing, of friendship, of mutual respect, and not final and irrevocable sales of land. On the European side, however, these treaties were regarded as legal purchases of land, with attending obligations such as the provision of annual payments, farm supplies, medical aid, and so forth.

Throughout the 19th century, federal legislation shaped the life of native people. In 1876 the INDIAN ACT was passed, consolidating previous legislation and more clearly defining and confining the native people. Public and legal affairs of status Indians were governed by successive amendments and a new Indian Act in 1951. Bands were assigned reserve lands, which constituted the remains of the vast homelands once held by the native people. These reserves were to be training grounds for assimilating the native peoples into the general society. At the same time, the Indians were to be removed from the influences that were judged as "undesirable" and submitted to controlled culture change toward "civilization" and self-sufficiency.

Like the Indians of the Prairie provinces, the MÉTIS also experienced the effects of the flood of European settlers. Their efforts to resist this threat resulted in the RED RIVER REBELLION and NORTH-WEST REBELLION. Their resistance was crushed after brief outbreaks of war and their political leader, Louis RIEL, was convicted of treason and executed (1885). In the late 20th century, paralleling some of the more recent Indian movements, the Métis have begun to reassert their identity.

From the early 19th century, government has pursued a policy of encouraging the assimilation of the native people. European colonizers regarded Indian culture as "backward," "stagnant," "primitive," and "inferior" to European culture. The policy of assimilation would, it was thought, remedy the situation. Indians who seemed to accept programs for cultural change were seen as "progressives"; those who resisted were "conservatives." The enfranchisement system removed an Indian from this group; in exchange for citizen status and voting privileges Indian status was lost. In the late 19th century and early 20th century, Indian administrators interfered increasingly in the everyday affairs of reserve life. Indian landholdings came to be seen as an impediment to "progress" and "development," and this justified the expropriation of reserve lands, especially those close to urban settlements.

To ensure their own survival, Indian leaders have frequently made compromises with the Europeans. CROWFOOT expressed his appreciation for aid given the Blackfoot and signed Treaty No 7 (1877) as a means of further protection. Chief Herbert Wallace, a Port Simpson Tsimshian of the early 20th century, credited the missionaries with assisting the Indians to understand better their own LAND CLAIMS and land rights. At that time the Nishga renewed their land protest with the Nishga Petition (1913). By the late 20th century some of the most acculturated Indian leaders had also become the most insistent critics of the poor treatment accorded Indians and advocates of greater concern for the survival of Indian traditions as well as political and economic rights. The White Paper of 1969, which threatened Indian survival, and to which Indian spokesmen such as Harold CARDINAL responded vigorously, changed the course of Indian protest. New Indian organizations sprang into existence and existing organizations were rekindled with enthusiasm.

Pan-Indianism has been fostered to a degree by the meeting of peoples of various tribes and cultures in the cities and as a result of a common language, residential schools (before the second half of the 20th century) and increased physical mobility. One of the most exciting adaptive possibilities lies in the Northwest Territories where, unlike most of Canada, native peoples constitute the majority of the population.

Since 1971, the year the Inuit national organization, the Inuit Tapirisat of Canada, was formed, Inuit have also made a greater effort to gain control over their own affairs. Leaders have emerged from among a generation of younger people more familiar with the culture of southern Canada, but determined to preserve and develop Inuit land and culture.

The native people, though socially, culturally and economically exploited by centuries of relations with non-natives, have survived as a people. They now demand greater control of and participation in all the spheres of public affairs that govern them. *See also* NORTH and various entries under NATIVE PEOPLE. E.P. PATTERSON

Reading: E.P. Patterson, *The Canadian Indian* (1972).

NATO (North Atlantic Treaty Organization), Canada's first peacetime military alliance, placing the nation in a defensive military arrangement with the US, Britain and the nations of Western Europe. In 1947 there was much concern in Ottawa as the Soviet Union created a buffer zone in Eastern Europe between itself and Germany. The USSR was apparently pursuing a policy of aggressive military expansion at home and subversion abroad, and there was real fear that France or Italy might become communist (*see* COLD WAR). The problem was complicated by what Ottawa saw as a resurgent isolationism in the US, an unwillingness by Congress to pick up the international burdens that France and Britain, both weakened by WWII, could no longer bear. The answer seemed to lie in an arrangement that would link the democracies on both sides of the Atlantic into a defensive alliance, thus securing W Europe from attack while involving the US firmly in world affairs. An extra advantage for Ottawa was that such an arrangement would bind together all of Canada's trading partners, and it thus suggested potential economic benefits.

The initial public expression of this thinking was that of Escott REID, Dept of External Affairs, at the COUCHICHING CONFERENCE on 13 Aug 1947. Other Canadians, including Reid's minister,

Louis ST. LAURENT, picked up the idea, and it was soon being discussed in Washington and London. Secret talks between the British, Americans and Canadians followed, and these led to formal negotiations for a broader alliance in late 1948. Canada's representative was Hume WRONG, ambassador to the US and a hardheaded realist. Wrong believed any treaty should be for defence alone, a view popular among the other participants. But Ottawa had grander visions, and L.B. PEARSON and Reid pressed him to argue for the inclusion of a clause calling for the elimination of economic conflicts among the parties. Despite misgivings, Wrong secured the inclusion of Article II, the "Canadian article." Regrettably, little came of it.

The treaty was signed 4 Apr 1949, but it was largely a paper alliance until the KOREAN WAR. That led the NATO states to build up their forces, and for Canada this had major consequences: a huge budget increase and the first stationing of troops abroad in peacetime. The Canadian contribution was small, but its quality was widely considered to be second to none. Nonetheless, high costs and the nuclear arms given the forces in 1963 worried critics. After a major review of foreign policy, the Trudeau government decided in 1969 to cut the Canadian contribution drastically, reducing the army and air elements. Although in 1983 Canadian troops continued in Europe in these diminished numbers, and although a new Soviet truculence in the 1980s raised concerns, the Canadian commitment of arms and men to the alliance remained substantially lower than other NATO partners wished.

J.L. GRANATSTEIN

Nattrass, Susan Marie, trapshooter (b at Medicine Hat, Alta 5 Nov 1950). She has dominated her sport as few athletes ever have. By 1981 she had been women's world champion 6 times (setting several records in the process) and was the perennial Canadian and N American champion. At the 1976 Montréal Olympics, she was the first woman to compete in her sport. In 1981, Nattrass won the LOU MARSH TROPHY as Canada's athlete of the year, gained Canada's female athlete of the year honour, and was awarded the Order of Canada. GERALD REDMOND

Natural Resources, *see* RESOURCES.

Natural Sciences and Engineering Research Council, est 1978 as a crown corporation, reports to Parliament through the Ministry of State for Science and Technology. It comprises a president, a vice-president and 20 members representing Canadian universities, industry and labour. It was established to promote science and engineering outside the health sciences; it also responds to the minister's requests for advice on specific research.

Nault, André, Métis leader (b at Point Douglas, Red River Colony 1829; d at St Vital, Man 1924). Although a kinsman of Louis RIEL and always considered a Métis, Nault was not of mixed blood. Interference with his hay privileges by surveyors provoked the first armed resistance in the North-West in 1869. During the rebellion of 1870 he was in charge of the party that seized Ft Garry, and he sat on the council that condemned Thomas SCOTT on 3 Mar 1870. Nault commanded the firing squad the next day. Chased across the border and left for dead by Orangemen shortly after the Canadian takeover, Nault returned to St Vital and in 1873 was arrested with Ambroise Lépine for Scott's murder. Unlike Lépine he was not tried and was pardoned as part of the general amnesty of 1875.

J.M. BUMSTED

Nault, Fernand, stage name of Fernand-Noël Boissonneault, dancer, choreographer, teacher, director (b at Montréal 27 Dec 1921). As resident choreographer of Les GRANDS BALLETS CANADIENS Nault has created a succession of highly theatrical ballets which have greatly contributed to the company's popularity. Trained in Canada, the US and Europe, he danced with American Ballet Theatre 1944-65 and was also a company ballet master from 1958. His lengthy association with Les Grands Ballets Canadiens began in 1965 and he has variously held the positions of associate director 1967-74, director of schools 1974-76 and resident choreographer. Nault was guest choreographer of the Colorado Ballet 1978-81 and its artistic director 1981-82.

MICHAEL CRABB

Naval Aid Bill As early as 1909 the Conservative Party believed that Canada should contribute "emergency" funds to help the Royal Navy maintain its superiority over the German navy. In Mar 1912 the RN required more "dreadnought" battleships. After consulting with Winston Churchill, First Lord of the ADMIRALTY, in July 1912, PM Borden agreed to provide up to $35 million for 3 dreadnoughts. Payment was authorized by the Naval Aid Bill, introduced by Borden in Dec. The Liberals resisted bitterly, angered by Borden's neglect of the Canadian navy (est 1910 by the NAVAL SERVICE ACT). The Conservatives carried the bill on 15 May 1913 only by imposing CLOSURE on debate for the first time in Canadian history. However, the Liberal majority in the Senate defeated the bill 2 weeks later. WWI began before Borden could do anything more about naval policy. ROGER SARTY

Naval Service Act established the Royal Canadian Navy, 4 May 1910. The Act proposed a small navy under the control of the Canadian government, with emergency provision for transfer to the British Admiralty. PM Wilfrid LAURIER had been under increasing pressure from the British government and Canadian imperialists to contribute directly to the Royal Navy, in the face of a growing challenge from the German navy. The Act was bitterly opposed by French Canadian nationalists, led by Henri BOURASSA, who opposed deeper involvement in imperial affairs. Laurier's compromise placated neither group, severely reduced his support in Québec, and ultimately contributed to his defeat in 1911. The navy survived, although it entered WWI with only 2 warships, the RAINBOW and the *Niobe*. *See* ARMED FORCES. ROGER SARTY

Navigation Acts, a complex set of British laws dating from 1651 and 1660, regulating British and later imperial shipping and trade to foster economic and naval power (*see* MERCANTILISM). They governed ownership and crew nationality of vessels trading to Britain and her colonies, and the acceptability of routes and commodities. They were used to try to link British North America economically with the West Indian colonies; more generally, trade among BNA colonies and theirs with Britain had to be conducted in British or colonial vessels. Trade on the Great Lakes did not entirely fit the system; enforcement was lax before 1815 and by 1822 legislation permitted cross-lake trade in many commodities. Following repeal of the CORN LAWS in 1846, Canadians resentfully denounced the Acts as a burden. They were repealed in 1849 as part of Britain's overall movement to free trade. DOUGLAS MCCALLA

Navy Island, Ont, 130 km², the only Canadian island in the NIAGARA R, is owned by the federal government and managed by the Niagara Parks Commission; access is solely by boat. So named because its timber was used to build British naval vessels in the mid-1760s, it was occupied by insurgents during the REBELLIONS OF 1837-38. By the 1880s it contained a summer resort hotel, orchards and farm buildings. It was proposed as the site for a permanent United Nations headquarters in 1945, but remains an isolated, uninhabited wilderness reserve rarely visited except for summer camping. JOHN N. JACKSON

Navy League of Canada, a volunteer organization fd 1918 under federal charter, but tracing its origins to branches of the British Empire Navy League established in Canada from 1895. The league's central function is the promotion of Canada's maritime interests, and it has consistently supported expansion of the merchant marine. The league provided seamen's comforts during wartime and has been active in youth training. Boy's Naval Brigades (now called Sea Cadets) were begun in 1903, and after 1945 training was extended to girls and preadolescents (Navy League Cadets). *See* CADETS; ARMED FORCES. MARC MILNER

Neatby, Hilda Marion, educator (b at Sutton, Eng 19 Feb 1904; d at Saskatoon 14 May 1975). Best known as author of *So Little for the Mind* (1953), a critique of Canadian education, Neatby was also an influential member of the Massey Commission (*see* NATIONAL DEVELOPMENT IN THE ARTS, LETTERS AND SCIENCES, ROYAL COMMISSION ON), a historian of Québec and a professor at U of Sask. In her 1953 study, Neatby called for a return to basics in primary education and an emphasis on traditional education for the best students in high school. She presented her ideas forcefully. These were strongly criticized by educational bureaucrats and widely debated throughout Canada. She published *Quebec, The Revolutionary Age, 1760-1791* (1966). The following year she became a companion of the Order of Canada.

MICHAEL HAYDEN

Neatby, Kenneth William, agricultural scientist (b at Sutton, Eng 30 Mar 1900; d at Ottawa 27 Oct 1958). Son of an English doctor who immigrated to Saskatchewan in 1906, Neatby joined the Winnipeg Rust Laboratory as a wheat geneticist in 1926, and in 1933 discovered how to forecast rust resistance in new wheat hybrids. He taught at U of A 1935-40 and then spent 6 years as farm liaison agent for a wheat wholesaler. After becoming director of the Dept of Agriculture's science service in 1946 he doubled its size and trebled its budget, laying the foundation for a new research branch that was formally created some months after his death. The dept's Neatby Building, housing 125 laboratories, commemorates him. DONALD J.C. PHILLIPSON

Nechako River rises in the COAST MTNS in W-central BC and flows E to form the principal tributary of the FRASER R. Because of massive damming of its headwaters, it is no longer possible to give its length or tell exactly where it used to rise. Since the 1950s its headwaters have been backed up into the huge Nechako Reservoir behind Kenney Dam, and two-thirds of this flow is diverted W to provide power for aluminum production at KITIMAT. The river drains 46 000 km² (14 000 km² above the dam). Its principal tributaries are the Cheslatta, Nautley and Stuart rivers. James McDougall of the NWC was the first non-native to reach the Nechako (1806), called *Incha-Khoh* ("big river") by the local CARRIER Indians. In 1807 Simon FRASER established Fort George (now PRINCE GEORGE) at the Nechako-Fraser confluence. Fur traders in the valley were followed in the late 19th century by prospectors heading for the Omineca and Klondike goldfields and by workers on the Yukon telegraph line. Homesteaders came to farm in the early 20th century. Today the river valley supports an economy based on farming, forestry and mining. The Nechako and its tributaries are also important salmon-spawning streams. Diversion and regulation of the river for power generation caused the displacement of native and non-native people in the 1950s and adversely affected salmon stocks. ROSEMARY J. FOX

Neel, Louis Boyd, conductor, administrator, lecturer, surgeon (b at Blackheath [London], Eng 19 July 1905; d at Toronto 30 Sept 1981). In 1932, while maintaining a busy surgical prac-

tice in London, Neel formed the Boyd Neel Orchestra, a chamber ensemble of 17 string players performing and recording contemporary music as well as the established repertoire. A surgeon in the British navy in WWII, he organized concerts for the armed forces. He guest-conducted most important symphony orchestras and opera companies before coming to Toronto as dean of the Royal Conservatory of Music (1953-71). He conducted the CBC Symphony Orchestra (1953-64), founded and conducted the Hart House Orchestra (1954-71) and conducted the Mississauga Symphony Orchestra (1971-78). Awarded honorary degrees from the Royal Academy of Music and U of T, he was a Commander of the British Empire. MABEL H. LAINE

Nègres blancs d'Amérique (1967), a Marxist analysis of Québec history and a program for the future, written under the guise of autobiography by Pierre Vallières. Written while Vallières was confined in a Manhattan jail for FLQ activities, it dramatizes his impoverished, frustrated childhood during the Duplessis era as the son of working-class parents in Longueuil-Annexe; his checkered career as a philosophy student, office worker, Franciscan postulant, writer and friend of the poet Gaston MIRON and of the intelligentsia associated with CITÉ LIBRE, PARTI PRIS and *Le* DEVOIR; and his "conversion" to Marxism and FLQ involvement following a trip to France and Spain. To Vallières, Québec's working class reveals the characteristics of a colonized people; "white niggers" denotes a condition of being which he felt could be altered only through violent revolution. The work was revised and expanded in 1969, and it was translated in 1971 by Joan Pinkham as *White Niggers of America*. MICHÈLE LACOMBE

Nelles, Percy Walker, naval officer (b at Brantford, Ont 7 Jan 1892; d at Victoria 13 June 1951). Nelles achieved his first command, HMS *Dragon*, in 1929 and 2 years later took over HMCS *Saguenay*, the first warship built specifically for Canada. As chief of the naval staff 1934-44, he was instrumental in the navy's survival of the Depression and the architect of its phenomenal wartime growth. An able, if colourless, administrator, Nelles was sent to London in Jan 1944 as liaison officer following a bitter break with naval minister A.L. MACDONALD over the handling of naval expansion. He retired in Jan 1945. MARC MILNER

Nelligan, Émile, poet (b at Montréal 24 Dec 1879; d there 18 Nov 1941). A romantic, Parnassian and symbolist, Nelligan was an outstanding turn-of-the-century writer. Except for a few summer vacations in Cacouna and a sea voyage about which little is known, Nelligan spent his entire life in Montréal. He attended the École Olier 1886-90, Mont Saint-Louis 1890-93 and the Petit Séminaire de Montréal 1893-96. In Sept 1896 he enrolled in the Collège Sainte-Marie, which he left in Mar 1897. He became friendly with Louis Dantin and Arthur de Bussières, and on 10 Feb 1897 he was elected a member of the École littéraire de Montréal and began writing poetry with increasing ardour.

His first poem, "Rêve fantasque," had been published in *Le Samedi* on 13 June 1896, under the pseudonym of Émile Kovar. Other poems appeared in *Le Monde illustré*, *Alliance nationale* and *Le Petit Messager du Très-Saint-Sacrement*. In the course of his reading, he discovered Lamartine, Hugo and Millevoye, Verlaine, Baudelaire and Pierre Dupont, Rodenback and Rolliant, Catule Mendès, Heredia and Leconte de Lisle, and other Parnassian and symbolist poets such as Sully Prudhomme, Théodore de Banville, Albert Samain and Arthur Rimbaud. He was fascinated by the dark world of Edgar Allan Poe.

Nelligan recited his poems brilliantly at the 4 sessions of the École littéraire de Montréal. At the last meeting, held in the Château de Ramezay on 26 May 1899, he performed a forceful reading of his "Romance du vin," which, with his unforgettable "Vaisseau d'or," has contributed to his almost legendary fame. On 9 Aug 1899, exhausted, ill and on the verge of insanity, Nelligan was taken to the Retraite Saint-Bénoît; in 1925 he was transferred to the Hôpital Saint-Jean-de-Dieu, where he remained until his death.



Poet Émile Nelligan (1904), whose sad and nostalgic poetry has given him almost legendary status in Québec literature (*courtesy Public Archives of Canada/C-88566/Laberge/Gill Collection*).

Nelligan's work, which includes some 170 poems, sonnets, rondels, songs and prose poems, is strikingly lyrical. The poet's voice is sad and nostalgic, oscillating between the theme of the passage of time and a hallucinatory vision of the world. Conveyed through traditional prosody, Nelligan's imagery often attains the symbolic. His work was collected by Louis Dantin and published in 1904. Three subsequent editions were issued in 1925, 1932 and 1945. In 1952 Luc Lacourcière published a critical edition of the work, which was reprinted in 1958, 1966 and 1974. Two deluxe editions appeared in 1967 and 1979. PAUL WYCZYNSKI

Nelson, BC, City, pop 9143 (1981c), inc 1897, named after Hugh Nelson, lt-gov of BC, overlooks the W arm of Kootenay Lk, 660 km E of Vancouver. The prehistoric boundary of the Interior SALISH and the KOOTENAY is nearby. In 1887 Silver King Mine on Toad Mt led to rapid growth in Nelson. The first railway in the Kootenay reached here in 1892; the Spokane Falls and Northern Ry (Burlington Northern) followed in 1894. Nelson soon became a transfer point for lake traffic and, with completion of the Crow's Nest Pass Ry and the Kettle Valley line (1898), developed as a railway maintenance and service centre. A copper and lead smelter operated in Nelson 1896-1907. Disease virtually eliminated fruit farming between 1920 and 1950. Nelson remains the administrative and wholesale distribution centre for the Kootenay region. For a time, logging and sawmilling became important, but the plywood plant was permanently closed 1982. The instability caused by closure of Notre Dame U seemed to have been overcome by the establishment of the David Thompson University Center, but the centre was also closed (1984). WILLIAM A. SLOAN



Nelson River, 644 km long, flows NNE out of Playgreen Lk, at the NW tip of Lk Winnipeg. It spills out into a number of lakes, including Cross, Sipiwesk, Split and Stevens, flowing E from the latter into Hudson Bay. Its main tributaries are the Burntwood R, on which THOMPSON, Man, is located, and the Grass R. Sir Thomas BUTTON wintered at its mouth 1612 and named it for Robert Nelson, a ship's master who died there. The entrance to the river became the scene of a bitter struggle for the fur trade, and YORK FACTORY was established at Marsh Point, a peninsula separating the Nelson and HAYES R. However, the Hayes, not the Nelson, became the main route from the bay inland. The Nelson takes an often turbulent course through the granitic SHIELD; as the last link in the long SASKATCHEWAN R system and as a conduit for the waters of the Red and Winnipeg rivers as well, it has a mean flow at its outlet of 2370 m^3/s — roughly the same as the Columbia R. Today the Nelson's drop and huge volume are exploited for hydroelectric power. The largest developments are Kettle Rapids, built 1970-74 (1.2 MW), Long Spruce, built 1977-79 (0.9 MW), and Kelsey, built 1960-72 (0.2 MW) to provide power for nickel smelters at Thompson.
JAMES MARSH



Nematoda, phylum of unsegmented, cylindrical worms; approximately 30 000 species are known. Nematodes exhibit both radial and bilateral symmetry. The smallest adults are under 0.25 mm long; the largest (whale parasites) may exceed 9 m. Nematodes are pseudocoelomate, ie, have an unlined space between the body wall and digestive tract. Flexible cuticle covers the fluid-filled body. The digestive tract (a muscular, glandular esophagus and simple intestine) extends from mouth to anus. The mouth may contain elaborate, cuticular (horny) teeth, plates or a hollow spear. Circulatory and respiratory systems are absent. Sexes are separate. All nematodes, regardless of habitat or life-style, possess similar life cycles: 4 larval stages, separated by a molt in which old cuticle is shed and replaced, precede the adult stage. Molts may be the only indication of development since larvae may be superficially identical to adults. Most

nematodes are free-living scavengers, herbivores or predators, in soil, fresh water or salt water. Parasitic species living in plants or animals are less common but more notorious. The golden nematode has decimated potato crops in Newfoundland and southern Vancouver I. Others cause serious damage to timber, field and greenhouse crops. Trichina worm in pigs or bears and dog round worm are familiar animal parasites. Virtually every animal can be infected with several species. Nematodes have been classified variously as an order, class or phylum, and were once considered a class of phylum Aschelmintha. T.F. MACE

Nepheline Syenite, white to whitish grey, medium-grained IGNEOUS ROCK. It consists of nepheline, potash and soda feldspar and accessory magnesium and iron-rich minerals. The Canadian nepheline syenite industry began in 1932 with the staking of claims on Blue Mt near Peterborough, Ont. A long period of persistent efforts in technical and market research and in development was necessary to establish this unique industry. The use of nepheline syenite as a raw material for glass, ceramic and filler industries was first developed in Canada, which was the world's only producer for many years. Over the years, nepheline syenite has become preferred to feldspar as a source of alumina and alkalis for glass manufacture. It promotes more rapid melting at lower temperatures, thus reducing energy consumption, lengthening the life of the furnace and improving yield and quality of glass. The material is used in ceramic glazes and enamels and in fillers in paints, papers, plastics and foam rubber. A growing market is developing in the white-ware industry where the material is used as a body and a glaze ingredient for bathroom fixtures, vitreous enamels, china, ovenware, electric porcelain and ceramic artwares. The 2 Canadian nepheline syenite operations are located on Blue Mt in Ontario — giving the local pottery its characteristic name. Other occurrences have been identified but these are either too high in iron content or too variable in chemical composition for exploitation. Nepheline syenite occurs in southern BC, in the Bancroft area of Ontario and in southern Québec, but none of these deposits is, as yet, of economic significance. Extraction in the Blue Mtn area is by open pits. Ore is hauled to the mill where it is put through a magnetic separation circuit to remove iron-bearing minerals. The mill produces several grades of nepheline syenite, based on grain size and iron content, to meet a wide variety of markets. Shipments in 1981 were 605 000 t, worth about $18 million. Canada exports 70% of its production; over 90% of exports go to the US. *See* METALLURGY.
J.Y. TREMBLAY

Neptune Theatre, in Halifax, named after Canada's first theatre in 1606, Marc LESCARBOT's Théâtre de Neptune, opened on 1 July 1963 in a 525-seat former vaudeville house. Tom Patterson, founder of the STRATFORD FESTIVAL, and Leon Major, Neptune's founding artistic director, with the support of the CANADA COUNCIL, had visited Halifax in 1962 to explore the possibility of establishing a professional theatre there. The response was positive and, with dedicated support from the community, the theatre was obtained and renovations were undertaken.

The first company in Canada to engage its artists and technicians on a 52-week basis and to adopt the repertory system, Neptune attracted directors such as George McCowan and Mavor MOORE. But within 4 years, the company was in grave financial difficulties and was rescued by the provincial and municipal governments. In 1978, when the theatre was in trouble again because of a decline in subscriptions, actor John NEVILLE was appointed artistic director. Within 5 years, Neptune's deficit had been eliminated and the number of season-ticket holders had doubled. In addition to traditional offerings, Neville presented plays by Canadians such as Rick Salutin and John Gray. In 1983 Tom Kerr became artistic director.

Netball is a ball-goal game, with 7-a-side teams, played by girls and women, chiefly in English-speaking countries. As in BASKETBALL, the aim is to score goals by sending the ball through a goal ring attached to a 10-foot (3 m) pole. Players may not run with the ball, and are restricted to prescribed areas of the court. After the early form of basketball was introduced into England in 1895, it was modified as a sport for girls. Netball spread throughout the Commonwealth and was introduced in Canada in the early 1960s, the first games being played in Montréal in 1962. The Canadian Amateur Netball Assn was formed in 1973. In the 1979 world tournament, Canada placed 11th out of 22 countries. Netball in Canada is played mainly in NS, Qué, Ont, Alta and BC. BARBARA SCHRODT

Netsilik Inuit (or Netsilingmiut) is one of several groups of INUIT who live on the Arctic coast of Canada W of Hudson Bay. When visited by the Greenlandic explorer Knud Rasmussen in 1923, the 259 Netsilingmiut were scattered throughout a territory of about 103 600 km² between Committee Bay, Victoria Strait and Somerset I. Until recently they were nomadic hunters. Their name means "people of the place where there is seal" and probably derives from the name of a lake, Netsilik (Seal), on BOOTHIA PENINSULA. The Netsilingmiut traditionally lived in small shifting family groups with simple nonhierarchical social organization. There was no formal government and no institutionalized group relationships. They hunted seal, caribou, musk oxen and occasionally polar bear, and fished for salmon, trout and char. By ingenious technology, they converted the bones, skins and flesh of these animals, as well as stone, snow and ice, into all the necessary survival materials.

The Netsilingmiut speak a dialect of Inuktitut, the language spoken by Inuit from northern Alaska to eastern Greenland. The Netsilingmiut had a detailed knowledge of an enormous expanse of territory. They sometimes spent several years on journeys to the coast of Hudson Bay and to the Thelon R, where they obtained knives, needles, wood for sledges and kayaks, and, early in the 20th century, firearms.

White men first entered Netsilik territory early in the 19th century, some in search of a NORTHWEST PASSAGE from the Atlantic to the Pacific; others in search of the remains of the FRANKLIN expedition. Explorers were a second source of goods from the outside world. A third source appeared in 1923, when the first HBC post was established on KING WILLIAM I. The HBC was followed in the 1930s by missionaries, then by the RCMP; and in the 1950s the process of change accelerated with the establishment of schools and nursing stations. Today, most Netsilingmiut live in or near the settlements of Spence Bay and Pelly Bay on Boothia Peninsula, and Gjoa Haven on King William I. They are Christian, many speak English and Inuktitut, and their life is heavily influenced by southern goods, services and institutions. Many of their values and ways of relating to one another remain Inuit. *See also* NATIVE PEOPLE, ARCTIC.
JEAN L. BRIGGS

Nettiling Lake, 5543 km², elev 29 m, max length 123 km, is located toward the S end of BAFFIN I, in the Great Plain of the Koukdjuak, about 110 km SW of Auyuittuq National Park, 160 km W of Pangnirtung and 280 km NW of the Frobisher Bay settlement. The third-largest lake of the Far North and tenth-largest in Canada, it is fed by AMADJUAK LK and several other small lakes and streams. The largest lake on Baffin I, it is dotted by numerous islands and contains 3 bays: Mirage, Camsell and Burwash. It empties into FOXE BASIN from its W shore via the very shallow Koukdjuak R. DAVID EVANS

Neutral in the early 17th century lived in the Hamilton-Niagara district of SW Ontario and in New York state. They spoke an Iroquoian language and were known to the HURON as the *Attiwandaronk,* meaning "people whose speech is awry or a little different." In 1615 Samuel de CHAMPLAIN misnamed them "la Nation neutre" since they were then at peace with the Five Nations and the Huron. The Neutral numbered about 40 000 and had an army of 4000 to 6000 warriors prior to the smallpox epidemics of 1638-1640. They lived in LONGHOUSES in about 40 settlements that included large palisaded towns, villages and smaller specialized seasonal hamlets distributed around the Niagara Peninsula and along the Niagara Escarpment. The main concentration of settlements was within a 32 km radius of Hamilton, Ont.

The Neutral had trading and war alliances with surrounding Iroquoian-speaking peoples, particularly the PETUN, Huron, Wenro, Kakwa, Erie, Andaste and probably some of the Five Nations of IROQUOIS. They were also allied with the OTTAWA against the Algonquian-speaking Mascouten of Michigan and Ohio. The Mascouten were long-standing, bitter enemies, and in 1643 the Neutral army captured and brought back 800 prisoners, both male and female, torturing some of them.

They relied upon horticultural crops of corn, beans and SQUASH, as well as on considerable hunting of deer, raccoon, black bear and the now extinct passenger pigeon. Their diet was augmented by fishing and nut collecting, and tobacco was cultivated for ritual and trade purposes. The men were heavily tattooed and in summer wore little if any clothing. They were extremely proficient at knapping chert arrowheads and scrapers, and the women made pottery, though it was gradually replaced by European copper containers. Such trade items were often included in their cemeteries as grave goods.

It has been suggested that unlike other contemporaneous Northeastern Iroquoians, the Neutral had developed politically beyond the confederacy level. Their powerful war chieftain Souharissen, with 10 Neutral tribes united under his rule, had far more political power than those of other groups whose chiefs had little real control over their tribesmen. The capital town Ounontisaston (9.6 km SE of present-day Brantford) was visited by the French Recollet priest Joseph de la Roche Daillon in 1626, and 14 years later by Jesuits Jean de BRÉBEUF and Joseph Marie Chaumonot. In 1650-51 the Iroquois dispersed and destroyed the Neutral as a cultural entity. *See also* NATIVE PEOPLE, EASTERN WOODLANDS and general articles under NATIVE PEOPLE.
WILLIAM C. NOBLE

Neville, John, actor, director, producer (b at London, Eng 2 May 1925). He began a distinguished career as a classical actor in Great Britain in 1947 and became associate producer of the Nottingham Playhouse Company in 1961 and its joint theatre director 1963-67. Neville came to Canada in 1972. As artistic director of the CITADEL THEATRE, Edmonton, 1973-78, he improved public support and the artistic stature and scope of the theatre. From 1978 to 1983 he served as artistic director of the NEPTUNE THEATRE, Halifax, where he again doubled subscriptions and toured productions to smaller communities. He made his critically acclaimed acting debut at the STRATFORD FESTIVAL as Don Armado in *Love's Labour's Lost* in 1983, repeating the role in 1984. Neville became the artistic director of the Stratford Festival in 1985, succeeding John HIRSCH.
ANTON WAGNER


NEW BRUNSWICK
Trans-Canada Highway
Primary Road
Ferry
Railway
National Park
POPULATED PLACES
1 - 999
1 000 - 4 999
5 000 - 24 999
25 000 - 99 999
Provincial Capital
0 20 40 60 km
1 : 2 224 700
QUÉBEC
MAINE, USA
Carleton
New-Richmond
Campbellton
Dalhousie
Charlo
Athorville
Balmoral
Chaleur Bay
MISCOU ISLAND
ILE LAMÈQUE
Lorne
Grande-Anse
Caraquet
Pointe-Verte
Petit-Rocher
Nepisiquit Bay
Bertrand
Shippegan
Beresford
Paquetville
Bathurst
Tracadie
Cabano
Kedgwick
Restigouche River
St-Quentin
St-Jacques
Edmundston
Rivière-Verte
Ste-Anne-de-Madawaska
Clair
St-Léonard
Nepisiguit River
Neguac
Miramichi Bay
Grand Falls
Chatham
Newcastle
Chatham Head
Nelson-Miramichi
Tignish
Gulf of St Lawrence
KOUCHIBOUGUAC
Plaster Rock
Perth-Andover
Presque Isle
Blackville
Rogersville
St-Louis-de-Kent
Richibucto
PRINCE EDWARD ISLAND
Saint John R
Miramichi R
Doaktown
Buctouche
Summerside
Souris
Northumberland Strait
Bristol
St-Antoine
Hartland
Stanley
Salmon R
Shediac
Cap-Pelé
Borden
CHARLOTTETOWN
Woodstock
Chipman
Minto
Moncton
Cape Tormentine
Port Elgin
Nackawic
FREDERICTON
Grand Lake
Salisbury
St-Joseph
Petitcodiac R
Hillsborough
Petitcodiac
Dorchester
Sackville
Canterbury
Oromocto
Gagetown
Harvey
Chiputneticook Lakes
Sussex
Amherst
Springhill
New Glasgow
Stellarton
McAdam
Fredericton Junction
Kennebecasis R
Norton
Alma
FUNDY
Shepody B
Cumberland Basin
Chignecto Bay
NOVA SCOTIA
St Croix River
Hampton
Quispamsis
Rothesay
Westfield
Grand Bay
Saint John
St Martins
Minas Channel
Cobequid Bay
Minas Basin
St Stephen
St George
Lepreau
St Andrews
DEER I.
Blacks Harbour
CAMPOBELLO ISLAND
Bay of Fundy
Kentville
Middleton
Bangor
GRAND MANAN ISLAND
Grand Harbour
Digby
Dartmouth
HALIFAX
ATLANTIC OCEAN

New, Chester William, university teacher, historian, biographer (b at Montréal 9 Oct 1882; d at Hamilton, Ont 31 Aug 1960). Raised and educated in Hamilton, New was a graduate of U of T and McMaster. Ordained a Baptist minister, he served a brief pastorate before embarking on graduate work in history, some at Oxford and in Germany but the bulk of it at U of Chicago. His first teaching post was at Manitoba's Brandon College, then an affiliate of McMaster. In 1920 he joined the latter as professor of history and department head, a position he occupied until he retired in 1951. His colourful teaching style, renowned absentmindedness, and keen backing of intercollegiate athletics endeared him to generations of students. Apart from his widely used high-school history textbooks his best-known works were *Lord Durham* and *Henry Brougham* (published posthumously). He was a fellow of the RSC. CHARLES M. JOHNSTON







New Brunswick

Capital: Fredericton
Motto: Spem Reduxit ("Hope was restored")
Flower: Purple violet
Largest Cities: Saint John, Moncton, Fredericton, Bathurst, Edmunston, Campbellton
Population: 696 000 (1981c); rank eighth, 2.86% of Canada; 50.5% urban; 47.3% rural nonfarm; 2.2% farm; 9.7 per km² density; 1.8% increase from 1976-81; Jan 1984e pop, 710 500
Languages: 68% English; 31.4% French; 0.6% Other
Entered Confederation: 1 July 1867
Government: Provincial — Lieutenant-Governor, Executive Council, Legislative Assembly of 58 members; federal — 10 senators, 10 members of the House of Commons
Area: 73 436 km², including 1344 km² of inland water; 0.7% of Canada
Elevation: Highest point — Mount Carleton (820 m); lowest point — sea level along northern and eastern coasts
Gross Domestic Product: $6.6 billion (1982e)
Farm Cash Receipts: $195.1 million (1982)
Value of Fish Landings: $78.263 million (1983 prelim total); $67.377 million (1982 total)
Electric Power Generated: 11 588 106 MWh (1983)
Sales Tax: 10% (1984)

New Brunswick is one of 3 provinces collectively known as the "Maritimes." Joined to Nova Scotia by the narrow Chignecto Isthmus and separated from Prince Edward Island by the Northumberland Str, NB forms the land bridge linking this region to continental N America. It is bounded in the N by Québec and in the W by the US (Maine), and its history has often been influenced by the activities of these powerful neighbours. Successively part of an Algonquian cultural area, of French ACADIA, and of British Nova Scotia, it achieved separate colonial status only after the arrival of LOYALIST refugees from the American Revolution. In 1784 the British divided Nova Scotia at the Chignecto Isthmus, naming the W and N portion New Brunswick after the German duchy of Brunswick-Lunenburg, which was also ruled at the time by King George III of England. NB was one of the 4 original provinces, its entry being essential to CONFEDERATION. Its influence declined sharply with the rise of the West and the central cities; yet it has survived a series of economic crises to develop progressive communities with enviable life-styles. The return of Acadians expelled during the SEVEN YEARS' WAR (1756-63) and the immigration of French from Québec created tensions between the 2 language groups. The trend in recent years has been towards tolerance and an increasing acceptance of duality in public institutions. NB is now the only officially bilingual province in Canada.

Land and Resources

The area of New Brunswick is 73 437 km². The principal regional divisions are the watershed of the Bay of FUNDY, centering on the SAINT JOHN R valley, and the N and E shores. The Saint John R offered early access to much of the best farmland and timber resources of the province. Occupied by the descendants of Loyalists and other immigrants from Great Britain and the US, the valley has been inhabited mainly by Protestants who, until the 1960s, tended to dominate the government, and the educational and commercial institutions of the province. The residents of N and E shores, living in coastal fishing villages and interior lumbering settlements along the rivers, have been separated physically from the valley communities by uplands and belts of forest, and separated culturally by their predominantly French language and Catholic religion.

The 2 major divisions include several subregions. In the NW the French-speaking population of Madawaska County, looking to Québec for intellectual leadership and conscious of common interests with neighbouring Americans, talk of a "republic of Madawaska." Residents of Carleton and Victoria counties on the upper Saint John have a sense of community based on their virtual monopoly of the potato industry and strengthened by their strong commitment to evangelical religions. In the SW at the mouth of the Bay of Fundy lies Charlotte County, distinguished in part by its fisheries, including a unique sardine fishery, and by strong tourist and other ties with the US. There is another division at the head of Fundy, where Albert and Westmorland counties encompass an anglophone population conscious of its central location in a Maritime region, while the Acadian community of Westmorland and Kent counties aspires to the leadership of the French in the province. An anomaly in the regional division is the Miramichi section of Northumberland County, which as a traditionally English-speaking, mixed Catholic and Protestant area, bisects the Acadian community of the northern and eastern shores. In the N, Gloucester and to a lesser degree Restigouche counties form a heartland of Acadian culture.

Geology New Brunswick's rock foundation was largely formed in the Paleozoic era, 600 to 225 million years ago. It was part of a geological formation extending from the southeastern US to Newfoundland. Much of the rock in northern and western NB was created through ocean deposits of the Ordovican period (500-430 million years ago). These rocks were folded, intruded with granites, and overlain with lavas which reflected sporadic volcanic activity throughout the Paleozoic era. They contain the zinc-lead-copper deposits of the Bathurst to Newcastle area. Folding, faulted movements and volcanic activity reached a climax over 350 million years ago in what has been called the Acadian orogeny. Much of the base of the central and eastern parts of the province originated in the later Carboniferous period (ending 275 million years ago) with the rocks formed in rivers, swamps and shallow basins. These included red, green and grey sandstones, some of which are coal-bearing, and conglomerates and isolated deposits of limestone, gypsum, salt and oil-bearing shales.

Surface New Brunswick topography is characterized by northern uplands, rising to 820 m and mountainous in appearance, gently rolling hills in the centre and E, sharp hills on the southern coast sloping down to tidal marshes and a lowland plain in the SE. The soils tend to be thin and acidic over the uplands, deeper but frequently poorly drained and acidic in the centre and W, and rocky in portions of the S. The best soils tend to lie in intervale lands along the rivers. The upper Saint John is flanked by low plateaus of well-drained sandy loam with good lime content — excellent for growing potatoes. The finely textured soils of the Fundy lowlands are also suitable for agriculture. Whatever their agricultural deficiencies, NB soils do grow trees. Only 7% of the province is cleared land; 2% is covered with water; and 2% is regarded as barren wasteland, leaving almost 90% of the province under forest cover. Of this, 38% is softwood, 14% is hardwood and the remaining 48% is mixed, with softwood predominating in about half. Spruce and fir are the leading softwoods, followed in importance by cedar and white pine. Jack pine, red pine, hemlock and larch are also present. The hardwoods are led by red and sugar maples, poplar, white and yellow birch and beech in that order, with occasional ash, elm, hop hornbeam and red oak.

Water No part of New Brunswick is more than 180 km from the ocean, the principal means of early transportation. An extensive river system brought access well into the interior of the province, permitting early development of the timber trade and dictating patterns of settlement. The largest cities are located on the rivers, as are most of the towns and villages. Lakes are common in the S, with the largest, Grand Lk, more than 30 km in length.

Climate New Brunswick's climate tends to be continental, though tempered by proximity to the ocean. It is harshest in the NW where more than one-third of precipitation comes as snow, and temperatures are several degrees colder than the central interior. Coastal communities are several degrees warmer in winter and colder in summer, with annual snowfalls of only 15 to 20% of precipitation. The average frost-free period varies from about 100 days in the NW to 170 along the Fundy coast.

Resources The forest is the province's greatest



Near Bath in the Saint John Valley (*courtesy New Brunswick Tourism*).

natural resource, supporting lumbering, pulp and paper, hunting and fishing as well as the tourist industry. Second in importance are mineral deposits, which include the base metals near Bathurst in the N, potash deposits near Sussex in the S, significant coal reserves in the area of Grand Lk, oil shales in Westmorland County and recent gold discoveries along the Bay of Fundy. Third comes agriculture, with substantial potato production on the northern Saint John, and dairy and mixed farming largely in the river valleys. Fisheries rank 4th with ground fish, lobster, crab and herring taken from the Bay of Fundy, Northumberland Str and eastern shore fisheries. Both agriculture and fisheries support a substantial food-processing industry. The rivers, especially the Saint John in utilities at Mataquac, Beachwood and Grand Falls, have yielded significant portions of the province's energy needs. Still to be assessed is the energy potential of the Bay of Fundy tides which rise from 4.6 m at the entrance to 15.2 m at the head of the bay. Fish and game offer a recreational resource to resident and visiting sportsmen. Trout are caught throughout the province; bass and pickerel are available in southern lakes. In 1980, 37 837 bright salmon were taken by 20 633 licensed anglers and 96 674 licensed hunters reported a white-tailed deer kill of 18 344. Bear, ducks, geese and ruffed grouse are also hunted. A limited kill of moose is permitted. In recent years winter angling has been developed in 135 lakes and ponds. Approximately 1000 licensed trappers take furs (wildcat, beaver, fox, coyote, mink, muskrat, weasel, raccoon, otter, fisher, martin and lynx) valued at more than $2 million.

Conservation Forest conservation efforts by provincial and federal governments have included forest inventories in 1958, 1968 and 1979, active suppression of forest fires, aerial attacks on the spruce budworm, replanting of forests and the maintenance of numerous game reserves. The most recent inventory reported a sharp reduction in burnt-over areas, an apparent increase in reforestation (the Department of Natural Resources reported planting 26 million seedlings on crown lands in 1980 and making available another 1.7 million for small freehold owners from provincial nurseries at Kingsclear, Madran and Kent), but an overall decline of approximately 5% in merchantable softwood. The decline was attributed to higher levels of harvest and the ravages of the spruce budworm. Shortages were also reported in hardwood available for veneer and sawlogs. The budworm, a moth whose larvae in summer months devour the needles of spruce and fur, did serious damage to provincial forests in the 1920s and then departed. Since 1952 the province has met a later outbreak with aerial spraying of pesticides which killed a portion of the budworms and their natural predators. However, the budworm's persistence as well as the potential damage to human health in the spray present the province with an acute dilemma.

In the 1970s salmon angling improved markedly with the federal ban on commercial salmon fishing. The war continues against poaching with the arming of wardens, the tagging of legally caught salmon, and jail sentences and vehicle confiscation for night hunters. Attempts to protect fish and game, and to assert an overriding provincial jurisdiction have brought wardens into conflict with Indians trying to defend traditional treaty and aboriginal fishing and hunting rights. The federal Department of Fisheries attempts to protect fishing stocks by the rotation of lobster seasons, by limiting commercial fishing licences and placing quotas on particular species, and by the division of fishing grounds.

People

New Brunswick's initial European settlers were Acadian French who, with the use of dikes, farmed the marshlands of the Chignecto Isthmus and part of the northern shore of the Bay of Fundy. Following their expulsion (1755 onwards) their lands were taken by Protestant settlers from New England, Pennsylvania and Yorkshire, Eng. When the Acadians tried to return after the Peace of Paris in 1763, some were granted land in the Memramcook area and some found employment in fishing stations from the Gaspé to Cape Breton. When the Loyalists arrived, most of the Acadians on the lower Saint John pushed up the river to Madawaska. The Loyalist exiles, approximately 14 000 in number, penetrated the interior largely by way of the Saint John R. Essentially a cross section of society in the Thirteen Colonies, they included a very few college graduates and Anglican clergy and close to 1000 blacks, most of them slaves of wealthy Loyalists but some, perhaps a third, Loyalists in their own right. About 200 blacks later left for Sierra Leone and the remainder were joined by refugee blacks from the War of 1812. Although the Loyalists overwhelmed the perhaps 3000 residents of NB on their arrival, they too were diluted in the first half of the 19th century by immigrant waves of Scots and Irish who found employment in a burgeoning lumber industry. Forced to compete with cheap immigrant labour, older settlers frequently left. In the depression of the traditional timber and shipbuilding economy in the 1880s, it was the turn of the Irish and Scots to seek employment elsewhere. The growth of cities outside the region and the collapse of the new industrial economy in the 1920s continued to drain the population of most of its natural increase. Acadians, who were more resistant to economic pressures to leave, and were bolstered by immigration from Québec, consolidated their hold on the northern counties as railways opened new lands for colonization. The trend to urbanization changed NB from more than two-thirds rural before 1941 to predominantly urban by 1971. Then came a reversal as the officially designated urban population dropped from 62% to 53% in the decade, owing to a resumption of migration from the region as well as a residential move to the suburbs, which had been made attractive by improved services, cheaper land and lower taxes.

Urban Centres New Brunswick's chief metropolitan area is SAINT JOHN (pop 114 048). A leading centre of British North America in the mid-19th century, the city owed its importance to the timber trade (made accessible by its river) and to its ice-free port, which supplied the estuary and dominated shipping and shipbuilding on the Bay of Fundy. Saint John's metropolitan pretensions were flawed by its failure to secure the provincial capital or the university and undermined by NB's entry into a nation whose interests were continental rather than maritime. Saint John's current urban status is largely industrial, based on an oil refinery, pulp and paper mills, a nuclear power plant, dry dock facilities and a major container port. Second in importance as a metropolitan region is MONCTON (pop 98 354), which has long owed its importance to transportation and distribution facilities (headquarters of the Atlantic division of the CNR and a trucking centre). It is also the traditional headquarters for the Acadian media and financial institutions and in the 1960s became the site of a provincial francophone university. Ranking third, FREDERICTON (pop 64 439) gained its importance from Saint John's deficiencies — the provincial government and university. When the civil service and universities mushroomed in the 1960s and early 1970s, so did Fredericton. A neighbouring town, OROMOCTO (pop 13 648), the headquarters for CFB GAGE-



Le Village Acadien at Caraquet, NB, preserves traditional Acadian buildings (*photo by Malak, Ottawa*).

TOWN, reflects in its growth and decline the shifting status of the Canadian Armed Forces. BATHURST (pop 24 267), EDMUNDSTON (pop 21 901) and CAMPBELLTON (pop 15 508) emerged as largely single-industry towns when NB made the transition from sawlogs to pulp and paper manufacture. With base metal mining, a zinc reduction mill, and with a port at nearby Belledune, Bathurst is now becoming the industrial leader of the N.

Labour Force By occupation New Brunswick's labour force breaks down as follows: managerial and professional, 20%; clerical, 15.4%; sales, 10.4%; service, 14.3%; primary occupations, 6.1%; processing, 13.9%; construction, 10%; transportation, 4.6%; material handling, 4.3%. Service industries are the principal employers accounting for almost 50% of jobs available. Utilities at 10.8% and public administration at 8.1% make the non-goods-producing sector responsible for more than 68% of jobs. The primary industries of forestry, mining, fisheries and agriculture provide the base for most of the 14.6% of positions in manufacturing.

New Brunswick's potential labour force of persons over 15 years totalled 484 150 in 1976. The official participation rate of 54% was 7% under the national average. The rate was much higher in the 25-to-44 age brackets, approximating 88% for men and 47% for women. Participation rates were highest, approaching national levels, in the Saint John R valley and lowest (under 50%) in the northern counties of Gloucester, Northumberland and Restigouche. Participation rates correlated with difficulty in entering the labour force. Unemployment was highest in the northern counties. From 1976 to 1981 NB's unemployment rate, despite a 13.74% growth in jobs over that period averaged 12%, approximately 4% above the national level. Traditionally, young New Brunswickers have emigrated to find employment. Not since Confederation has the province held its entire natural increase and the 1960s recorded a net loss of 59% "going down the road." Emigration declined in the 1970s as the first half of the decade saw New Brunswickers return (though the second half saw a resumption of the exodus, when Alberta replaced Toronto as a principal attraction).

Language Of the total population of 696 400, 65% gave their mother tongue as English and 33.6% French in the census of 1981. Another 4870 cited European languages, 2055 Asian. Approximately 4000 were native Indians. Provincial language legislation is intended to provide equality between the 2 official languages. Institutional backing for the language legislation is provided by 2 parallel educational systems, including a French university with its own law school and other professional schools, and by the hiring of specially trained court interpreters, the creation of unilingual French schools wherever the lure of playground English seemed too strong, and the construction of French cultural centres in Fredericton, Saint John and Newcastle.

The children of the province's 2584 Micmac and 1438 Maliseet Indians attend regular provincial schools and receive other provincial services, including medical treatment, foster care for children, and forestry protection and roads for the 15 occupied reserves — all at federal expense. Indians are exempt from the 10% sales tax but pay other provincial taxes. The province supports Indian athletic events and has adopted a policy of affirmative action in assisting Indians to obtain jobs. The province, to date, has refused to recognize land claims of the Union of New Brunswick Indians.

Ethnicity The population of French origin grew dramatically after Confederation; from 44 907 or 15.72% in 1871 to 24.15% in 1901 and 33.56% in 1931. By the latter decade the figures for those of French origin and those giving French as their mother tongue (32.67%) had begun to diverge, suggesting a degree of assimilation. The gap had widened by 1961 when 38.82% gave French as their ethnic origin compared with 35.21% as their mother tongue. In 1971, following a period of declining birth rates, figures for ethnic origin dropped to 37% and for mother tongue to 34%, while only 30% reported French as the principal language in the home. By 1981 the Acadian population appeared to have stabilized, with a slight decline in these percentages in the recent census.

Other ethnic groups in 1871 included 29.27% English, 35.24% Irish and 14.31% Scots. These were highly represented in the emigration patterns of the depression of the 1880s and in subsequent rural depopulation. By 1971 only 57.6% of New Brunswickers gave their ethnic origin as British. Relative changes were also suggested by the rise of the percentage of French origin in the Roman Catholic Church from 46.8% in 1871 to 72.4% in 1961. Other New Brunswick ethnic groups in 1971 included Germans, 7350; Dutch, 4475; Scandinavians, 2985; Asians, 1400; Italians, 970; Jews, 765; Ukrainians, 525; and Poles, 450.

Religion In 1971, 52.2% of New Brunswickers professed adherence to the Roman Catholic Church. Of these 68.2% were of French origin inhabiting the northern and eastern shores. Of the remainder almost half resided in Saint John. Of the leading Protestant denominations, Baptists accounted for 14%; United, 13.4%; Anglican, 10.9%; Pentecostal, 2.7%; and Presbyterians, 2.1%. The Anglicans were concentrated in the lower Saint John R valley. Baptists and Pentecostals were strong in the so-called bible belt from Victoria and Carleton E to Albert and Westmorland. The United Church, bearing both Methodist and Presbyterian traditions, was scattered throughout the English-speaking sections. Other religious groups included Salvation Army (2185), Lutheran (1880), Jewish (850), Ukrainian Catholic (700), Greek Orthodox (375), with "others" listed in the census totalling 11 885 and an identical number listed as having no religious affiliation.

Economy

Since the early 19th century timber has dominated the New Brunswick economy. The province, like the Maritime region as a whole, underwent severe economic dislocation in the latter half of the 19th century as a declining shipbuilding industry, stagnant timber markets and increased tariffs struck hard at the outports. New railways and the rise of manufacturing towns failed to compensate for losses in the older industries. The 1920s saw a decline of the industrial towns, as their industries were closed down after takeovers by central Canadian competitors or were adversely affected by national policies and hindered from competing in national markets. By the 1930s pulp and paper mills had surpassed lumber in importance and their rise encouraged the development of hydroelectricity. Nevertheless, farm and fishing activity declined and emigration rates remained high in succeeding decades. Government campaigns for economic development in the 1960s and early 1970s, although not always successful, have seen the expansion of forest industries, the advent of a new and important mining industry, modernization of fisheries and farming, increased manufacturing based largely on local resources and the cultivation of tourism.

Agriculture The vicissitudes of agriculture in New Brunswick, as elsewhere in Canada, reflect a relative decline in the value of agricultural products and the abandonment of near-subsistence farming by rural people drawn to the attractions of a consumer economy. Although total production remained stationary, farm holdings declined from 31 899 in 1941 to 4551 in 1976; improved land went from 350 000 ha to 137 000 ha; and direct agricultural employment dropped from 26 834 in 1951 to an estimated 6000 in 1960. Meanwhile, the numbers employed in the processing and transportation of agricultural produce has grown to an estimated 18 000.

POTATOES, especially seed potatoes, are the province's chief agricultural export and account for 20% of the national total. Production is concentrated along the upper Saint John R valley with Carleton and Victoria counties accounting for approximately 80% of the crop and Madawaska another 15%. Dairy production is most

New Brunswick Fashionables, at Fredericton, handcoloured lithograph by J.N. Giles, 1834. Fredericton was the early political and social capital of New Brunswick (*courtesy Public Archives of Canada/C-10546*).





Potato fields in New Brunswick (*photo by Karl Sommerer*).

important in Kings, Westmorland and York counties where farmers supply the 3 major cities. Potatoes and dairy products together account for 44% of the province's farm income; beef, poultry and hogs make up another 32% and field crops 13% (fruit 7% and vegetables 6%); eggs and maple products round out the total. Producers are organized under approximately a dozen boards that market milk, turkeys, eggs, hogs, cream, chickens, apples, some forest products, and bedding plants.

Industry The non-goods-producing industries of New Brunswick account for 65% of the province's Gross Domestic Product, about 5% higher than the national average, and yield over 70% of the total wages and salaries. Of 289 000 jobs in 1980, 23 000 were in transportation, communication and other utilities; 8700 in finance, insurance and real estate; 60 000 in community, business and personal services, including educational and medical services; 35 000 in retail and wholesale trade, of which the annual retail value exceeds $2 billion, and 40 000 in public administration and defence exclusive of crown corporations. Included in public administration were 4172 military personnel, chiefly located at CFB Gagetown, a training base for land forces, and at an air force base near Chatham.

The tourist industry in 1980 yielded revenues estimated at $257 million and accounted for 12 600 "man years" of employment. To such attractions as Saint John's reversing falls, the potted-plant-shaped rocks on Albert County's Fundy coast, the tidal bore of the Bay of Fundy, and rugged forest and coastal scenery, the provincial government added highly successful recreations of historical communities: a Loyalist settlement, KINGS LANDING, near Fredericton and the Acadian Village at CARAQUET; the government has also created or drawn attention to more than 60 museums, restored fortifications and other sites of historic interest around the province. Two major national parks, Fundy near Alma and Kouchibouguac near Richibucto, are complemented by 58 provincial parks, several of which operate year-round. These encourage tourists to pause in their tours of the Maritime region and they enhance the quality of life for local residents.

Manufacturing industries are largely based on the processing of primary products produced locally. Forty-one percent of their net value of production is related to the forest industry. Food and beverage processing, notably the McCain enterprises at Florenceville and Grand Falls, ranks 2nd in gross value of factory shipments. The Irving oil refinery in Saint John, the Brunswick Mining and Smelting in Bathurst, and the Saint John drydock are the other large producers. A $3 billion contract for the building of patrol frigates for the Canadian navy was awarded to a Saint John firm in 1983. Significant too are chemical products, the processing of non-metallic minerals, metal fabricating and printing and publishing. Altogether in 1980 manufacturing employed 34 000 in approximately 1250 firms with an annual output valued at $3.5 billion. Over 800 have fewer than 25 employees. Ninety percent of all firms are owned locally while only 4%, accounting for 8% of the jobs, are foreign owned.

The construction industry employed 17 000 in 1980 and represented an investment of close to $1 billion. For most of the decade the nuclear plant at Point Lepreau was the largest project. By the end of 1981 major construction activity included the modernization of pulp and paper plants, potash developments near Sussex, a Mitel electronics plant near Buctouche and shipyard expansion at the port of Saint John.

Mining Mining was traditionally of scant importance in New Brunswick. The gypsum, granite and grindstones included among 19th-century exports were largely of local significance. Although coal led to a rapid development of the Grand Lk region, especially with the arrival of the railroad in 1903, that area never yielded enough to make the province self-sufficient. With coal's loss of status to oil and hydroelectricity, coal mining had come to a virtual halt by the mid-1960s. The energy crises of the early and mid-1970s led to coal's recovery through strip-mining, but by then coal was upstaged by mineral developments in the NE. The discoveries of extensive base-metal reserves in the Bathurst-Dalhousie region in the 1950s have raised the mining industry to a position of major importance. By 1981 the value of NB's mineral output exceeded half a billion dollars and directly employed 4000 men. NB's zinc production was 34% of the national total; silver 24.3%, lead 13.2%, copper 6.3% and antimony and bismuth were 92% and 78.9% respectively. Expansion continues with major potash developments near Sussex and gold discoveries near the Bay of Fundy. The growth of the mining industry has brought development into the poorest section of the province and has largely justified in economic terms the upgraded transportation, education, health and other services launched in the 1960s program of equal opportunity.

Forestry The forest which now covers almost 90% of the province has traditionally dominated the New Brunswick economy. Accessible rivers and a British preferential tariff led to the rapid development of the timber industry early in the 19th century as the white pine was slashed for British marine and domestic needs. Closely integrated with the timber trade was a widely diffused shipbuilding industry which both absorbed forest products and facilitated their access to markets. In the mid-19th century, forest products accounted for more than 80% of the province's exports. The timber trade had declined by the end of the century and the province lost markets from a shrinking West Indian economy, new American tariffs and fresh competition from W coast timber. These problems were only partially alleviated in the rise by the late 1920s of a vigorous pulp and paper industry. By the end of the 1970s the forest industry accounted for 14% of the jobs in the province, 38% of provincial exports and almost one-quarter of goods produced. Pulp consumed 80% of the timber harvested with the remainder going for lumber and similar products. Lumber mills tended to be small, with a majority contributing only 5% of production. Pulp mills demanding large capital outlays and a large work force have been major factors in the urban development of the province. Three pulp mills, controlled by the Irving interests, at or near Saint John, produce sulphate pulp, newsprint, tissue and materials for corrugated cardboard cartons. Mills at Newcastle and South Nelson produce sulphate pulp and pulp and paper respectively. Consolidated Bathurst's mill at Bathurst produces sulphate pulp and corrugated medium. The New Brunswick International Paper Company operates a newsprint mill at Dalhousie, and Fraser's Incorporated, a member of the Noranda group, has plants near Campbellton and Edmundston. Others include a hardwood pulp mill at Nackawic and a paper bag company at Barker's Point.

Of the 6 million ha of productive forest land, 52% is privately owned. The remaining 48% owned by the Crown has traditionally been leased to the larger firms. The 34% of woodland held in small parcels has supplied an important source of income for farmers and fishermen. The forest industry has also been the inspiration for a forest management school at Fredericton, a forestry faculty at U of New Brunswick, and for federal and provincial research laboratories in the province. The recognition of the potential limits of resources for which many are competing has led governments to abandon the leasing of crown lands in favour of long-term guarantees of timber to major producers.

Fisheries The fisheries of New Brunswick account for about 17% of the production of the Canadian E coast fisheries. In decline until the 1960s, the industry was revived by a modernization of methods and vessels. Additional enthusiasm was generated by expectations of a 200-mile (370 km) limit, finally asserted in 1977. Recent years have seen a decline in volume associated with a general reduction of fish stocks, although prices rose sharply in the late 1970s. The main fishing areas are the Gulf of St Lawrence, Northumberland Str and the Bay of Fundy. In 1980 the total value of the catch was $48.7 million by 5200 fishermen operating 3100 vessels. In processed value, herring led at $67.8 million; lobster was 2nd at $40.8 million, and crab and cod followed with values of $32.2 and $13.7 million respectively. Exports accounted for almost half of the production with 64% going to the US, 18.5% to Europe and 8.2% to Central America. The fish-processing industry employed 10 000 workers in 130 plants in the province.

Finance Most financial institutions, such as banks and trust and insurance companies,

are local branches of central Canadian firms. Among the few exceptions are local credit unions and the Compagnie assomption mutuelle d'assurance-vie, largely an Acadian institution with its headquarters at Moncton.

Transportation Far from central markets and with their chief city aspiring to national port status, New Brunswickers have traditionally shown great concern about transportation. They have protested disproportionately high railway freight-rate increases, loss of regional autonomy in the federally owned Intercolonial Railway and a failure to channel Canada's winter trade through Canadian ports. In 1927 their region won a partial victory in the Maritime Freight Rates Act, which provided for statutory reductions in freight rates. In that year they created the Maritime Freight Rates Commission (now the Atlantic Provinces Transportation Commission) at Moncton, as a permanent watchdog of regional interests in transportation policy. In 1969 the Maritime Freight Rates Act was repealed in favour of one creating a regional committee to administer transportation subsidies to encourage industrial development. By then transportation had become much more complex as highway trucking surpassed the railways in the carriage of freight. Airplanes and buses carried the bulk of public passengers. The advent of containerized traffic, for which the ice-free facilities of the port of Saint John were particularly well suited, encouraged a renewed struggle for enhanced status as a national port.

Currently, New Brunswick has 2 major railways systems: the CPR which runs through the US state of Maine and whose eastern terminus is Saint John, and the CNR whose regional headquarters is Moncton and main terminus is Halifax. Passenger service operated for the 2 lines by the crown corporation VIA RAIL has been reduced to a train a day from and to central Canada, and rail-liner service between Fredericton, Saint John, Moncton and Campbellton.

Saint John, Moncton and Fredericton have major airports with sophisticated navigational aids. Other licensed public airports include Charlo, St Leonard, Edmundston, Woodstock, Bathurst, Pokemouche, Chatham and St Stephen. Service to central Canada is provided by Air Canada and Eastern Provincial Airways. The latter provides a network of flights within the province and region. There are also more than 2 dozen landing strips maintained for forest protection or private use.

SMT, an Irving-owned firm, supplies the major bus service within the province, connecting with Acadian at Amherst, Voyageur at Edmundston, and Greyhound at St Stephen. During the last 5 years, aided by federal and provincial funds, municipally owned urban transit has been maintained in Saint John, Moncton and Fredericton. There are also several local bus lines.

Saint John is the major port with year-round service for containerized and bulk traffic. Its busy season has traditionally been the winter, when the St Lawrence R is frozen over. It is served by 9 container shipping lines with access to ports in more than 100 countries. Conventional steamship services are provided monthly and bi-monthly by 22 lines to most regions of the world. Ten other ports dot the NB shoreline, of which Caraquet is an important fishing centre, Chatham-Newcastle an outlet for fish and timber exports, and Belledune the major outlet for the base-metal industry.

Energy New Brunswick was better off than her Maritime and New England neighbours at the end of the cheap oil era signalled by the OPEC cartel and the shortages of 1973-74 and 1979-80. The publicly owned New Brunswick Power Commission had built, with federal assistance, a major dam on the Saint John R near Fredericton which had more than doubled the province's electrical capacity from that source. Limited coal reserves in the Grand Lk area proved accessible to strip-mining. A few New Brunswickers had not made the transition away from wood in heating their homes and for many the change back was not difficult. In 1970 the NB government had already committed the province to nuclear energy through the construction of a CANDU reactor at Point Lepreau. Nevertheless, in 1981 oil was still dominant, accounting for 72% of energy consumed, compared with 11.6% for hydro, 11% for wood, 4.5% coal and 1% coke and natural gas. Even subtracting the oil used in transportation, oil still supplied 60% of the energy for manufacturing, heating and other domestic use.

The major producers of energy are the Irving refinery at Saint John, whose capacity is approximately double the province's requirements, and the NB Power Commission, which maintains major oil-fired thermal units at Coleson Cove and Courtney Bay, and two largely coal-fired units at Grand Lk and Dalhousie. The major sources of hydro are the Mactaquac, Beachwood and Grand Falls utilities. A tradeoff exists as oil-generated electricity exported to Maine virtually equals the hydroelectricity imported from Québec. The Point Lepreau nuclear reactor has recently entered production, delivering 141 000 megawatt hours daily (or about 50% of normal provincial consumption) operating at 95% capacity. Half of this is committed to sale in the US to recover costs of construction which greatly exceeded estimates. Additional options currently under consideration include a second nuclear reactor, a natural gas pipeline through the Maritimes, and an increase in hydro production by raising the levels of existing dams.

Government and Politics

New Brunswick's titular head of state is the LIEUTENANT-GOVERNOR. Appointed by the federal government and officially representing the Queen, his duties are largely ceremonial. Power resides with the premier, the leader of the party or coalition having a majority of support in the 58-seat elected legislative assembly. The premier presides over a 23-member Cabinet, each member of which normally heads a provincial department or, in one case, a crown corporation, the NB Electric Power Commission. The assembly, elected within 5-year intervals, is ordinarily sovereign within its spheres of responsibility. These spheres have been outlined in the BNA Act (CONSTITUTION ACT, 1867), subsequent amendment and interpretation; the province is also subject to the CANADIAN CHARTER OF RIGHTS AND FREEDOMS which recently accompanied Canada's assertion of authority in the amendment of its own constitution. Women achieved the provincial vote in 1919, but were not entitled to run for provincial office until 1934. They currently hold 4 seats in the assembly and 3 positions in the Cabinet.

Lieutenant-Governors of New Brunswick 1867-1984

Name	*Term*
Charles Hastings Doyle	1867
Francis Pym Harding	1867-68
Lemuel Allan Wilmot	1868-73
Samuel Leonard Tilley	1873-78
Edward Barron Chandler	1878-80
Robert Duncan Wilmot	1880-85
Samuel Leonard Tilley	1885-93
John Boyd	1893
John James Fraser	1893-96
Abner Reid McClelan	1896-1902
Jabez Bunting Snowball	1902-07
Lemuel John Tweedie	1907-12
Josiah Wood	1912-17
Gilbert White Ganong	1917
William Pugsley	1917-23
William Freeman Todd	1923-28
Hugh Havelock McLean	1928-35
Murray MacLaren	1935-40
William George Clark	1940-45
David Lawrence MacLaren	1945-58
J. Leonard O'Brien	1958-65
John Babbitt McNair	1965-68
Wallace Samuel Bird	1968-71
Hédard J. Robichaud	1971-82
George Francis Gillman Stanley	1982-

Premiers of New Brunswick 1866-1984

Name	*Party*	*Term*
Peter Mitchell		1866-67
Andrew Rainsford Wetmore		1867-70
George Luther Hatheway		1871-72
George Edwin King		1872-78
John James Fraser		1878-82
Daniel Lionel Hanington		1882-83
Andrew George Blair	Liberal	1883-96
James Mitchell	Liberal	1896-97
Henry Robert Emmerson	Liberal	1897-1900
Lemuel John Tweedie	Liberal	1900-07
William Pugsley	Liberal	1907
Clifford William Robinson	Liberal	1907-08
John Douglas Hazen	Conservative	1908-11
James Kidd Flemming	Conservative	1911-14
George Johnson Clarke	Conservative	1914-17
James Alexander Murray	Conservative	1917
Walter Edward Foster	Liberal	1917-23
Peter John Veniot	Liberal	1923-25
John Babington Macaulay Baxter	Conservative	1925-31
Charles Dow Richards	Conservative	1931-33
Leonard Percy de Wolfe Tilley	Conservative	1933-35
A. Allison Dysart	Liberal	1935-40
John Babbitt McNair	Liberal	1940-52
Hugh John Flemming	Conservative	1952-60
Louis J. Robichaud	Liberal	1960-70
Richard B. Hatfield	Conservative	1970-

The courts of New Brunswick have been in a period of transition. The basic structure was a Supreme Court (divided between Appeals and Queen's Bench), county courts, and courts presided over by provincial magistrates. Under the BNA Act the first 2 levels were appointed and paid for by the federal government; the third by the provinces who were responsible for the "administration" of justice. In reforms of the 1960s the province assumed the costs for local courts. In 1979, with federal co-operation, the county or district courts were amalgamated with courts of Queen's Bench. Recently, through a family division of the Queen's Bench, NB has been experimenting with an integrated family and juvenile court system. Under the Official Languages Act, French and English were guaranteed judicial services in their own language. Since 1967 an ombudsman has investigated citizens' complaints against public agencies and officials.

Local Government As part of its so-called "equal opportunity" reforms of the 1960s, the Liberal government of Louis ROBICHAUD abolished the 15 county councils and restricted the responsibilities of the city, town and village councils largely to services for property. Municipal taxes were limited to a percentage of the actual market value of real property in each community. Provincial "equalization" payments assist the poorer municipalities. Property services for rural areas are supplied directly by the province.

Federal Representation In federal politics New Brunswick has traditionally had one representative in the Cabinet and 10 seats in the Senate. It now has 10 seats in the House of Commons; an actual decline of 5 seats since Confederation but a relative decline in its membership of from 8.3% to 3.6% of that body. Occasionally, it has been able to enhance that influence through co-operation with its sister provinces of NS and PEI, although these have experienced a similar decline.

Regional Government Efforts at co-operation for internal development and external influence were formalized in the Council of Maritime Premiers in 1973. In quarterly meetings of the premiers and in agencies such as the Maritime Provinces Higher Education Commission, the 3 provinces sought to establish regional co-operation, possibly moving towards union. Although failures to agree on initial plans for energy, constitutional reform and regional development disappointed many regionalists, co-operation has been achieved in more than 40 areas of administration.

Public Finance In 1982 ordinary revenues totalled $1.8 billion. Major sources included taxes on individual income (14.7%), corporate income (6.3%), sales (17.5%) and real property (9.2%). The provincial personal income tax rate of 55.5% of federal basic tax is, along with the corporate income tax, collected by the federal government for the province. The NB sales tax of 10% exempts clothing, footwear, and equipment used in manufacturing. Approximately one-quarter of total provincial revenues comes from federal equalization payments — a plan intended to help poorer provinces maintain a basic standard of services. About 10% is derived from federal payments in support of established programs, such as hospital insurance, medicare and post-secondary education. Major expenditures include health and social services (33.4%), education (23.9%), municipalities (8.4%) and service of public debt (10.7%). Expenditures for physical assets such as bridges, highways, schools and hospitals are considered capital expenditures and are financed through borrowing. In 1982 these totalled $201 million, of which 53% went for roads and bridges and 37% for schools and hospitals.

Health Although New Brunswick was the first province to establish a department of health, economic difficulties saw its services lag far behind most other provinces until the late 1960s. Today the province is divided into 7 health districts with major regional hospitals at Saint John, Fredericton, Moncton and Bathurst, and 2 under construction at Campbellton and Edmundston. These are supplemented by 33 smaller institutions. Psychiatric care is offered in the home, in chronic care hospitals at Saint John and Campbellton, and in units of the regional hospitals. Hospital and other medical services are provided without premiums under the nationally integrated programs. Small user fees were introduced in 1983. A provincial plan aids people over 65 in the payment of prescription drugs. Almost 4000 senior citizens receive care in provincially subsidized nursing homes. Public health services include nursing, inspection, control of communicable diseases, maternal and child health care, home care, nutrition, tuberculosis control and a home dialysis program.

Politics Since 1900, when party lines had solidified, New Brunswick has had a balanced 2-party system with the Conservatives holding power 43 out of the 83 years. Third parties have fared poorly in provincial politics, despite a United Farmers' Party which won 6 seats in 1920, the CCF which captured 11% of the vote in 1944, the Parti-Acadien which made a strong showing in 2 constituencies in 1978, and the NDP which raised its share of the popular vote to 10.2% in 1982 and elected one candidate. Excepting a lone Progressive elected in 1919, third parties have done little better at the federal level.

The outstanding issues in provincial politics have involved ethnicity and regional disparity. The growth of the population of French origin from 15.7% in 1871 to 38.8% by 1961 has underlain a persistent agitation by Acadian leaders for representation and influence commensurate with numbers. Politicians have occasionally exploited tensions between the 2 linguistic groups, but the winning party has traditionally been that which has been able to win a substantial share of support from both. The election in 1960 of the venturesome young Acadian premier, Louis J. Robichaud, in a conjunction of circumstances conducive to change, contributed to economic and linguistic reforms so rapid and fundamental as to be called revolutionary. The Acadians gained most from the program of equal opportunity, which redistributed incomes from urban centres to a poverty-stricken north, pressed ahead with projects for economic development, and proposed language services to both peoples along the lines of the federal Royal Commission on BILINGUALISM AND BICULTURALISM. Of critical importance to the program's success was the simultaneous attack on regional disparity by federal governments. Despite the opposition of prominent corporations and conservatives appalled at the pace of change, Robichaud remained in power for the decade. Nor did his successor, Conservative and Protestant Richard Hatfield, seek to reverse the trend. Indeed, so enthusiastically did his government implement changes along the lines of the program that his party made increasing inroads in Acadian constituencies, defusing the Parti-Acadien's bid for a separate Acadian province. The drive for economic development slowed by the end of the 1970s, probably less because of public criticism of spectacular failures, such as the Bricklin sports car, than because of the decline of interest by federal governments.

Recent political reforms, including strict conflict of interest laws, mandatory disclosure of financial support and public financing of political parties, has removed some of opportunity and motives for petty political corruption so common in Canadian provincial politics.

Education

The educational institutions of Loyalist New Brunswick began with a strong Anglican bias which stimulated the proliferation of other denominational schools and colleges. The Common Schools Act of 1871, which established free public schools, virtually excluded the Catholics. A later compromise permitted teaching by members of religious orders and religious instruction after school hours. Education, however, remained a flashpoint of tension among religious and language groups in the province.

Administration The educational reforms of the 1960s relieved municipalities of their responsibilities for education and sought full educational services for both French and English in their own languages. The 12 grades of elementary and high school are administered in 40 school districts by local school boards but are financed by the province. Parallel systems for each language group report to 2 deputy ministers acting for the Dept of Education and Dept of Continuing Education. While the latter assumes responsibility for community colleges, the universities and the Ranger School are under the jurisdiction of the Maritime Higher Education Commission, an agency designed by the Council of Maritime Premiers to rationalize higher education offerings and facilities throughout the region. The Fisheries School and the NB Craft School are the responsibilities of other provincial departments. Aid for post-secondary students is provided through provincially administered, partially forgivable, interest-free loans.

Institutions In 1981 the francophone system served 48 569 students in 156 schools under 15 school boards. The anglophone system served 100 288 students in 294 schools under 26 schools boards. There were 10 community colleges with 2934 students enrolled in French-language programs and 8085 in English. Anglophone university programs served 7583 students at UNIVERSITY OF NEW BRUNSWICK (Fredericton and Saint John); at Catholic-affiliated Saint Thomas, which shared library and sports facilities of the Fredericton campus; and at United Church-affiliated MOUNT ALLISON UNIVERSITY (Sackville). Francophone programs served 3081 students at UNIVERSITÉ DE MONCTON and affiliated centres in Edmundston and Shippegan. Recent trends have included pressure for unilingual schools and school boards by francophones, the emergence of a burgeoning French immersion program in the anglophone system (which included 8660 students in 66 schools in 1982-83) and the establishment of private schools by evangelical denominations. Traditional Anglican boarding schools are Rothesay Collegiate and Netherwood School for Girls, both at Rothesay. *See* NEW BRUNSWICK SCHOOL QUESTION.

Cultural Life

New Brunswick has traditionally produced its share of artists and scholars. Bliss CARMAN, Sir Charles G.D. ROBERTS, A.G. BAILEY, Desmond PACEY, W.S. MacNutt, Alden NOWLAN and Antonine MAILLET are a few of the literary and historical figures of international repute. Prominent artists have included John Hammond, Miller Brittain, Alex COLVILLE, Jack Humphrey and Lawren P. Harris. An early interest in science and its practical application was evident in pioneering programs in engineering and forestry at UNB and in the work of the Natural History Society of Saint John. That this tradition continues is indicated by recent reports of breakthroughs in "bionic" artificial limbs and in natural methods of insect control. Fredericton in the 1870s and Saint John by the turn of the century seemed to produce environments particularly suited to creative endeavour. From the 1920s private patrons such as J.C. Webster of Shediac and Lord Beaverbrook (formerly Max AITKEN of Newcastle) helped develop institutional bases for creativity and for popular education through museums, art galleries, playhouses and universities.

Arts In recent decades the universities have been centres of literary and artistic endeavour. Mount Allison is famous for its artists and musicians. UNB has developed journals of national stature in the literary *Fiddlehead* and the historical *Acadiensis*. The U of Moncton has become a centre of research in Acadian studies. Acadian choirs have gained an international reputation for excellence. New Brunswick residents have access to Theatre New Brunswick, a professional theatre company based in Fredericton but offering live theatre in the towns and cities of the province. There are 6 public art galleries. More than 250 authors belong to the NB authors' association. Although the region lacks an effective scholarly press, local publishers produce popular works of fiction, humour, folklore and family and community history.

Communication Daily newspapers include the Saint John *Telegraph-Journal*, the Fredericton *Gleaner* and the Moncton *Times-Transcript* (all owned by the Irving interests). Until its recent bankruptcy, the French-language *L'Evangeline* aspired to be the voice of the Acadians in the region. A senior Canadian magazine, the *Atlantic Advocate*, is published in Saint John. The province receives three major TV sources, the CBC, CTV and Radio-Québec. Cable television (which carries the major American networks, the public television channel of the U of Maine, and FM radio) is available in urban centres. Several Pay TV channels have recently begun service. The CBC radio offers 10 outlets in French and 16 in English. Approximately 400 000 telephones are operated in the province by the NB Telephone Co Ltd, a Bell-dominated company integrated with the TransCanada telephone system.

Historic Sites New Brunswick has 2 public archives and 3 university archives, 2 historical settlements, a national historic park, a share in 2 international historic parks, 21 museums,

13 military restorations or other historic buildings open to the public and over 1000 buildings designated of historical interest. The New Brunswick Museum in Saint John has been an exhibitor of natural history and a collector of newspapers, public records and genealogical records. Since 1967 the Provincial Archives of NB in Fredericton has been the depository of government records, collections of public and private papers and other historical and genealogical materials. Kings Landing, the restoration of a Loyalist settlement up the river from Fredericton, is a spectacular attempt to bring history alive to visitors through the activities of a 19th-century village. The Acadian Village at Caraquet is a recreation of life in another cultural tradition. FT BEAUSÉJOUR, a national historic park located near the NS border, is a restoration of a significant French fort of the mid-18th century. Roosevelt Summer Home and Park on Campobello Island run by a joint Canadian-American Commission includes the Franklin D. Roosevelt summer estate and neighbouring houses, and offers luxury accommodation for small conferences. Recently a second international park has been designated on Saint Croix I, the site of Champlain's first settlement in N America.

Heritage societies have been active in Fredericton, Saint John, Saint Andrews, Chatham-Newcastle and Albert County. Concerns have involved the preservation of city cores and neighbourhoods, covered bridges and buildings of historical significance.

History

The first settlers of New Brunswick were the Micmac whose communities spread from NS and PEI to the S coast of the Gaspé peninsula. From the early 16th century they had developed contacts with the Europeans and established a trade which made them dependent on European technologies and victims of European diseases. The Micmac had long followed a pattern of seasonal migration from hunting grounds in the wooded uplands in winter to gatherings on the shore in summer for shellfishing and social congress. The Maliseet were more direct victims of European expansion. Pushed from their homes in New England, they had found refuge along the Saint John R in the 17th century.

Exploration When the French attempted settlement, first at the mouth of the ST CROIX R in 1604 and later at PORT-ROYAL, they were welcomed by the Micmac who taught them how to survive. After the French had shifted their interest to Québec, the Indians helped a few young men who remained, including Charles de Saint-Étienne de LA TOUR, to establish a fur trade on the Saint John R. The death of Isaac de RAZILLY in 1635, leader of a revived settlement at Port-Royal, occasioned a feudalistic struggle over trade and territory between La Tour, Charles de MENOU d'Aulnay and Nicolas DENYS. On d'Aulnay's death in 1650, La Tour regained control of the Saint John and Denys recovered a fishing and trading post at Miscou harbour and built another at Nipisiquit (Bathurst). After an extensive career in trade and fisheries along the coast of ACADIA, Denys retired to Nipisiquit in 1670 to write an historically important description of Acadia. The Saint John R valley remained Indian territory from which the French launched raids against New England in the 1690s, helping to create a deep-seated and persistent hostility to the French presence in Acadia.

Settlement Meanwhile, the tiny settlement begun at Port-Royal flourished, spreading around the Bay of Fundy to include the Chignecto Isthmus and Shepody on the N shore. The Acadians developed a unique society characterized by a diking technology which enabled them to farm the marshes left by the Bay of Fundy's 15 m tides. Their society was also characterized by neglect from the French authorities, and this encouraged the development of a tightly knit and independent community. Caught in imperial struggle between British and French, most were expelled by the British in 1755 or later and scattered throughout the Thirteen Colonies. Those who returned after the Treaty of Paris in 1763 found their lands occupied by several thousand immigrants, largely from New England. Some received grants of land in the Memramcook area, some squatted on the Saint John R and some found employment with the Robin brothers, of Jersey in the Channel Islands, who in 1764 began to establish fishing stations along the coast from Gaspé to Cape Breton I. After the American Revolution, approximately 14 000 Loyalist refugees came to the N shore of the Bay of Fundy, established the city of Saint John and settled the Saint John and St Croix river valleys. A few penetrated other parts of the province. Hungry for jobs and conscious of their isolation from Halifax, they petitioned for separate colonial status, which was granted in 1784. The Loyalists in turn were inundated by Scottish and Irish immigration during the first half of the 19th century.

Development Napoleon's continental blockade, which in 1809 cut Britain off from traditional timber supplies from Scandinavia, led to a deliberate effort through protective timber tariffs to foster the colonial industry as a dependable source. Blessed with rivers which made accessible rich stands of spruce and pine, NB's squared-timber trade boomed for half a century. Timber became a source of development leading to new settlement and giving its own peculiar cast to the economy and to politics and society. Population grew from perhaps 25 000 to almost 200 000 by mid-century, of which approximately 85% earned their living from the forest. Indeed governments and historians have been critical of the province's excessive reliance on this single, highly volatile staple. Booms and slumps tended to bankrupt the settler reliant on timber, and many settlers were reduced to wage labour status, dependent on a few influential entrepreneurs in each region. Associated with the timber industry was wooden shipbuilding, whose production sites dotted the coast and rivers of the province and by mid-century turned out over 100 vessels a year, both for export and for the use of the merchants of Saint John.

New Brunswick industries, helped by the Crimean War and American Civil War, and by a RECIPROCITY treaty with the US in natural products, weathered the crisis of the British abandonment of the timber tariffs and navigation Acts in the late 1840s. But the conjunction of blows which afflicted NB's economy after Confederation, of which the NATIONAL POLICY of protective tariffs was but one, proved more permanently damaging. The reciprocity treaty was cancelled, timber resources became less accessible, and the wooden vessels lost in their competition with steam-driven, iron-hulled ships. New Brunswickers by the thousand left the declining ports and timber towns to find employment in the US.

Some New Brunswick entrepreneurs were quick to make the transition to a national, continental economy. Confederation brought the INTERCOLONIAL RAILWAY to NB by 1876 and the CPR reached Saint John in 1889. Merchants, lumbermen and shipbuilders tended to transfer their capital to iron foundries, textile mills, sugar refineries and other secondary industries whose growth was fostered by the tariff. But eventually the new industries, scattered through the province, were taken over by the larger and better capitalized industries of central Canada. The classic pattern emerged of takeover, failure to modernize, closure and the exploitation of the market from expanding plants in central Canada. The postwar recession of the 1920s saw the continued decline of traditional industries, and the virtual collapse of a manufacturing sector further undercut by adverse federal policies in tariffs and transportation. Investigation of Maritime problems by a federal royal commission and attempted remedial action were largely negated as NB plunged with the rest of the world into the Depression of the 1930s. Several decades of economic stagnation reduced NB to a standard of living much lower than the national average. National policies served to increase the disparity, as the tariff (or, during WWII, federal investment) created and maintained a manufacturing sector in central Canada. Yet the revenues thus generated were hoarded within provincial boundaries. Meanwhile, Maritime governments lacked the money to maintain essential services. By 1940 NB's expenditures on education and health services were slightly over half of the national average; its illiteracy and infant mortality rates were the highest in the country. Despite the recognition of the Rowell-Sirois Report on DOMINION-PROVINCIAL RELATIONS (1940) of the need for a fairer distribution of the tax revenues from a national economy, the adjustment grants which the commissioners recommended for the poorer provinces were not adopted until the 1960s.

The nature of NB's disparity was twofold: the extreme disparity of standards of living compared with other provinces; and the internal disparity between the urban sections of the largely English S and the rural sections of the largely French N. The attack on both proceeded simultaneously. Within the province, the government moved behind a slogan of "equal opportunity" to provide greater equality in services. Acting on the recommendations of the 1963 Byrne Commission, the Robichaud administration proceeded with more than 125 pieces of legislation to alter radically the division in responsibilities between provincial and county or municipal units of government. Acting on the principle that the provincial government should maintain services to people, the government took complete responsibility for educational, medical, judicial and social assistance services. To the municipalities it left services to property such as water, sewer, fire protection and local police services. Taxes were to be assessed province wide on the actual market value of property.

Along with the rationalization in services went a determined effort at economic development. The optimism of the 1960s persuaded both federal and provincial governments that the chronic disparity of province and region could be overcome through industrialization. Federal-provincial attempts at rural development, government investments in electrical generation, mining, forestry, fishery and secondary manufacturing, the building of major highways through the N of the province, and the use of transportation subsidies to help NB products reach national markets were all part of a federal-provincial effort to push the province's standard of living closer to the national average. To a large degree such efforts have been successful. Social and educational services are now on a par with the rest of the country. A well-trained civil service has helped primary industries modernize in a transitional period when the failure to do so would have meant collapse. A favourable infrastructure and direct assistance reversed a pattern of decline in secondary industry.

Nevertheless the province's improved standard of living rests upon a fragile base. The enthusiasm for industrial development by federal governments slowed in the 1970s amid spectacular failures and the jealousies of other regions. Governments have found the maintenance of fiscal transfers less controversial — transfers which in any case return to the centre in the purchase of consumer goods. Of critical

importance are the indirect transfers which accompany such traditional welfare-state programs as old-age pensions and unemployment insurance. No less important are the direct EQUALIZATION PAYMENTS and grants for established programs, which in 1981 accounted for 35% of the ordinary revenues. As past victims and beneficiaries, New Brunswickers have a vital interest in the continuing evolution of the Canadian constitution. ERNEST R. FORBES

Reading: A.G. Bailey, *Culture and Nationality* (1972); R.J. Bryn and R.J. Sacouman, eds, *Underdevelopment and Social Movements in Atlantic Canada* (1977); J. Daigle, ed, *The Acadians of the Maritimes: Thematic Studies* (1982); J. Fingard, *Jack in Port: Sailortowns of Eastern Canada* (1982); Ernest R. Forbes, *The Maritime Rights Movement 1919- 1927: A Study in Canadian Regionalism* (1979); W.S. MacNutt, *New Brunswick: A History 1784-1867* (1963); G.A. Rawlyk, *Nova Scotia's Massachusetts, 1630 to 1784* (1973); R. Rumilly, *Histoire des Acadiens* (1955); S.A. Saunders, *Economic History of the Maritime Provinces* (1939); W.A. Spray, *The Blacks in New Brunswick* (1972); H.G. Thorburn, *Politics of New Brunswick* (1961); R.A. Tweedie, F. Cogswell and W.S. MacNutt, eds, *Arts in New Brunswick* (1967); L.F.S. Upton, *Micmacs and Colonists: Indian-White Relations in the Maritimes, 1713-1867* (1979); E.C. Wright, *The Loyalists of New Brunswick* (1955); G. Wynn, *Timber Colony: A Historical Geography of Early Nineteenth Century New Brunswick* (1981). *See also* the journal *Acadiensis*.

New Brunswick Research and Productivity Council (NBRPC), research organization established by a provincial Act as a CROWN CORPORATION in 1962. NBRPC initially encouraged university-based research in industrial and scientific technology through grants-in-aid. This phase ended in 1965 when it commenced research for provincial and other Canadian and international industrial and government clients. NBRPC gained an international reputation for expertise in computer-assisted MANUFACTURING and extractive METALLURGY (eg, through development of a specialized sulphation roast process). In 1981 a Council of Maritime Premiers Committee on Research and Development advocated a co-operative expansion with the NOVA SCOTIA RESEARCH FOUNDATION CORPORATION to serve the entire region. NBRPC is composed of members drawn from management, labour and "professional" groups, who are appointed to 3-year terms by the Lieutenant-Governor-in-Council. The chairman reports annually to the premier. Research is conducted by staff (about 90 people) under an executive director, primarily in laboratories at UNIVERSITY OF NEW BRUNSWICK, Fredericton. Additional facilities include a provincially sponsored Manufacturing Design Centre (a joint venture with a number of universities and colleges) and a forthcoming $20-million federal-provincial MINERAL research facility at Chatham. The council provides free technical advice to many industries, especially those with few employees. Funding is through industrial and government contracts, with initial and ongoing federal grants and an annual provincial operational grant. MARTIN K. MCNICHOLL

New Brunswick School Question On 17 May 1871 the New Brunswick government passed the Common Schools Act to strengthen and reform the school system. At the same time, however, it abandoned an informal system of separate schools that had grown up since the 1850s. There was an outcry from New Brunswick's Roman Catholics, and various remedies were proposed or attempted: disallowance, resolutions in the Canadian House of Commons, the courts. None worked. The 1871 Act, though it violated familiar conventions, did not violate Section 93 of the BRITISH NORTH AMERICA ACT. Two cases made that clear: *Ex parte Renaud* at the NB Supreme Court, 1873, and *Maher* v *The Town of Portland* at the JUDICIAL COMMITTEE OF THE PRIVY COUNCIL in London, 1874. The Jan 1875 Caraquet Riots, in which 2 people were shot and killed, showed strongly the need for accommodation on the school issue; amendments somewhat improving the Catholic position were then made to the Act. But New Brunswick did not get real separate schools; it got an informal system, not unlike that in Nova Scotia. P.B. WAITE

New Caledonia ("New Scotland"), a name given in 1806 to the central and highland plateau area of BRITISH COLUMBIA by Simon FRASER, a partner, trader and explorer in the NORTH WEST COMPANY. Fraser had never been to Scotland, but the BC interior reminded him of his mother's descriptions of the Scottish Highlands. New Caledonia became a trading department or district for the NWC, and had its headquarters at Ft St James, built in 1806 on Stuart Lk. Nearby were Forts Fraser and George, the latter at the junction of the Nechako and Fraser rivers, from which Fraser began his celebrated exploration of the river, named after him, that drained New Caledonia to the S. Other names for the central interior appeared on maps at this time: the Americans called it Oregon; Capt George VANCOUVER called it New Hanover; and British fur trader James Colnett called it North West Georgia. However, the NWC's dominance of the FUR TRADE of the BC interior, until the 1821 merger with the HUDSON'S BAY COMPANY, assured the continuance of the name New Caledonia.

In 1858 legislation was introduced to create a crown colony to bring British law and authority to an area undergoing a GOLD RUSH and rapid population expansion. Colonial Secretary Sir Edward Bulwer-Lytton called the region New Caledonia; however, the French possessed a S Pacific colony called New Caledonia, and to avoid confusion or resentment the name was changed to British Columbia. Queen Victoria made this choice, and the new secretary of state for the colonies, the duke of Newcastle, considered it neither "very felicitous" nor "very original." The name was changed before the legislation received royal assent, and New Caledonia became British Columbia on 2 Aug 1858. Thereafter the earlier term disappeared from general use. BARRY M. GOUGH

New Democratic Party (NDP), founded in Ottawa in 1961 at a convention uniting the CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), affiliated unions of the Canadian Labour Congress (CLC) and New Party clubs, is a democratic socialist party (*see* SOCIAL DEMOCRACY) and a member of the Socialist International.

The party has had 3 leaders: T.C. DOUGLAS (1961-71), David LEWIS (1971-75) and Ed BROADBENT (1975). Since its birth, the NDP has polled in the federal elections an average 16.9% of the vote. While this is an increase compared to the CCF, the federal NDP has yet to become a major party. Because of the electoral system, the CCF-NDP has consistently received a smaller percentage of the seats in Parliament than its percentage vote (*see* PARTY SYSTEM). Federally the NDP has made the greatest impact during MINORITY GOVERNMENT situations. While the West provided the highest level of voting support, individual memberships and MPs for the party, a majority of NDP votes come from central Canada (largely Ontario). The NDP, like the CCF, has been unable to elect an MP from Québec.

Provincially the CCF-NDP has formed the governments in BC (1972-75), Saskatchewan (1944-64, 1971-82) and Manitoba (1969-77, 1981), and the Official Opposition in Alberta, Ontario, Nova Scotia and the Yukon.

In domestic affairs, the NDP is committed to a moderate form of SOCIALISM and a mixed economy. It favours government planning and public ownership (eg, CROWN CORPORATIONS, co-operatives), where necessary, to provide jobs and services. The CCF-NDP has always been a forceful exponent of such SOCIAL SECURITY measures as universal medical care, old-age pensions, workers' compensation and unemployment insurance as a means to reduce class inequalities. As the official political voice of labour, the NDP has encouraged trade-union organization. In recent years, the party has favoured industrial democracy and workers' control in the factories. While the CCF was an advocate of strong, federal government powers, the NDP has been more receptive to provincial rights and the advantages of decentralization.

In foreign policy, the NDP, like the CCF, has manifested strong pacifist tendencies. While this pacifism moderated somewhat in the 1950s and early 1960s, the party currently opposes Canada's involvement in NATO and NORAD and calls for Canada to become a nuclear-free zone. The party is critical of the high rate of foreign, particularly American, ownership of Canadian industry. Largely because of NDP pressure, recent Liberal governments have introduced such nationalist measures as the National Energy Program (NEP) and the Foreign Investment Review Agency (FIRA).

While the party has always proposed an evolutionary form of socialism, a persistent minority endeavours to push the party further left. The WAFFLE, the most famous faction, disbanded in 1972 only to be replaced by another "left-caucus". The NDP remains stalled as a third party and is engaged in discussions about the appropriate role of social democracy and of KEYNESIAN ECONOMICS, a debate to which Jim Laxer contributed with his controversial 1983 report. In an effort to alleviate fears among the Canadian public of the growth of big government, the NDP has increasingly advocated more decentralist proposals. ALAN WHITEHORN

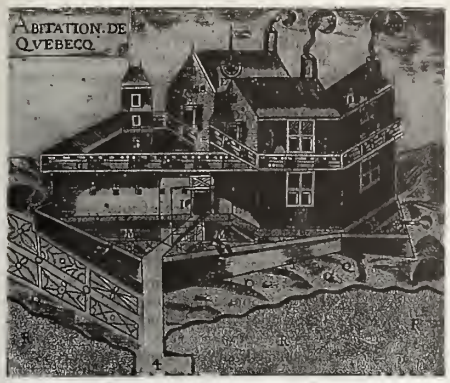
Reading: I. Avakumovic, *Socialism in Canada* (1978); S. Knowles, *The New Party* (1961); D. Morton, *Social Democracy in Canada* (1977); M. Oliver, ed, *Social Purpose for Canada* (1961); D. Shackleton, *Tommy Douglas* (1975).

New Denver, BC, Village, pop 642 (1981c), inc 1929, is located near the NE end of Slocan Lk, 48 km W, 116 km N of Nelson. Eli Carpenter, discoverer of Slocan Lk, wintered there in 1891. The site was first called Eldorado, then New Denver (1892), after Denver, Colo. The first newspaper in Slocan, called *The Ledge*, was published there by R.T. Lowery. New Denver was an early service centre for mines and the nearby towns of Three Forks, Sandon, Cody, Silverton and Slocan City. Mining declined after WWI, and by WWII 1500 relocated JAPANESE formed the bulk ofthe population. After the war, Japanese from other relocation centres moved here, and small-scale mining was supplemented by logging. The creation of Valhalla Wilderness Park, together with the magnificent scenery and surrounding ghost towns, give New Denver an optimistic future as a tourist centre.

WILLIAM A. SLOAN

New France France was a colonial power in N America from the early 16th century, the age of great European discoveries and fishing expeditions, to the early 19th century, when Napoléon Bonaparte sold Louisiana to the US. From the founding of Québec in 1608 to the ceding of Canada to Britain in 1763, France placed its stamp upon the history of the continent, much of whose lands — including ACADIA, the vast territory of Louisiana and the Mississippi Valley — lay under its control. The populations it established, especially in the St Lawrence Valley, are still full of vitality today.

France became interested in the New World later than the other Western Christian powers — England, Spain and Portugal — and after the trips made by Christopher Columbus in 1492, John CABOT in 1497 and the CORTE-REAL brothers in 1501 and 1502. In 1524 Giovanni VERRAZZANO followed the eastern shore of America from Florida to Newfoundland. Jacques CARTIER then made 3 voyages of discovery for France. He took possession of the territory in the name of the



Champlain's rendering of the Québec habitation, from *Les Voyages* (1613) (*courtesy National Library of Canada/Rare Book Division*).

king of France by planting a cross on the shores of the Gaspé in 1534. The next year he sailed up the St Lawrence R and visited Indian settlements at Stadacona [Québec] and Hochelaga [Montréal]. He spent the winter at Stadacona, where 25 of his men died of scurvy, and returned to France in 1536. In 1541-42 he returned, establishing a short-lived colony, which he called "Charlesbourg-Royal," at the mouth of the Rivière du Cap-Rouge near Stadacona. Religion gave the impetus to his voyages, but economic motives were even more obvious. The hope of finding a NORTHWEST PASSAGE to the Indies and the fabled Kingdom of the Saguenay was constantly stressed. Cartier brought back to France some minerals from this final voyage which he thought were gold and diamonds, but were only iron pyrite and quartz (*see* DIAMONDS OF CANADA). After these initial disappointments France turned its attention elsewhere and ignored the distant land until the end of the century.

Meanwhile, some Frenchmen had shown sustained interest in the region's FISHERIES. There are reports of BASQUE, Breton and Norman fishermen on the GRAND BANKS as early as the first decade of the 16th century. Each year more ships — a dozen or so in the decade 1520-30, about 100 by mid-century — made fishing trips. By 1550 fishermen were drying their catch on the shores, making contact with the Indians and taking furs back to France. In the 1580s, ship owners were leaving fishing for the FUR TRADE, an activity which was to draw Frenchmen far into the continent.

In 1608 Samuel de CHAMPLAIN, considered the founder of New France, erected a *habitation* (building) at Québec. He continued Cartier's dream of finding an opening to the Indies, pursued the commercial interests of the businessmen, his sponsors, and followed the king's wishes. The settlement responded to economic demands: go out to the fur-rich areas, forge close contact with native suppliers and try to obtain the right of exploitation. The scale of the operation made it necessary to form private companies.

The colony's administration, 1608-63, was entrusted to these commercial companies, which were formed by merchants from various cities of France. Succeeding companies promised to settle and develop the French land in America in return for exclusive rights to its resources. The COMPAGNIE DES CENT-ASSOCIÉS, created by the great minister of Louis XIII, Cardinal de Richelieu, ran New France 1627-63, either directly or through subsidiary companies. It did not achieve the desired results. In 1663 the population numbered scarcely 3000 people, 1175 of them Canadian-born. Less than 1% of the granted land was being exploited. Of the 5.4 million livres' worth of possible annual resources enumerated by Champlain in 1618 — eg, fish, mines, wood, hemp, cloth and fur — only fur yielded an appreciable return, and it was irregular and disappointing.

Nor was evangelization among the natives flourishing. During its first half-century, New France experienced an explosion of missionary fervour, as demonstrated by the number and zeal of its apostles, inspired by the Catholic Counter-Reformation (*see* CATHOLICISM). In 1634 the Jesuits renewed the mission of STE MARIE AMONG THE HURONS in the western wilds. VILLE-MARIE, which became Montréal, was the work of mystics and the devoted. But the missionaries managed to convert very few Indians.

Various political and military events hindered colonization efforts. The alliances formed by Champlain made enemies of the Iroquois. Québec fell to the freebooting KIRKE brothers in 1629. The Iroquois nations grew belligerent as soon as the country was returned to France in 1632. Between 1648 and 1652 they destroyed HURONIA, a hub of French commercial and missionary activity. Attacks on the very heart of the colony demonstrated that the colony's survival was in doubt (*see* IROQUOIS WARS).

In 1663 Québec was just a commercial branch operation: the fur trade was opposed to agriculture, cross-cultural contact meant war and disease for the natives, the French population was small, and the administration of the colony by commercial exploiters was a disaster. The company relinquished control of the colony to the king. Under Louis XIV New France flourished. He made the colony a province of France, giving it a similar hierarchical administrative organization. He watched over its settlement, extended its territory and allowed its enterprises to multiply. However, he had first to guarantee the peace.

Under the marquis de Tracy, the CARIGNAN-SALIÈRES REGIMENT built forts, ravaged Iroquois villages and demonstrated French military power. The Iroquois made peace, and 400 soldiers stayed in the colony as settlers. The king also had 850 young women sent out as brides-to-be, and quick marriages and families were encouraged. When the offspring of these FILLES DU ROI came of age 20 years later, the demographic situation had changed. In 1663 there had been one woman to every 6 men; now

Paysanne in the time of New France, c1650, by Henri Beau (*courtesy Public Archives of Canada/C-1248*).





The habitant of New France had greater independence than his counterpart in France (*courtesy Public Archives of Canada/C-866*).

the sexes were roughly equal in number. The colony thereafter replenished 95% of its numbers through childbirth.

Under the authority of Jean-Baptiste Colbert, comptroller general of finances and then navy minister (*see* MINISTÈRE DE LA MARINE), colonial administration was entrusted to a GOUVERNEUR (for military matters and external relations) and an INTENDANT (for justice, civil administration and finances — ie, all civil aspects of colonial administration). The SOVEREIGN COUNCIL (Superior Council after 1703) acted as a court of appeal and registered the king's edicts.

The imperialism of Louis XIV, the pacification of the Iroquois and the need to rebuild the network of fur-trade treaties led to renewed EXPLORATIONS into the Great Lakes and Mississippi regions by such exceptional people as François DOLLIER DE CASSON, Louis JOLLIET, Jacques MARQUETTE and the Cavelier de LA SALLE. But the Indian wars started again in 1682 and the colony found new heroes, such as Pierre Le Moyne d'IBERVILLE. Political, military and missionary activity, combined with economic factors, created a need for furs to be acquired from the Indian nations.

Intendant Jean TALON, with Colbert's solid backing and other favourable circumstances, started a vigorous development program. In addition to watching over agriculture and the fur trade, Talon began ventures such as shipbuilding, trade with the West Indies, commercial crops like flax and hemp, fishing industries and a brewery. But by the time he left in 1672, economic circumstances had changed and virtually nothing remained of these premature initiatives.

It is difficult to identify the major elements of this nascent society. For Acadia, familiar features are the quality of its agricultural establishments, the importance of fishing and the alternating British and French regimes. In the St Lawrence Valley, farmers, though in the majority, were still clearing the land. Craftsmen no longer had the support of major enterprises. Fur traders were being squeezed by increasingly difficult regulations and economic circumstances, yet they provided the colony's only exports. Military officers, thanks to the introduction of coin currency and the presence of opportunities to flaunt themselves, enjoyed some prestige by



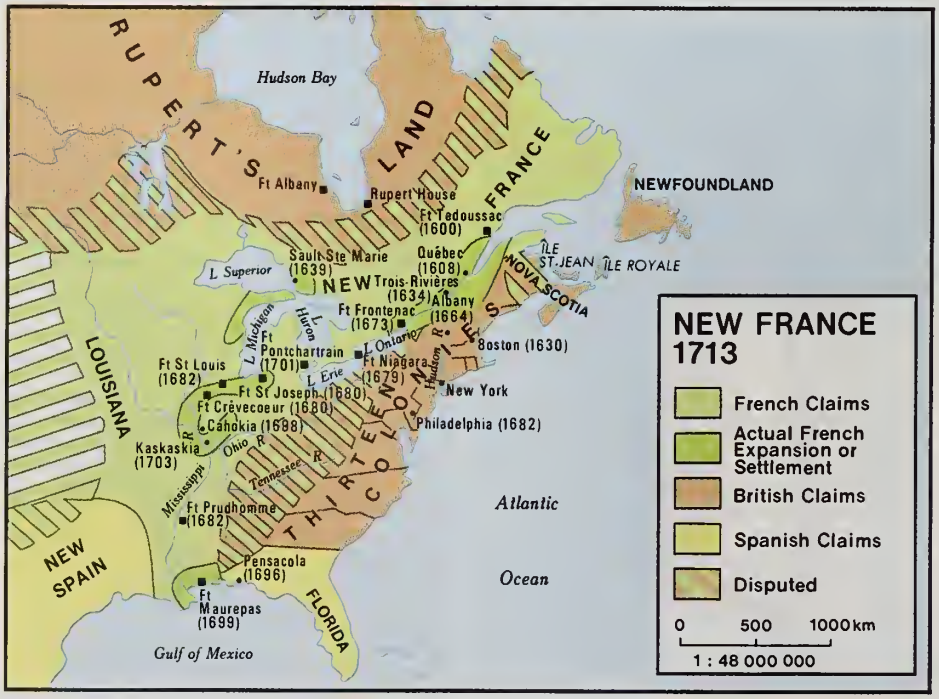
The Forges St-Maurice were one of the few industries established in New France (*courtesy Public Archives of Canada/C-4356*).

entering into business and being in the governor's entourage. The seigneur had little revenue and took his standing from his title and the exercise of functions entirely unrelated to the land (*see* SEIGNEURIAL SYSTEM). Social mobility was still possible and caused categories and groups to mingle, but there were 2 worlds: the city and the country.

New France reached its greatest territorial extent at the start of the 18th century. About 250 people lived in a dozen settlements in Newfoundland, and there were about 1500 in Acadia. Several hundred lived around the mouth of the Mississippi and around the Great Lakes. People from the St Lawrence Valley lived on the shoreline of Labrador as fishermen. The Saguenay R Basin (the King's Domain) had a few trading posts. Canada had about 20 000 inhabitants, most of them farmers scattered along a ribbon of settlement between the 2 urban centres of Québec and Montréal. In the West, a series of trading posts and forts dotted the communication lines. Finally, in the 1740s, the LA VÉRENDRYE family carried the exploration of the continent right to the foothills of the Rockies.

Despite this expansion, New France has been described as a "colossus with feet of clay." The British American colonies were 20 times as populous and felt themselves encircled and at risk. Through the TREATY OF UTRECHT of 1713, which ended the WAR OF THE SPANISH SUCCESSION, France yielded Newfoundland, the Acadian peninsula, Hudson Bay and supremacy in trade over the Iroquois to the English. Furthermore the early 18th century brought a major economic crisis in the colony. Its main export item was hit by a European sales slump, declining quality and less attractive returns.

Recovery was slow, but the economy experienced an unprecedented boom during the long period of peace, 1713-44. France built an imposing fortress at LOUISBOURG to protect its fishing zones, land and commercial trade with the colony. After 1720 agricultural surpluses were exported to Île-Royale (Cape Breton I) and the French West Indies. Some 200 seigneurs lived in the territory of Canada. A high birthrate led to a rapid population increase, which in turn led to the creation of parishes. Despite the strictures of MERCANTILISM, 2 major industries were established: the FORGES SAINT-MAURICE and royal shipbuilding. In 1735 a road linked Québec City and Montréal for the first time. Yet the fur trade still accounted for 70% of the colony's exports. And peace was being used to prepare for war: 80% of the colony's budgets (which never equalled the sums spent on the king's amusements) went for military expenses. Much more was spent on constructing European-style FORTIFICATIONS than on strengthening alliances with the Indian nations.



Colonial society, influenced by the French elite that led it, modelled itself on the mother country, yet increasingly grew apart from it because of the colony's small population and very different, land-based, economic and geographic circumstances. Nobles, the middle class, military officers, seigneurs, civil administrators and traders formed a high society which was extremely sensitive to the favours of the colonial authorities. Eighty percent of the population lived on and by the land. Each generation produced new pioneers who cleared and settled land, acclimatized themselves, managed some new territory and came to know their neighbours. The acquisition of this territory in America by the descendants of Frenchmen was characterized by the importance of the land, of inheritance, of economic independence and of analysed social relationships.

But France felt that New France cost much and yielded little. The expensive but inconclusive WAR OF THE AUSTRIAN SUCCESSION, which ended in 1748, saw the destruction of French overseas trade by Britain. The SEVEN YEARS' WAR found France on the defensive against England, now an aggressive maritime power. The British colonies, with 2 million inhabitants, were pitted against a mere 70 000 French colonists, a sign of the very limited success of French colonization in N America. After some spectacular military successes, the result of strategy well adapted to the local terrain, France fell back on the defensive. On 13 Sept 1759 the troops of Gen James WOLFE defeated those of the marquis de MONTCALM in the BATTLE OF THE PLAINS OF ABRAHAM near Québec City. Montréal fell the next year. France yielded its colony to England in the TREATY OF PARIS of 1763. It was the end, or nearly so, of French political power in America — but not of French presence. France left a great legacy to America: the Canadiens. They refused assimilation and affirmed their existence. Protected by their language, religion and institutions, concentrated in a limited geographic area, difficult to penetrate, they developed a way of life, social customs and attitudes of their own. Having become Québecois, they continued to strive to develop their nationality. JACQUES MATHIEU

Reading: W.J. Eccles, *France in America* (1972), G.F.G. Stanley, *New France, The Last Phase* (1968); M. Trudel, *Introduction to New France* (1968) and *The Beginnings of New France* (1973).

New Glasgow, NS, Town, pop 10 464 (1981c), inc 1875, is located on the East R, 15 km SE of PICTOU. The industrial and service centre for Pictou, Antigonish and Guysborough counties, it is typical of those 19th-century Maritime communities that successfully shifted from mercantile to industrial enterprise, but later collapsed. The Carmichaels and McGregors, along with industrialists Graham Fraser and Thomas Cantley, spurred the town's growth. Agricultural settlement of the surrounding district by Scottish Presbyterians supported early growth. By the 1820s local timber was used for shipbuilding, the economy's mainstay until Confederation. Railway building in the late 1860s and 1870s and development of nearby coal and iron deposits spurred an industrial revolution based on the iron and steel industries. New Glasgow and neighbouring Trenton spawned Canada's first steelmaking enterprise, the NS Steel Co (1882-83). These industries flourished through WWI, then collapsed in the face of external competition and corporate mergers. The town's population peaked at 8917 in 1921, but has grown slightly since WWII as the town became a regional centre. Although still predominantly Scottish and Presbyterian, New Glasgow's ethnic base is now more diverse. Other British peoples and Acadians reside there, working nearby in pulp-and-paper and tire-manufacturing industries. L.D. MCCANN

New Hamburg, Ont, UP, pop 3923 (1981c), is located midway between KITCHENER and STRATFORD in the midst of a prosperous rural countryside (populated partly by Old Order Mennonite and Amish, who settled the area in the 1830s). At first called simply Hamburg, after the port of departure of many German emigrants in the 19th century, it was a result of the railway boom created by the expansion of the GRAND TRUNK RY in 1857 and of the influx of German immigrants in the mid-19th century. The sixth generation of pioneer farmers of German origin remains on the land, and the settlement today is primarily an agricultural service centre. Population growth after the 1850s was slow until after WWII. New Hamburg is known widely for its annual Ontario Mennonite Relief Sale of traditional handicrafts. In 1973 it was reorganized within the Regional Municipality of Waterloo and reverted to the status of a settlement within the Township of Wilmot. KEN MCLAUGHLIN

New Left, an international political movement of the 1960s, mainly of youth and students, which originated in the "Ban the Bomb" movement of the late 1950s. It expanded to include issues such as the Vietnam War, Third World liberation struggles, women's liberation, education, ecology, and popular culture. Critical of the Old Left (SOCIAL DEMOCRACY and MARXISM-Leninism) and its alienating hierarchical, centralized and bureaucratic structures, the New Left proposed local control of the political process, accessibility to political and social institutions and participatory democracy. Critical as well of modern capitalism, the New Left advocated confrontations with that system by dissident intelligentsia and workers, and by the poor, blacks, natives and ethnic minorities. It included supporters of every position between nonviolent civil disobedience and libertarian socialism. In Canada, the ideas of the New Left were argued about and practised by the Student Union for Peace Action, the Canadian Union of Students, Students for a Democratic University and the Union générale des étudiants de Québec — highly decentralized organizations that were active on a regional, even local, basis. Also active in the debates were *Our Generation* and *Canadian Dimension* magazines. Among issues raised by the Canadian New Left were nuclear disarmament, community organizing, the "multiversity," American control of the economy, the composition of the working class, Québecois separatism and sexual inequality.

After the OCTOBER CRISIS (1970) the New Left fell into disarray, although it was also weakened by the incursion of government-sponsored groups (eg, The Company of Young Canadians, which was established to support, encourage and develop programs of social and economic reform); by failure to link up with working-class organizations and by the lack of a sustained program and strategy for social change. In the 1970s many adherents entered the women's liberation movement, the Parti Québécois and various Marxist-Leninist groups. Some New Left ideas are now being revived in the antinuclear movement. MYRNA KOSTASH

New Liskeard, Ont, Town, pop 5551 (1981c), inc 1903, located on the NW end of Lk TIMISKAMING, 157 km NW of North Bay. The history of this agrarian community at the mouth of Wabi Cr dates back to 1892 when the Ontario government first opened up the area to settlement. The agricultural potential of the Little Clay Belt, a 56 km strip of land stretching to the NW, quickly attracted farmers from "Old" Ontario. By 1896 a thriving village, first known as Liskeard (after Liskeard, Eng) but changed by postal authorities to New Liskeard to avoid confusion with Lisgar, had come into existence. New Liskeard's role as service centre to the surrounding farming community was assured by the arrival of the Temiskaming and Northern Ontario Ry (ONTARIO NORTHLAND) in 1905, and its growth in the 20th century was shaped by the varying fortunes of agriculture. Since 1966 the town has been the site of the New Liskeard College of Agricultural Technology. MATT BRAY

New Religious Movements, unorthodox, splinter religions that are usually outgrowths of ancient religious traditions. The complexity of the subject and a desire for objectivity have led scholars to prefer this expression to the popular term "cult," which has become associated with the 1978 mass suicide of People's Temple members in Jonestown, Guyana, and with other dangerous practices. In the sociology of religion, "church," "sect" and "cult" have specialized meanings identifying specific types of religious movements; "cult" suggests an intellectually inclined, mystically oriented group rather like the QUAKERS. A theological definition identifies cults as groups that deviate from some traditional standard of Christian orthodoxy. Thus, Roman Catholics might argue that Baptists constitute a cult. Yet, as a result of media coverage, "cult" has come to refer to groups such as the Unification Church ("Moonies") and the International Society for Krishna Consciousness (Hare Krishna, or ISKCON).

The Jonestown tragedy distorts discussion about new religions. Few people realize that the Jonestown group was both religious and political. Jim Jones was a minister in a traditional Christian denomination, but his group was a political co-operative with strong socialist ideas. Most members of the new religions are well educated, relatively affluent young Caucasians often recruited as individuals, but the people at Jonestown were generally ill-educated, poor, black Americans often recruited as families. The social differences between the new religions and the People's Temple are so great that few meaningful comparisons can be made.

Sociologists David G. Bromley and Anson D. Shupe argue that most people react unfavourably towards the new religions because of "media hype," and that actual membership in N American new religious movements is low. Sociologist Reginald Bibby discovered that only about 1% of Canadians have even a strong interest in new religious movements (1983); more significantly, only a fraction of 1% have any actual group involvement. Daniel G. Hill, commissioned by the Ontario government to study the "cult problem," agrees, citing a Toronto magazine which claimed that the Hare Krishnas had 10 000 members in Toronto when they had only 80 full-time members. It is difficult to give accurate membership figures for most new religions. The groups and their critics both tend to exaggerate their numbers. Hare Krishna in Toronto claims about "80 full-time members" and "5000 part-time or associates who attend services" (1983). The latter figure appears impressive, but includes anyone who visits the temple or an organized meeting, and a minority of the East Indian community who find in the movement an opportunity to continue traditional religious practices. What is perhaps most deceiving is the large number of groups, most of them relatively small. Richard Bergerson counted some 300 religious or para-religious groups in Québec, but the 1981 census indicates that over 88% of Quebecers are Roman Catholic. Nor is geographical distribution necessarily broad: most of Québec's non-Catholics are found in Montréal.



Splinter religions, which usually are an outgrowth of ancient religious traditions, include the Hare Krishna *(courtesy Canapress)*.

How many people belong to the more controversial new religions in Canada? Estimates in 1982 showed about 450 Hare Krishna members; 350-650 Unification Church members; 250 Children of God; about 700 full-time Scientologists and 15 000 taking Scientology courses; and over 200 000 who had been initiated into Transcendental Meditation (TM). However, if membership in new religions is small, the number of people holding nontraditional religious views and likely to have participated in the new movements is relatively high. Bibby's research indicates that 28% of Canadians have some interest in yoga; 21% in TM; 45% in astrology; and 69% in ESP. About 13% believe in reincarnation. Frederick Bird and Bill Reimer found that 32% of their sample of adult students in Montréal had participated at some time in activities organized by new religions, but they emphasize the difference between occasional participation and full membership. It may be that a market exists for new religious movements to fulfil needs that are not met by traditional churches. But by 1983 no group had fully established itself in Canadian society, although some groups, such as ISKCON and TM, have established rural communities and own property. It appears that, after sampling various groups, many people will not join any, commonly reverting to Protestant or Roman Catholic affiliations, or occasionally turning to such traditional movements as the MORMONS or the more conservative Christian churches.

When placed in historical context the new religious movements may appear less strange. Modern society is called a "secular society," in which RELIGION and the sacred play little official role. Many provinces exclude religion from the curriculum in public schools, thus suggesting an attitude that religion is essentially unimportant. Hence, when young people turn to religion in any significant way their actions are seen as odd and needing explanation.

Traditionally, society's values have been based on religious values. Before the rise of CHRISTIANITY many different religions competed for the hearts and minds of the people. Even after Christianity became accepted as the religion of Europe there were periods of religious renewal and revival that produced many new varieties of Christianity. Perhaps the best known of these periods was the 16th-century Reformation.

Many theories exist as to why new religions grow. Some people posit tension and social unrest, whereas others stress religious reactions to dead orthodoxies. But the rise of new religions is not new, and by examining past examples we can discover patterns that help us to understand the present better. Thus, although groups such as the METHODISTS and Mormons began as suspect movements and encountered strong opposition, we know today that they did not cause society to disintegrate and that over time their practices were influenced by, and helped form, social attitudes in a positive way.

Identifying the New Religions The popularity of new religions is constantly changing and new groups continually appear. In the mid-1960s TM was growing rapidly; in the early 1970s it was the Divine Light Mission; in the mid-1970s the Unification Church; and in the early 1980s Rajneeshism. Each movement went

through a period of rapid growth and then spectacular decline. Hence, a means of identifying groups generally is more valuable than an elaborate enumeration of new religions and their particular beliefs. To identify specific groups, one must recognize the existence of central experiences that may be generally labelled "spiritual." These include dreams, visions, precognition, ESP, a sense of awe, a sense of a presence, ghosts, dread, etc. They occur in all religious traditions. Specific traditions give them explicit interpretations in their own teachings. Thus in the HINDU tradition Indian villagers see visions of Krishna, in Roman Catholicism the Virgin Mary may appear to the devoted, and in some newer groups spacemen reveal spiritual truths. In each case a system of thought is used to make sense out of strange experiences.

Three main systems of interpretation mold the teachings and practices of the new religious movements. The traditional Western systems originated with the religion of the ancient Hebrews and express themselves through JUDAISM, Christianity and ISLAM. This type of religion, which has distinctive ideas about God, creation and the nature of humanity, may be called the Abramic tradition because its member religions all recognize Abraham as their founding father. The second type of system is that which in its many forms has the practice of meditation or yoga at its core. It finds expression in Hinduism, BUDDHISM, Jainism and SIKHISM. The third religious type is that in which religious thought is expressed in technical and scientific language. Religions of this type are truly new religions which openly proclaim their modernity and boast of their superiority. Some are forms of gnosticism that claim both Jewish and Greek roots, but whose schools employ much modern psychology. Another manifestation of modernity can be found in the Human Potential Movement, which includes client cults in which individuals seek to transform themselves through training and participation in various groups, encounters and techniques.

Although these systems can be isolated, syncretism (the combination of differing beliefs and traditions) makes any summary of individual movements difficult. One can begin to categorize different new religions by their heritage and their rhetoric. The Unification Church is primarily Abramic although influenced by Korean philosophies. Hare Krishna is yogic, and Scientology is a religion of modernity. The classifications do not explain the religions, but help to identify them and assist the observer to analyse and understand their dynamics and theological patterns. The groupings should be seen as dynamic models to assist understanding, not as static analyses of beliefs. Members of new religions must be recognized to be on individual spiritual quests. A person may join the Unification Church essentially because of a vivid experience that that church appears able to explain. As the members' understanding of Unification thought grows, their essential allegiance to the group may then change from a reliance upon experience to a commitment to the beliefs of the group's development of Abramic concepts. In time, through study, this commitment to Abramic themes may lead the convert out of the group in search of a more traditional interpretation of the Abramic tradition.

Why and How People Join Social and psychological needs vary from person to person. New religions meet many of these, but so do golf clubs, traditional churches, theatrical groups, political movements and a host of other social organizations. The new religions seem to meet 2 requirements especially well: giving meaning and purpose to life, and taking "spiritual" experience seriously.

Few Canadians seem to be on a quest for life's meaning and most seem content with their immediate goals. Yet most people have wondered at some time about the purpose or meaning of existence. If during one such time of conscious reflection a person meets members of a new religious movement who claim to have found the answer to his or her questions, he or she may be tempted to investigate and perhaps join that movement. Beyond merely puzzling over life's meaning, many people have "spiritual" experiences, including unusual feelings and sensations ranging from out-of-the-body experiences to ESP and mystical visions. According to Bibby, some 58% of Canadians think they have had premonitions and 51% claim to have experienced mental telepathy. Research in Britain indicates that these and other apparently inexplicable occurrences are far more common than is usually thought. Yet our secular culture regards such experiences as at best "odd" and at worst evidence of psychological illness. Naturally, few people are willing to talk openly about them. However, members of the new religions take such experiences very seriously and not only interpret them, but actually encourage people to talk about and reflect on them. By supplying meaning to everyday life and offering explanations for unusual experiences, the new religions are able to present potential converts with a comprehensive world view that is self-authenticating. Thus the new religion holds out to the convert insights and psychological supports that make membership attractive and enticing.

Recruitment generally proceeds primarily along friendship networks; members bring their friends into the groups. This theory of interaction is clearly illustrated in a classic paper by J. Loflund and R. Stark, "Becoming a World-Saver: A Theory of Conversion to a Deviant Perspective" (*American Sociological Review*, 1965). Once initial contact has been established, existing members become the candidate's new friends and friendship ties are strengthened and extended. The importance of friendship in this process becomes obvious when one considers the response of outsiders to a new religion. Usually family members or old friends warn the new or potential convert against the group. Such warnings normally strengthen rather than weaken the cause of the new religion, because they are perceived not as criticism of the religion but as uninformed criticism of one's friends. Also, most religious groups teach that the outside world is under the influence of evil powers which will do everything possible to prevent potential converts from accepting the truth.

Brainwashing-Deprogramming Controversy One major reason for interest in the new religions in the 1970s was the claim that "cults recruit members by brainwashing techniques." This was supported by lurid autobiographical stories along with TV and radio interviews given by people who claimed to have "escaped" from the cults through deprogramming. Theoretical support came from Flo Conway and Jim Siegleman, authors of *Snapping* (1978), in which a theory of personality change is proposed to explain why people join the new religions. The authors intended their work to include not only the Unification Church, but also all "born-again" or EVANGELICAL Christians, and to show that William Sargent's *Battle for the Mind* (1957), their theoretical base, is a study of Christian conversion generally. The assumption behind the theory is that the human mind is like a computer and that people, because they can be programmed, are not responsible for their actions.

Snapping and Josh Freed's *Moonwebs* (1981) — a sensational account of life among the Moonies — and other books support the practice of forcible deprogramming. This involves kidnapping members of religious groups and holding them prisoner until, through a combination of kindness, love, criticism and fear, members "break" and renounce their membership. This practice is clearly illegal and has many implications for civil religious liberties. Deprogramming has not been restricted to members of the new religions: in the US, Roman Catholics, Anglicans, Baptists, members of feminist groups and others have been deprogrammed because their views offended other family members. In Calgary and Montréal, widespread publicity surrounded the kidnapping and attempted deprogramming of Unification Church members. The Montréal case became the basis of the 1982 film *Ticket to Heaven*. Ontario's Hill Commission, however, spoke out strongly against kidnapping, and concluded that, if cults practise mind control and brainwashing, the evidence shows that they are not very successful. Deprogramming therefore appears unnecessary.

University of Toronto psychiatrist Saul V. Levine has argued that even when the deprogramming "succeeds" it usually creates severe mental problems. For deprogramming to work, people must be convinced that they were victims who joined the religion against their will through a process of brainwashing which removed from them all responsibility for their actions. The result is that they can never be sure that they are not being trapped again by a brainwashing technique of which they are unaware. An acute sense of dependency and self-doubt is created. By contrast, people who voluntarily leave new religions after participation retain their psychological integrity and self-respect. They may consider themselves fools for joining, but they have no fear of being trapped again.

Considerable evidence exists that membership in the new religions depends on individual free choice. Strong social pressures may be exerted by some groups, but such pressures are essentially no different from those of more traditional religious groups or other voluntary associations. Moreover, most people who join new religions soon leave by choice. British sociologist Eileen Barker's study of Unification Church recruiting techniques showed that, although many people accepted invitations to the church for several weeks, at the end of a year only 4% of those contacted became members. Similar work by others indicates equally high dropout rates from all new religious movements.

New Religions of Canadian Origin Although not usually recognized as a new religious movement, the Latter Rain Movement, which originated in North Battleford, Sask, in 1948, may be the most influential Canadian contribution to modern religion. Essentially a PENTECOSTAL revival movement, Latter Rain spread from a Foursquare Gospel church through evangelical Christianity worldwide. Many contemporary practices of CHARISMATIC Christianity, such as "singing in tongues," gained popularity as a result of this movement, which produced hundreds of new independent evangelical churches. Most have remained essentially orthodox, but some developed unusual beliefs and practices. Today, in Canada, the most prolific of new religions are continental in nature and not essentially Canadian. Evangelical groups which attempt to recreate biblical Christianity are the most common. These are usually orthodox and generally accepted by other Christians. But a significant minority adopt social and theological beliefs that place them on the fringe of orthodoxy. Others, such as the Local Church, the Way and the Children of God, have been rejected by other Christians and have become centres of controversy.

Probably considered the most notorious is the Children of God, or "the Love Family." The group originated with David Berg, a Pentecostal evangelist, as a California "Jesus people" group in 1968. Berg's movement arrived in 1971 in Vancouver, where it grew relatively rapidly.

Berg changed his name to Moses David and claimed to receive "revelations" from God that included visions of the end of Western society. Eventually the group formed a series of colonies that went underground as a result of adverse publicity and the exposure of their allegedly perverse sexual practices. At its height the Children of God had around 8000 members. In 1983 it likely had under 2000 worldwide, with about 50 in Canada.

A uniquely Canadian movement is the Kabalarian Philosophy. Founded in Vancouver in 1930 by Alfred J. Parker (1897-1964), it blends Eastern and Western thinking, and teaches an understanding of mind and cycles based on mathematics. Its practices include vegetarian diets and physical exercises similar to those of yoga. Another important group in BC is the Emissaries of Divine Light, based at One Hundred Mile House. It encourages highly respectable forms of living and is essentially Eastern in orientation.

In Alberta there are several fundamentalist Mormon groups. These usually assert that the Utah Church of Jesus Christ of the Latter-day Saints has deviated from true Mormon doctrine by rejecting the practice of polygamy. Like charismatic Christians they thrive on prophetic revelations and literal interpretation of the Scriptures. Although not a new religion, an important movement originating in Saskatchewan is Ex-Mormons for Jesus, an organization of fundamentalist Christians. They are similar to the Toronto-based Committee on Mind Abuse (COMA) and other anticult organizations across Canada. These groups are united by the belief that cults are bad and that action is needed to fight them. Bromley and Shupe in *The New Vigilantes* (1980) claim that in their social organization such movements are similar to the new religions.

In Québec the Apostles of Infinite Love began in the 1950s after its founder, a former Catholic priest, moved from France. He ordained a Québecois, Gaston Tremblay, as Pope Jean Grégoire XVII, and in spite of his 2-year sentence for forcible detention of 3 children, the group expanded to over 30 monasteries in Canada and the US. I. HEXHAM, R.F. CURRIE, J.B. TOWNSEND

Spiritualism

Although formal spiritualism has existed for over 125 years, it should be considered within an examination of new religious movements because of a revival of interest in N America. Modern spiritualism developed in the 19th century within a spiritual and mystic resurgence based on such influences as earlier mysticism, Emanuel Swedenborg's writings, New Thought, Rosicrucianism and N American Indian SHAMANISM and spiritism. Andrew Jackson Davis and Phineas P. Quimby were especially important mid-19th-century influences. Through the work of 18th-century Austrian physician F.A. Mesmer, trance and clairvoyance had become familiar. In 1848 Margaretta and Kate Fox in Hydesville, NY, began to communicate with a spirit by rappings. Mediumistic circles soon spread throughout the US. The movement arrived in Canada by 1850 and quickly spread through the country; it was taken to Britain in 1852. The dissemination of the spiritualist system is simple: all that is required to begin a group is a person with mediumistic abilities.

There are 7 principles to which most Canadian spiritualists subscribe: the fatherhood of God (not a person but the creative universal spirit); the brotherhood of man; communication of spirits and ministry of angels; the continuous existence of the human soul; personal responsibility (including free will); compensation and retribution hereafter for all good and evil deeds done on Earth; and the eternal progress open to every human soul. There is no belief in an eternal hell — every soul can progress. Some spiritualists believe in reincarnation. These principles also imply that the living have both a physical and a spiritual body. Based on these principles are 2 propositions: the survival of the individual personality, or spirit, after death, and the concern of the spirit world for the living and the ability to communicate with the living. The objective of spiritualism is scientific verification of these 2 propositions rather than simple belief that they are true. This is accomplished, spiritualists believe, at each service by spirits' communications to the living through mediums or by spiritual/psychic healing. A particular group may emphasize messages or healing; healing seems to be more important in western Canada than in Ontario, but the result is the same: verification of survival after death.

Spiritualists believe that everyone has at least one spirit "guide," who is around to aid, protect and instruct, and that mediums have special abilities, in altered states of consciousness or trance, to communicate with their guides and move spiritually into an alternative reality where time and space do not exist as we know them. The medium clairvoyantly may be able to see glimpses of the future or the past. The guides allow other spirits to contact the medium who then acts as the agent through whom messages are passed from the spirit world to the living. Early spiritualism emphasized such physical "proofs" of spirit communication as table rappings by spirits, materialization of spirits, levitation and other phenomena presumably from the spirit world. Although these sometimes occur in modern seances, they are not an important element of the current movement.

Spiritual/psychic healing differs from faith healing in that faith healing occurs in churches, is performed by clergy, normally requires some faith on the part of the sick person, and frequently claims instantaneous cures. Spiritual/psychic healing is done by laity who are often affiliated with an organized spiritualist church, and is often done in a private home. It requires no faith on the part of the patient, and rarely produces instantaneous cures. Healing requires a series of treatments. Further, spiritualist/psychic healers insist that their patients continue traditional treatments with their doctors. Healing is thus an adjunct rather than an alternative to medical therapies.

A healer believes that spirits work through him or her to send "energy" to the patient. The healer is merely an "instrument" through which the spirit world acts. A treatment is usually accomplished in 10-15 minutes by the healer's entering a semitrance and either touching the patient's body or holding the hands about 2-4 cm from the body, directing the healing energies through the hands.

Believers often organize into churches loosely structured around a mediumistic or charismatic leader, but they remain individualist in belief. The 2 kinds of groupings are religious services, held in a church, and psychic development circles, usually held in a home. The church service is composed of hymn singing, a sermon, messages from the spirit world and healing. Organization is egalitarian, with many members taking part in the service as healers, speakers or mediums. The circles are groups of about 10 who meet regularly to communicate with the spirit world, send healing energies to persons not present, and develop their psychic and mediumistic abilities. The use of Ouija boards and similar mechanisms to contact spirits is discouraged because it may allow the "lower spirits" to come, and this would be harmful.

Many Canadian spiritualists attend "camps" in the US, where formal classes are held in healing, mediumship and aspects of the belief system, and a minister's or healing certificate may be obtained. Spiritualism is primarily an urban, middle-class phenomenon. Spiritualists are not marginal to society, but participate actively in community affairs; their activities are tolerated by society and generally ignored by traditional churches. Women are equal with men and often take a lead in a spiritual activity. Children are not deliberately drawn into membership: it is necessary to keep a balance between the mystical and the real world, a distinction that might be difficult for a young child. Visitors are warmly welcomed, but no pressure is exerted to join the organization or to accept particular beliefs. Some spiritualists estimate that there are 800-1000 spiritualists in Canada in the 1980s, but only about one-third are active. Although there have been a number of important spiritualists in Canada, the most prominent was PM Mackenzie KING. J.B. TOWNSEND

Reading: W.S. Bainbridge and R. Stark, "Church and Cult in Canada," *The Canadian Journal of Sociology* 7, 4 (1982); R. Bergeron, *Le Cortège des fous de Dieu* (1982); R.W. Bibby, "Religionless Christianity," *Social Indicators Research* 13, 1 (1983); F. Bird and B. Reimer, "Participation Rates in New Religious Movements," *Journal for the Scientific Study of Religions* 21, 1 (1982); D.G. Bromley and A.D. Shupe, *Strange Gods* (1982); M.D. Bryant, ed, *Religious Liberty in Canada* (1979); R.S. Ellwood, Jr, *Religious and Spiritual Groups in Modern America* (1973); A. Hardy, *The Spiritual Nature of Man* (1971); D.G. Hill, *Study of Mind Development Groups, Sects and Cults in Ontario* (1980); W.R. Martin, *The Kingdom of Cults* (1965) and *The New Cults* (1980); G.K. Nelson, *Spiritualism and Society* (1969); J.T. Richardson, "People's Temple and Jonestown," *Journal for Scientific Study of Religion* 19, 3 (1980).

New Westminster, BC, City, inc 1860, pop 38 550 (1981c), is located on the N bank of the FRASER R, 20 km E of Vancouver. Surveyed by the Royal Engineers and named by Queen Victoria, "The Royal City" was established in 1859 by Gov James DOUGLAS as the capital of BC. Few colonial era buildings survived a fire in 1898 but one, the Captain William Irving House (1862-64), is now the city's historic centre.

History New Westminster never displaced its great rival, Victoria, as the commercial metropolis of the Fraser R and Cariboo goldfields. Then, in 1868 the Legislative Council chose Victoria as the permanent capital of the recently united colonies of BC and Vancouver I. Although New Westminster secured a CPR branch line in 1886, the completion of the main line to Vancouver in 1887 further relegated it to secondary rank. Nevertheless, the city remained an important freshwater port, a major lumber producer, a salmon-canning centre, a commercial centre for the Fraser Valley and an administrative and service headquarters with such institutions as the County Court, the BC Penitentiary, the Provincial Mental Hospital and the Royal Columbian Hospital. The city also secured rail links to the US via the Great Northern Ry and Fraser River Ry Bridge (1904); to the eastern Fraser Valley via the BC Electric Ry (1910); and to eastern Canada via the CNR (1915). Population growth has been uneven. Rising during the CPR boom from 1500 (1881) to 6678 (1891), the population remained steady until it doubled to 13 199 during the boom decade 1901-11. It then rose grad-

Pattullo Bridge, New Westminster, BC (*courtesy Elliott and Nicole Bernshaw/Bernshaw Photography*).



ually to 42 835 in 1971 but has since declined. New Westminster has been known for such figures as John Robson, BC premier and founder of the *British Columbian* newspaper (1861-1983), and for the national success of its lacrosse teams. The city is home of the CANADIAN LACROSSE HALL OF FAME.

Economy Although the once-famous salmon-canning industry has gone, the forestry industry remains important, employing over 40% of the manufacturing work force in local mills producing lumber, shingles, plywood, and pulp and paper for local consumption and export. Nevertheless, the number of industrial plants has declined in the past decade; much retailing has moved to suburban municipalities, and the Fraser R Harbour Commission has transferred most of the port activity to the river's S side and to Annacis Island. Increasingly, the city is becoming a residential centre marked by apartment buildings rather than single-family dwellings, a trend which may grow with the completion of the Automated Light Rapid Transit line to Vancouver and the proposed redevelopment of the waterfront for housing and commercial purposes. PATRICIA E. ROY

Newcastle, NB, Town, pop 6280 (1981c), inc 1899, is located below the juncture of the NW and SW branches of the MIRAMICHI R. The shire town of Northumberland County 1786-1967, it was probably named for Thomas Pelham-Holles, duke of Newcastle and PM of England. Two Scots, William Davidson and John Cort, settled the area in 1765, drawn by the potential of the salmon fishery. They were followed by some LOYALISTS and many Scottish and Irish immigrants. In 1825 a great fire devastated the Miramichi area and laid waste Newcastle and nearby Douglastown. Only 12 of Newcastle's 260 buildings escaped the flames. The fire put an end to the masting industry, but shipbuilding, the fisheries and lumbering became significant industries afterwards and the latter 2 are still important. Newcastle is a busy port, exporting wood pulp and wood products. The town's most famous "son" was Max AITKEN, later Lord Beaverbrook, who became the province's greatest benefactor. WILLIAM R. MACKINNON

Newcombe, Howard Borden, geneticist (b at Kentville, NS 19 Sept 1914). After studying at Acadia and McGill and wartime service in the Royal Navy, he worked with M. Demerec at Cold Spring Harbor Laboratory, NY. In 1947 he moved to the Chalk River Laboratory of ATOMIC ENERGY OF CANADA LTD. In 1949 he provided direct proof for the occurrence of spontaneous, undirected mutations in bacteria. This work eliminated the last vestiges of Lamarckism from biology and contributed greatly to the subsequent explosive development of molecular genetics. In 1957 he turned his attention to vital statistics and health records for analytical studies in demographic genetics. He pioneered computer-assisted "record linkage" techniques in epidemiology. He was a founder of the Genetics Soc of Canada and in 1963 was elected a fellow of the Royal Soc of Canada. ROBERT H. HAYNES

Newfie Bullet An affectionate but ironic name informally applied to the trans-insular Newfoundland passenger railway in its latter days. A narrow-gauge train, winding 900 km around lakes and mountains from St John's to Channel-Port aux Basques (track completed 1898), it was not noted for its speed. In the late 1960s CNR replaced the subsidized passenger service with a bus service. ROBERT D. PITT







Newfoundland

Capital: St John's
Motto: Quaerite Prime Regnum Dei ("Seek ye first the Kingdom of God")
Flower: Pitcher plant
Largest Cities: St John's, Corner Brook
Population: 568 000 (1981c); rank ninth, 2.3% of Canada; 58.4% urban; 41.2% rural nonfarm; 0.3% farm; 1.5 per km² density; 1% increase from 1976-81; Jan 1984e pop, 579 400
Languages: 99.3 English; 0.3% French; 0.4% Other
Entered Confederation: 31 Mar 1949
Government: Provincial — Lieutenant-Governor, Executive Council, House of Assembly of 52 members; federal — 6 senators, 7 members of the House of Commons
Area: 404 517 km², including 34 032 km² of inland water; 4.1% of Canada
Elevation: Highest point — Mt Carbrick, Torngat Mountains (1652 m); lowest point — sea level along coasts
Gross Domestic Product: $4.698 billion (1982e)
Farm Cash Receipts: $34.672 million (1982)
Value of Fish Landings: $166.721 million (1983 prelim total); $176.289 million (1982 total)
Electric Power Generated: 39 993 562 MWh (1983)
Sales Tax: 12% (1984)

Newfoundland, the youngest Canadian province, joined Confederation at midnight on 31 March 1949. Some portion of the coast of this easternmost part of Canada was assuredly one of the first parts of the continent seen by Europeans. Tenth-century Viking explorers from Iceland and Greenland saw Labrador and most probably settled briefly in the northern part of the Island of Newfoundland. In the late 15th century the GRAND BANKS SE of Newfoundland were known to Basque, French and Portuguese fishermen. Since the time of King Henry VII of England, who on 10 Aug 1497 awarded John CABOT £10 for finding "the new isle," the Island has been referred to as Terra Nova, but more commonly in the English-speaking world as Newfoundland. The French call it Terre-Neuve; the Spanish and Portuguese still call it Terra Nova. The LABRADOR part of the province may have received its name from the Portuguese designation, "Terra del Lavradors." CAPE SPEAR, near St John's, is the easternmost point of the province and thus, excepting Greenland, of N America. From Cape Spear across the Atlantic to the nearest point in Ireland it is nearly 3000 km. Winnipeg, in mid-Canada and Miami in the southeastern US are farther away — 3100 km and 3400 km, respectively. The southern coast of the province lies astride lat 47° N, but Cape Chidley on the northernmost tip of Labrador is just N of 60° N, giving the province a total north-south extent of just over 1800 km. The land and freshwater area is 404 517 km², of which 292 218 km² are in Labrador and 112 299 km² on the Island. Newfoundland is the seventh-largest Canadian province. Neighbouring NS, NB and PEI are smaller, and even their combined area is less than that of Newfoundland, which is slightly larger than Japan.

Land and Resources

The province is physically divided into 2 major units of unequal area, the much larger unit being the mainland territory of Labrador to the N and the smaller unit the Island of Newfoundland to the S. Within each there are distinct variations in the physical characteristics of the environment and in the occurrence and availability of natural resources and corresponding variations in the nature and pattern of human settlement.

Distinctive subregions within each major unit can be outlined. In Labrador there are 3 such subregions: a northern coastal region, ruggedly mountainous, deeply fjorded and growing only ground-level subarctic vegetation, with very little settlement; a southern coastal region with a rugged, barren foreshore and a forested hinterland, with light to moderate settlement; and the bulk of the vast interior, which comprises a well-forested, dissected plateau, where settlement is concentrated in a few large towns.

On the Island of Newfoundland there are 4 distinct regions, the W coast, the interior, the NE coast and the S coast. The W coast is dominated by the table-topped Long Range Mts, which rise to 722 m. They are bordered in places by a narrow, well-forested coastal plain and are frequently penetrated by glacially deepened valleys and by several large, fjordlike bays, the largest of which are the Bay of Islands and Bonne Bay. There is almost continuous settlement in the bays and coves along this coast and there is some interior settlement in the Codroy Valley to the S and around Deer Lk, which lies on a small plain within the mountain range. The interior is a plateaulike region with frequent undulations in the terrain representing the ridges and slopes of the watersheds carved out by the major stream systems; 4 large rivers, EXPLOITS, GANDER, HUMBER and Terra Nova, drain most of the area. The region supports extensive forest stands, particularly on the gentle slopes of the major watersheds. Settlements are widely separated and most of the population is concentrated in a few large towns associated with forest or mineral-resource use and with transportation services. The NE coast, with its numerous bays, islands and headlands, fronts on the Atlantic Ocean from the Great Northern Peninsula, to the AVALON PENINSULA. Inland sections of this region are generally well forested, but exposed headlands and offshore islands have low, scrubby vegetation. The region has a shoreline typical of land that was submerged by glaciation and in places rebounded after the ice caps melted. Thus, there are innumerable bays, coves, islands and fjords, which often provide excellent harbours. It is also an area that can annually expect to be blocked by arctic drift ice throughout the winter and early spring.


NEWFOUNDLAND
Trans-Canada Highway
Primary Road
Ferry
Railway
National Park
POPULATED PLACES
1 - 999
1 000 - 4 999
5 000 - 24 999
25 000 - 99 999
Provincial Capital
0 50 100 150 km
1 : 6 200 000
Ungava Bay
Labrador Sea
ATLANTIC OCEAN
Gulf of St Lawrence
St Lawrence R
HAMILTON BANK
LABRADOR
QUÉBEC
ISLAND OF NEWFOUNDLAND
NOVA SCOTIA
PRINCE EDWARD ISLAND
NEW BRUNSWICK
ST-PIERRE AND MIQUELON (FRANCE)
C Chidley
NORTH AULATSIVIK I
Seven Islands B
Nachvak Fd
Saglek B
Kuujjuaq
Rivière George
Rivière à la Baleine
Rivière Wheeler
Lac Le Moyne
Lac de la Hutte Sauvage
Rivière aux Sables
Lac aux Goélands
Attikamagen L
Petitsikapau L
Schefferville
Kanairiktok R
Smallwood Res
Naskaupi R
Menihek Ls
Labrador City
Wabush
Fermont
Churchill Falls
Churchill River
Grand L
North West River
L Melville
Hamilton In
Happy Valley-Goose Bay
Bagle R
Joseph L
Atikonak L
Ashuanipi L
Moisie R
Little Mecatina R
Natashquan R
Brûlé L
Port Hope Simpson
Lac Magpie
Romaine R
Lac Musquaro
Rivière du Petit Mecatina
Lourdes-de-Blanc-Sablon
Str of Belle Isle
BELLE ISLE
QUIRPON I
St Anthony
Hare B
GROAIS I
BELL I
HORSE IS
Flower's Cove
Port au Choix
Roddickton
Port Saunders
Great Harbour Deep
White B
La Tabatière
Tête-à-la-Baleine
St-Augustin
Rivière-au-Tonnerre
Havre-St-Pierre
Natashquan
Sept-Îles
Port-Cartier
Détroit de Jacques-Cartier
Port-Menier
ILE D'ANTICOSTI
Groswater B
Sandwich B
Rigolet
HUNTINGDON I
Cartwright
Makkovik
C Harrison
Hopedale
NUNAKSALUK I
TUNUNGAYUALOK I
Kogaluk R
Nain
SOUTH AULATSIVIK I
PAUL I
C Kiglapait
COD I
Fraser R
St Pauls B
GROS MORNE
Bay of Islands
Deer Lake
Corner Brook
Stephenville
C St George
St George's B
St George's
Meelpaeg L
Grand Lake
Badger
Buchans
Windsor
Grand Falls
Bishop's Falls
Gander
Lewisporte
Notre Dame B
Twillingate
La Scie
Baie Verte
Springdale
Ipe Batt's Arm
FUNK I
FOGO I
C Freels
Bonavista B
Bonavista
Catalina
TERRA NOVA
Trinity B
Bay de Verde
Conception B
C St Francis
ST JOHN'S
Carbonear
Come-by-Chance
St Alban's
Harbour Breton
Fortune B
Grand Bank
Marystown
Burin
Placentia B
Placentia
Argentia
Bay Bulls
Fermeuse
C Race
Trepassey
C St Mary's
St Mary's B
St Lawrence
Isle aux Morts
La Poile B
Burgeo
Rose Blanche
Channel-Port aux Basques
Ramea
Gaultois
Cabot Strait
ILES DE LA MADELEINE
Cap-aux-Meules
Cheticamp
C North
Ste-Anne-des-Monts
Grande-Vallée
Cap Chat
Gaspé
Murdochville
Baie de Gaspé
Percé
Grande-Rivière
Carleton
Bonaventure
Newport
Chaleur Bay
Paspébiac
MISCOU I
Dalhousie
Belledune
Bathurst
Caraquet
Tracadie
Newcastle
Chatham
Tignish
Alberton
Pointe-Sapin

Settlement has developed along the shores of most of the bays and on some offshore islands. The S coast region coincides with the whole southern portion of the Island of Newfoundland. This coast also has the deeply embayed characteristics of a submerged shoreline. It is not blocked by arctic drift ice, although in some years parts of the eastern Avalon Peninsula as far S as St John's may be cut off for a few days. In inland areas the topography is generally hilly and rugged and much land is covered by shallow bogs and heathy vegetation. On the gentle slopes of the major river systems and in the interior of the Avalon Peninsula there is good forest vegetation.

Geology Labrador occupies the easternmost section of the Canadian SHIELD and comprises mostly tough, ancient Precambrian IGNEOUS and metamorphic rocks. There are some areas of softer SEDIMENTARY rocks, notably in the W in a formation called the Labrador Trough — within which lie some of the most extensive iron-ore deposits in N America. The interior region is plateaulike, on average about 450 m above sea level and greatly dissected by large, E-flowing rivers, such as the CHURCHILL R and its tributaries, which cut through the eastern rim of the saucer-shaped Shield to discharge into the Labrador Sea. This rim is largely mountainous, especially in the N, where the TORNGAT MOUNTAINS rise to over 1500 m. The highest peak is Mount Caubvick at 1652 m.

The Island of Newfoundland is part of the Appalachian system and displays in its major bays, peninsulas, river systems and mountain ranges the typical SW to NE alignment. Rocks are more varied on the Island than in Labrador. Continental drifting, followed by frequent periods of crustal deformation and interspersed by long periods of erosion and deposition, have combined to produce this great variety in types and ages. The oldest rocks are Precambrian and occur in the E, in and around the Avalon and Burin peninsulas; they are mostly folded sedimentary rocks, but in a few areas later intrusions have solidified into volcanic rocks. Small remnants of gently sloping Cambrian and Ordovician sedimentary rocks occur in pockets along the coast. The most significant are in Conception Bay, where the Ordovician rocks that form BELL I contain layers of hematite iron ore with estimated reserves of billions of tonnes. The central and western portions of the Island are underlaid by a great variety of Paleozoic rocks of sedimentary, igneous and metamorphic origin, within which crustal deformation has been generally severe. Long periods of erosion following periods of uplift have left a polycyclical landscape with the remnants of old erosion surfaces displayed in the plateaulike interior and on the flat-topped mountains of the Long Range. There is a mineralized belt in these Paleozoic rocks, stretching from an area on the S coast just E of CHANNEL-PORT AUX BASQUES to the general area of western Notre Dame Bay on the NE coast, within which occur ores containing copper, lead, zinc, gold and silver. Through the years many deposits have been mined or quarried on a small scale and for brief periods. Around Buchans to the W of Red Indian Lk, significant deposits of ore have supported a large mining operation since 1928, and a large asbestos quarry has operated near Baie Verte on the NE coast since 1963. The youngest and least disturbed rocks of this Paleozoic series lie in and around the coastal plain on the W coast. These are Mississippian and Pennsylvanian and contain much limestone and gypsum, both of which are quarried. There are a few coal deposits and signs of petroleum, but nothing of commercial value has been discovered. Parallel to the E coast of the Island, under the ocean, extensive deposits of Cretaceous rock appear to stretch the length of the Grand Banks. Drilling from offshore rigs has proved the presence of enormous reserves of petroleum and natural gas in this area. Development will depend on the economic and technical feasibility of operations under adverse weather and iceberg conditions.



François, an outport on Newfoundland's southern coast (*photo by John deVisser*).

Surface All areas of the province show the effects of continental GLACIATION during the Pleistocene era, whose last stages are now dated to 7000 years ago. Moving ice sheets scoured and sculptured the surface. Most of the unconsolidated parent material beneath present-day soils consists of glacial debris or marine sediments, the latter now exposed owing to postglacial uplift. The interior regions of both Labrador and the Island are strewn with lakes and covered with moraines, and give evidence of an immense ice cap, which initially moved radially outward from a centre W of Labrador, but in the later periods of the Pleistocene broke down into smaller, separate ice caps with centres in Labrador, the W-central Island and the Avalon Peninsula. Most coastal regions are fjorded where the ice channeled down the valleys of the preglacial fluvial system. The longest and most steep-sided FJORDS occur in northern Labrador and around the Great Northern Peninsula of the Island, but there are few places where this scouring effect from ice movement is absent. Most bays have been deepened and are often fjordlike in character. Many places in the N of the Island and in Labrador show, because of postglacial uplift, raised shorelines and large stretches of marine sediments. The most striking and extensive marine deposits are those in the remnants of raised deltas that occur around St George's Bay and around Happy Valley-Goose Bay in Labrador at the mouth of the Churchill R. Coastal features, such as offshore islands, spits, tombolos and bay-mouth bars (*barachoix*), which are typical of a submerged shoreline, are common throughout the S and SE coastal regions.

SOILS are generally coarse and immature. In northern Labrador and in high places throughout the province, because of coolness and exposure, vegetation is either entirely lacking or is only of the subarctic, lichen TUNDRA ground-level variety. In the interior regions where surface deposits are deep, such as on the watersheds of the Churchill, Exploits, Humber and Gander rivers, there are excellent forest stands. Extensive bogland has developed in the many hollows of this glaciated landscape. The forest is made up of several of the species common to the boreal forest that stretches across northern N America. Black SPRUCE predominates, especially in open stands and where forest has regenerated after fire. Close forest is most common and here black spruce and balsam FIR are dominant, the ratio varying with the site type; balsam fir regenerates more successfully in places that have been clear-cut. Subdominants are represented by LARCH, PINE and such typical boreal deciduous species as paper BIRCH, ASPEN, ALDER, pin cherry and mountain ASH. Many of the nonforested areas support ground-level, mossy plants, some of which are food for wildlife, and some, such as the blueberry, partridge berry and bakeapple ("cloudberry"), can be gathered for human consumption.

Water Through scouring and deposits, glaciation left a pockmarked landscape capable of storing vast quantities of water in thousands of lakes, ponds and bogs. Many of the ponds are shallow, but many of the lakes are in large, old valleys deepened by glacial scouring and dammed by glacial deposits. In interior Labrador hundreds of lakes have been combined by means of canals, dikes and dams, to create a 6527 km^2 (roughly one-third the size of Lk Ontario) reservoir behind the huge hydro development of Churchill Falls. Because of the moist climate and plentiful snowfall, the water table is high in all areas, usually lakes are full and rivers flow perennially. There is naturally some seasonal fluctuation and occasionally very wet or dry years, but there are rarely shortages of water for domestic or industrial use.

Climate varies considerably throughout the province. Interior Labrador has a continental climate, but the southeastern areas around the Burin and Avalon peninsulas are marine. The transitional variation makes it difficult to designate specific climatic regions, but certain generalizations can be made. The climate of northern Labrador is truly subarctic in that there is generally coolness and dryness throughout the year. Winters are very cold with mean temperatures averaging -20°C, and summers are cool, July mean temperatures averaging 5-10°C. These temperatures are recorded at sea level, and the high land in the Torngat Mts would be even colder. Precipitation is low, annually averaging only 46 cm at Cape Chidley, of which 50% falls

Mountain stream in the Torngat Mts of Labrador (*photo by John Foster/Masterfile*).



as snow. The winters of interior Labrador are extremely cold, with mean temperatures for Jan between -18°C and -23°C; summers are warm, with mean temperatures for July of between 13°C and 17°C. The lowest temperature for the province was recorded in western Labrador at -51°C and the highest at Goose Bay at 38°C. In coastal areas the modifying influence of the ocean reduces the temperature range between summer and winter. In southern Labrador coastal regions are cold in winter and cool in summer, and interior regions are often severely cold in winter but warm in summer. On the Island there is a similar though not so marked difference between coastal and inland regions. The mean Jan temperature at St John's is -3.8°C, while the July mean is 15.3°C. Inland, for most locations, the midwinter mean is between -6°C and -10°C, and the midsummer mean is 13° to 16°C.

Precipitation varies in a NW to SE direction. Average annual precipitation around the Avalon and Burin peninsulas is over 140 cm, and the amount decreases northwestward to amounts around 40-60 cm in Labrador. Precipitation is fairly even every month, but in northern locations about half falls as snow, and in the milder SE snowfall is only about 12%. In any one year great variations may be experienced, depending largely on the paths taken by the storms that cross N America from W to E. When the path is northerly, mild winters with little snow result, but when southerly, there may be a severe, cold and snowy winter. Frequent storms mean frequent windy weather and high average velocities. Coastal waters are often hazardous for small craft. The mixing of the air masses off the Labrador Current and the Gulf Stream frequently creates fogs on the Grand Banks and in eastern and southern coastal areas, particularly in spring and early summer.

Resources and Conservation

The economy of Newfoundland is heavily dependent on natural resources. After its discovery around 1497, the Island depended on cod fishing for nearly 400 years, until the forest and mineral resources began to be exploited.

Forests The variation in climate and in the nature of the terrain dictates a similar variation in the nature of vegetation and growth rates. Generally the well-drained lowlands have the best forest growth, and there are sufficient timber stands to constitute an important resource. Initially the forests were used for building, fencing, fuel and boatbuilding and for shore structures related to the fishery, which made a small dent in the forest resource near coastal settlements. Since the turn of the 20th century, the increased value of lumber and pulpwood has led to penetration and exploitation of the interior. Much timber has been cut and regrowth is generally good although loss through FOREST FIRES and insect infestation has been at times severe (*see* FORESTRY).

Minerals Minerals of economic interest occur in many areas. Those in the mineralized belt of the Island (mostly the base metals, copper, lead and zinc) are mined at Buchans, Daniel's Harbour and near Baie Verte, when market conditions permit. Elsewhere, iron ore from hematite is mined in western Labrador, asbestos is quarried at Baie Verte, gypsum near St George's, pyrophyllite (aluminum silicate) near Foxtrap, Conception Bay South, and limestone near Corner Brook. Other mineral deposits, which have been or may be mined, include fluorspar at St Lawrence, iron ore on Bell Island, gold, copper, barite, uranium and limestone in various places, and the important offshore oil and gas reserves.

Fishery Perhaps the greatest and most permanent resource is the fish population of the waters surrounding the province. Groundfish, such as cod, grey sole, flounder, redfish and turbot, are plentiful on the banks and at times in all inshore areas. Surface-dwelling fish, such as caplin, squid, herring and mackerel, thrive in some areas, and migrating salmon are caught both at sea and in the larger rivers. Trout are plentiful in lakes, ponds and rivers and lobster and crabs in the shallow southern waters.



Corner Brook, Nfld, looking east from Crow Head with the Bowater pulp and paper mill in the upper right. Now one of the world's largest, the mill, which was the basis of Corner Brook's existence, began production in 1925 (*photo by John deVisser*).

Hydroelectricity Large natural reservoirs on the Labrador plateau and interior Island have presented opportunities for the large-scale development of HYDROELECTRICITY. In Labrador, over 5200 MW has been developed and there is a potential for a further 2000-5000 MW, mostly on the lower Churchill R. On the Island about 980 MW has been developed and a potential for a further 200-300 MW remains.

Conservation Since most of the interior of the province is relatively uninhabited, there is ample space and a suitable habitat for wildlife, some species of which constitute an important resource. There is a greater variety in Labrador than on the Island. Among large game are several species of CARIBOU, MOOSE, black BEAR and, in northern coastal areas, polar bear. There are many small, fur-bearing animals; the most important are BEAVER, FOX, LYNX, RABBIT, OTTER and MUSKRAT. Some are trapped for the value of their pelts or for food and some are hunted annually by licensed sportsmen. In many coastal areas colonies of millions of seabirds nest annually, primarily gulls, gannets, murres, kittiwakes and puffins. Sanctuaries to protect these birds have been declared at Gannet I off the Labrador coast, on FUNK ISLAND and Gull Island off the E coast of the Avalon Peninsula and at Cape St Mary's on the S coast. GROS MORNE NATIONAL PARK preserves a spectacular natural region on the W coast and TERRA NOVA NATIONAL PARK on the E coast. There are also 77 provincial parks, and an 868 km^2 wilderness area in the central Avalon Peninsula.

People

A small percentage of the population is aboriginal. The Island's only indigenous people, the BEOTHUK, are now extinct. There are a few thousand INUIT and N American Indians (MONTAGNAIS-NASKAPI) living mostly in Labrador and maintaining their original languages and some of their ancient cultures. MICMAC, living mainly on the Island's S coast, in the Conne R area, are engaged in LAND CLAIM disputes with the provincial government. Elsewhere the population is of European origin, the majority descended from immigrants from southwestern England and southern Ireland. On the W coast of the Island there are pockets of people of French descent (mostly ACADIAN) and some SCOTS whose ancestors were Scots from Cape Breton, NS. Religious affiliation closely follows ethnic origin. Most of those of IRISH and French descent are Roman Catholic and those of English origin are Anglican, United Church, Pentecostal, Salvation Army or Seventh-Day Adventists.

Settlement by Europeans proceeded slowly and reflected the dominance of the fisheries. Early settlers paid little attention to the soil or lack of amenities and settled on the shoreline in bays and coves close to the inshore and offshore fishing grounds, primarily on the E coast. Settlement gradually spread and became permanent. The first centres developed around St John's and Conception Bay, then generally along the E and S coasts. Fish were caught in summer, cured with salt, sun dried and shipped back to Europe in the fall. Inevitably centres of trade and commerce evolved, such as St John's, Harbour Grace, Trinity and Bonavista, and economic ties with the mother country were gradually relinquished. The livelihood of the population depended almost entirely on the vicissitudes of the fishery. New arrivals were few and out-migration to more promising N American areas was constant. The number of settlers grew slowly from about 12 000 in 1763 to 202 000 in 1891.

In the late 19th and early 20th centuries some diversification in the economy created greater stability. Iron-ore mines were opened on Bell Island in Conception Bay in 1894 and pulp and paper manufacture was started at Grand Falls in 1910. In 1925 a second pulp and paper mill was built in CORNER BROOK on the W coast, and in 1928 the mining of base metals was initiated at Buchans. A transinsular railway, begun in 1881 with several spur lines, contributed to the gradual improvement in economic conditions, and in 1935 the population numbered approximately 290 000. The GREAT DEPRESSION of the early 1930s was keenly felt, but ironically WWII brought an unprecedented prosperity, mainly because of employment provided by the construction and maintenance of large defence bases at St John's, Gander, Goose Bay, Stephenville and Argentia. There was only limited postwar prosperity, and by a referendum the people voted to join the Canadian Confederation in 1949. Benefits in the form of generous welfare payments, pensions and numerous other allowances, as well as the postwar marketing boom, kept the economy buoyant throughout the 1950s. The transition to provincial status

was not painless, but most Newfoundlanders, especially the young, are proud to be part of Canada. Over 65% of the 567 681 residents of the province in 1981 were born after Confederation.

The distribution of people changed markedly through the century from 1880 to 1980. When the cod fishery was the only important occupation, nearly all settlement was coastal. Most villages were small and the few large towns owed their size to their role as centres of trade and commerce. As other resources were developed, the mining towns, such as Wabana and Buchans, and pulp and paper towns, such as Corner Brook and Grand Falls, emerged. In the 1950s the centres of Labrador City and Wabush grew rapidly with the development of the iron-ore mines in western Labrador. Incidental to this diversification in the economy a pattern of centralization evolved. Opportunity in the fishery became limited because of the shifting emphasis from numerous small-boat operators to offshore trawlers and the switch from sun-cured, salted fish to fresh-frozen fish in modern plants. A subsequent population movement resulted in the demise of many of the small "outports" and the growth in the size and importance of centres with facilities for fish processing and with access to provincial transportation and communications networks.

In 1981 over half the population lived in incorporated towns. Only 10% of the LABOUR FORCE was engaged in primary occupations (fishing, mining, logging and farming). About 13.3% was engaged in manufacturing and processing, each largely associated with the fishery, pulp and paper, and mining industries. The majority are in professional, clerical, construction and other service-related occupations.

Economy

Once wholly dependent upon the fishery, the economy now includes mining and mineral processing, manufacture based on forest resources and the provision of services and government in centres of trade, commerce, transportation and communication. Transfer payments to areas of regional disparity and other federal government benefits are of paramount importance. The province is generously endowed with natural resources and given a favourable economic climate and clever management could prosper on its own merit. Periodically, development of each resource in turn has proved beneficial to both primary and secondary producers. It is anticipated that the development of offshore oil and natural gas will positively influence the province's economy, but true prosperity will occur only when all resources are developed concurrently and successfully (*see* REGIONAL ECONOMICS).

Agriculture Agriculture has been of very minor importance in Newfoundland because of the poor soil and adverse climate. Less than 0.01% of the land in the province is farmed — about half of it being confined to the northern Avalon Peninsula. Nevertheless, there are scattered pockets of fertile land and conditions are suitable for the growth of hay and pasture crops. Root crops such as potatoes, turnips and cabbage are produced in significant quantities, and in some places livestock, particularly cattle and sheep, are raised on natural pastures. Swine and poultry production is important, as is dairy farming around St John's and Corner Brook. The province is almost self-sufficient in egg production. There are about 4750 ha of land in crops and 4150 ha in pasture (1981 census). Annual yields show potatoes averaging 3 million kg on 396 ha, turnips averaging 3.2 million kg on 248 ha and cabbage averaging 1.5 million kg on 155 ha. Beets, carrots, lettuce, savory, strawberries, chard, broccoli and brussels sprouts are grown in small quantities in small market gardens. Over 1 million kg of wild blueberries are packed for export annually. There are roughly 3500 head of dairy cattle, producing 8700 kL of milk, and 2200 head of beef cattle. Nearly 20 000 pigs are raised and slaughtered annually. There are about 7400 head of sheep, nearly 475 000 layer chickens, producing 7400 dozen eggs, and nearly 500 000 broilers. Other than blueberries, all agricultural production is consumed locally and over 80% of the meat, fruit and vegetables are imported. Studies have shown that the mineral and organic soils (bogs) could provide all the food needed by the present population (except the major grains and tropical and subtropical fruits), but whether such an achievement would be economically feasible is not clear.



St John's, the capital and largest city of Newfoundland, named for the presumed date of discovery on the Feast of St John the Baptist in 1497 (*photo by Bill Brooks/Masterfile*).

Industry The most significant industrial activities based on local raw materials are the numerous processing plants for fresh-frozen and salted codfish, the pulp and paper mills, and the particle-board mill at Donovans, near St John's. Industries using local materials, but on a much smaller scale, are small boatbuilding yards, lumber mills, door and window construction, the canning of seafood and wild berries, and some homecraft industries producing souvenirs. Large manufacturing concerns using imported materials are the phosphorus plant at Long Harbour on the Isthmus of Avalon, the steel-shipbuilding plant at Marystown, the paint-manufacturing plant at St John's and numerous small plants producing staples such as bread, biscuits, margarine, ice cream, soft drinks, beer and other items, whose reputations give them a competitive advantage over imports. The tourist industry is small but has great potential. The province offers unique scenery and excellent parks, motels, hotels and historical sites, which survive mainly through local use aided by provincial and federal funds. Remoteness from the mainland and the increasing cost of travel make progress slow and difficult.

Mining In recent years Newfoundland has mined, on average, about 20 million t of ore (30.2 million in 1979 and 17.8 million in 1982) valued at just under $1 billion and employing around 4000-5000 people. Over 90% of the exported mineral product is from the twin communities of Wabush and Labrador City in western Labrador. Here, IRON ORE is quarried and concentrated (being low grade with about 20-30% iron content). Some ore is pelletized to provide a finished product that is carried S by rail to Sept-Îles, Qué, and thence through the Great Lakes-St Lawrence Waterway to smelters and steel mills around the Great Lakes. Poor markets for iron ore in the early 1980s curtailed production and jobs were lost. The copper-lead-zinc mine at Buchans, operating since 1928, has little ore and few employees remain; at its peak it produced over 50 000 t of concentrate annually, with an average value of $35 million. An asbestos mine at Baie Verte on the NE coast has a fluctuating output, annually producing between 13 000 t and 89 000 t. Other mining operations are small. There is a zinc mine near Daniel's Harbour on the Great Northern Peninsula and a pyrophyllite quarry at Foxtrap, Conception Bay S, that employs a few dozen people. Otherwise activity is sporadic and confined to the quarrying of limestone for cement near Corner Brook, and gypsum for plasterboard near St George's. The iron mines at Wabana on Bell Island closed in 1966 for lack of markets for that type of ore, although there are billions of tonnes in reserve. The fluorspar mine at St Lawrence on the foot of the Burin Peninsula closed from 1978 to 1984. The demand for brick for local building supports a small brickmaking industry at Milton, on Trinity Bay, where there are deposits of suitable clay and shale.

Forestry The principal use of the forest is for the production of newsprint. The mills at Corner Brook, Stephenville and Grand Falls together annually cut an average just short of 1 million cords, which has had a value in recent years of just over $300 million when converted to newsprint. The market for newsprint is highly competitive, and the periodic shutdown of plants or the reduction of staff for weeks and even months is becoming commonplace. In 1981 about 4000 people were employed in logging, wood manufacturing, sawmills, and the pulp and paper industry. Use of modern machinery means fewer jobs for loggers. Wood is delivered to the mills more often by road and rail than by the spring drive on streams and major rivers. In recent years there has been serious loss of good wood because of insect infestation, particularly by the spruce budworm. For the present there is an overabundance of wood, but the infestation has alerted foresters to the need for better harvesting techniques and a planned program of reforestation. In addition to newsprint, a significant portion of the forest product is taken for fuel, lumber, poles, fencing and mining timber. There are few large sawmills but many small ones. Total annual production averages 33 million board feet, which supplies only about one-third of the provincial requirements.

Fisheries Before 1930 the fishing industry concentrated on the production and sale of salted and sun-cured COD. The main markets were Mediterranean and Caribbean countries.

The advent of quick-freezing and of boats capable of transporting the frozen product to market radically changed the industry. Year by year the percentage of salted cod produced and sold declined, whereas the percentage of fresh-frozen fish species such as cod, turbot, plaice and redfish increased, and the principal market shifted to the US. The fishing industry has changed constantly from that time, partly in response to innovations and the modernization of fishing techniques, but also as a result of market variations, competition and the fluctuations of supply and demand. Today, fish companies are found on all coasts, relying on the catches of their own large, deep-sea trawlers, which bring a variety of fish from the banks, and on the small catches of the still numerous, inshore fishermen. The latter use gill nets, cod traps and baited lines and operate from medium-sized boats (long-liners) or from small trap boats or even dories. Since they operate near the shore and have limited range, their catch fluctuates. A few still prepare sun-cured salt cod, for which there is a good market, but most dried salt cod is now produced mechanically by large plants. Changes in the fishery since 1930 have meant more employment on shore in the processing plants and fewer men to secure the catch. Communities with large plants have grown markedly in size and importance although, as mainly one-industry towns, their future is insecure. In many settlements along the coast fishermen augment their income seasonally by catching lobster, salmon, caplin, herring, mackerel, squid, eels, scallops and crab totalling up to 100 000 t and with a landed value of nearly $50 million. In recent years a ready market has emerged for species or fish roe that previously were ignored; E European, Portuguese and Japanese ships annually purchase large quantities of squid, caplin and roe. On average, 500 000 metric t of fish, with a landed value of around $170 million, are taken annually by about 32 000 fishermen. The total processed value is close to $500 million. The offshore catch by trawlers usually amounts to two-fifths of the total and is made up mainly of cod, plaice and grey sole, redfish, turbot and herring. The inshore catch is two-thirds cod.

In 1984 many of the fishing companies were facing receivership because of heavy debts incurred during a period of poor markets, overproduction and overexpansion. An agreement was reached between the 2 levels of government and the banks whereby a new supercompany was formed through the amalgamation of all the former large companies. The success of the restructured fishery will depend largely on its ability to hold a substantial share of the US market, to secure new markets, and to achieve co-operation among fishermen, the industry and government.

Finance The province is served by all the major Canadian banking houses, trust companies, insurance brokers and loan companies. Most regional head offices are in St John's, but there are branches in all the larger towns in all regions. There are 13 credit unions, 20 consumer co-operatives, 13 housing co-ops and 19 producer co-ops. The CO-OPERATIVE MOVEMENT has had its ups and downs. Some fishermen's producer co-ops are very successful and a few consumer co-operative enterprises in large centres have profitable supermarket outlets. Private enterprise is encouraged, especially in resource-oriented areas, and government loans and grants are commonly used in small-business enterprises, such as fishing, sawmilling, farming and small-boat building.

Transportation In the early years of settlement all transportation was by boat or, in the N in winter, by dog team. The establishment of railways, roads and airports brought changes. The transinsular railway from St John's to Channel-Port aux Basques was started in the 1880s and quickly developed branch lines to Argentia in Placentia Bay, Bay de Verde in Conception Bay, Trepassey in the southern Avalon, and Bonavista. Branches were later built to Lewisporte on Bay of Exploits and to Stephenville. The line now operated by CN is narrow gauge and primitive, but it provided an essential service and fostered development across the Island throughout the first half of the 20th century. It was especially valuable to northern communities that were icebound for much of the winter. The railway is declining in importance and now carries mostly freight, and nearly all branch lines are closed or plan to close. There were also a number of small private or company-owned railways, such as the Grand Falls Central. The ultramodern Labrador and Québec North Shore Railway (LQNS) transports ore from Ungava and western Labrador, running from Schefferville, Qué, through Labrador, to Sept-Îles, Qué, on the Gulf of St Lawrence, with an important branch line to Wabush and Labrador City.

Highway development was rudimentary up to 1949. Roads were local, narrow and generally unpaved. A continual road-building and -improving program since the 1950s has provided an Island-wide road network, which is mostly paved and includes the TRANS-CANADA HIGHWAY from St John's to Channel-Port aux Basques. Few communities are isolated. A few important offshore islands have ferry service. Several important offshore islands, eg, Random, Twillingate and Greenspond, are now linked by causeways. In Labrador there is only a short road link between the communities on the Strait of Belle Isle and an interior road from Goose Bay westward through Churchill Falls to the LQNS Railway. The Newfoundland section of another road, linking Wabush and Labrador City with the Québec highway system to give the majority of the Labrador population year-round land access to the rest of Canada, has been completed.

BUSH FLYING has been important in Newfoundland since the 1920s, and some isolated areas still rely on ski- or float-equipped small aircraft or helicopter service for mail and emergencies. The number of landing strips increases annually and many areas can now rely on regular service. There are large airports at St John's, Gander, Deer Lk, Stephenville, Goose Bay and Labrador City; national and regional airlines provide regular scheduled service to and from these points.

The strategic location of Newfoundland made it a logical point for the initial attempts to cross the Atlantic by air. The first successful flight was that made by Alcock and Brown 14-15 June 1919 from St John's to Clifton, Ireland, in a 2-motor biplane. There were many subsequent crossings from Newfoundland in the 1920s and 1930s, culminating with the ferrying of thousands of bombers from Gander to England during WWII (*see* FERRY COMMAND); there was also flying-boat service from Botwood, and regular transatlantic air service via Gander in the prejet era.

Steamship Service Steamship service supplies Labrador coastal communities throughout the summer. There is also some coastal trade by sea around the Island, restricted in winter to the S coast because of arctic drift ice. Ferry service between Channel-Port aux Basques and N Sydney, Cape Breton I, operates daily year-round; and there is a CN Marine ferry service between N Sydney, NS, and Argentia three days a week, June-Sept. Mineral products, processed fish and newsprint are exported mostly in the summer from centres near the plants such as Corner Brook, Botwood and Long Harbour, and from larger towns with fish plants. Most imported products arrive by ship through Channel-Port aux Basques, Corner Brook, St John's and Goose Bay, and are distributed throughout the province by rail and road. In the far N, SNOWMOBILES have largely replaced dog teams in providing transport for hunters and trappers.

Energy Energy resources in the form of hydropower are abundant, especially in Labrador. The province uses only a fraction of its potential energy. On the Island all industrial and domestic needs are met by 980 MW provided by hydro sources and 550 MW from thermal sources. Some projects to help alleviate the high cost of power on the Island include using wood waste and peat in industrial and institutional furnaces. Most of the huge amount of power generated at CHURCHILL FALLS in Labrador is exported to Québec. The resale of this power by HYDRO-QUÉBEC at enormous profits has always irked the Newfoundland government. An attempt to circumvent the contract with Hydro-Québec by enacting legislation authorizing withdrawal of water rights was declared illegal by the Supreme Court of Canada in May 1984.

A picturesque fishing village (Pouch Cove) N of St John's (*photo by Richard Harrington*).



Government and Politics

The provincial legislature of Newfoundland (officially called the House of Assembly) has 52 members elected from single-member districts. As in other provinces it is modelled on the British parliamentary system. The formal head of government and representative of the Crown is the LIEUTENANT-GOVERNOR who is appointed by the prime minister for a period of at least 4 years. The statutory life of the House of Assembly cannot exceed 5 years. The PREMIER and actual head of government is usually the leader of the political party holding the majority of seats in the legislature. The CABINET, comprising the ministers of all government departments, is chosen by the premier from his caucus. Areas of provincial and federal jurisdiction are specified in the CONSTITUTION ACT, 1867. The provincial judicial system includes the Newfoundland Supreme Court, 7 district courts and 18 provincial courts. The Supreme Court is divided into a Trial Division with a chief justice and 3 associate justices, an Appeals Division with a chief justice and 3 associate justices, and a Family Court Division where cases are heard by a single justice. All these justices are federal appointees. The Supreme Court Trial Division sits in St John's but goes on circuit to areas with no local courts. Each of the 7 district courts is located in one of the 7 federal electoral districts and is federally administered. The 18 provincially funded and administered courts are located in major communities throughout the province.

Lieutenant-Governors of Newfoundland 1949-84

	Term
Sir Albert Walsh	1949
Sir Leonard Outerbridge	1949-57
Campbell L. Macpherson	1957-63
Fabian O'Dea	1963-69
Ewart J.A. Harnum	1969-74
Gordon A. Winter	1974-81
W.A. Paddon	1981-

Local Government Local government in Newfoundland bears little resemblance to that found elsewhere in Canada. The pattern of isolated coastal settlement precluded the establishment of a county or township system and generally retarded the initiation of local government. St John's, the first municipality, was incorporated as a city in 1888. Local government came much later to other large centres, and it was not until the post-WWII period that incorporation became common. Many communities have chosen to remain free from local taxes, building codes and other regulations and forgo the benefits of incorporation, such as road repair, garbage collection and street lighting. At present, out of over 800 communities, less than half have any form of local government. There are 2 cities, ST JOHN'S and CORNER BROOK, 167 municipalities administered by town councils, and 139 settlements administered by community councils or local service districts, the latter 2 usually representing groups of communities. Town and community councils have limited taxing authority and can provide few local services. Major works are often mainly financed by the provincial Department of Municipal Affairs, and the provincial government funds health, education, police, highway maintenance and other services.

Federal Representation The Terms of Union under which Newfoundland entered Confederation in 1949 stipulated that the province would be represented federally by 6 members of Parliament (later increased to 7) and 6 senators. Traditionally, at least one Newfoundland MP is appointed to the Cabinet. Several have made a mark in the high-profile portfolios of finance and external affairs, but in general the small representation gives the province limited clout in national decision making.

Public Finance Newfoundlanders endure the highest provincial tax rates in Canada. The 1983 budget estimated that almost one-third of the province's revenue would come from retail sales tax, which is 12%, and from personal income tax. Despite this high taxation rate, the government still receives about half its revenue from federal transfer payments and equalization grants. For 1983 this amounted to almost $1 billion. Education and health, at 24.8% and 23.5% respectively, are the areas of greatest expenditure. Provincial debt charges account for over 16%.

Health In the 1983-84 fiscal year the provincial government budgeted over $400 million on health-care facilities — one-fifth of total expenditures. Under the Medical Care Act of 1969, most health-care services are free to residents of the province. The foundations of the health-care system lie in the cottage hospital system and the International Grenfell Association facilities. The cottage hospital system, initiated by the Commission Government in 1936, was designed to bring a high standard of health care to outport residents. Small hospitals were constructed in central locations around the Island, but by the early 1980s their number had been reduced in favour of larger regional hospitals. The International Grenfell Association, founded by Sir Wilfred GRENFELL in the early 1900s and centered in St Anthony, has provided essential health-care services to inhabitants of the northern areas, particularly coastal Labrador. The General Hospital in St John's is the largest and best-equipped hospital; it is part of the Health Science Centre on the Memorial University campus, which also includes a faculty of medicine and a school of nursing.

Politics Newfoundland's colourful political history began in 1832, with the granting of representative government. A governor and council, appointed by the British government, held most of the power. A House of Assembly was elected by the people by open ballot. Legislation had to pass both chambers. This unworkable form of government was replaced, by popular demand in 1855, with RESPONSIBLE GOVERNMENT based on the British parliamentary system. In 1934, following the onset of the GREAT DEPRESSION and while saddled with crushing debts, the "Dominion" reverted to crown colony status and was governed by a commission consisting of a British governor and 3 commissioners and 3 Newfoundlanders, all appointed by the British government. From 1832 to 1933 no enduring political party with a strongly polarized political ideology emerged. The "Liberal," "Conservative" or "People's" parties were in fact loose coalitions of individual politicians and special-interest groups. Religion, ethnicity and social status were strong factors in early politics. For example, the Catholic "Liberal" Party in the mid-1800s was dedicated to advancing the interests of Newfoundland's Irish community. Parties also coalesced around issues such as Confederation with Canada, the building of a railway and fishermen's interests versus those of the fish merchants. The campaign for Confederation that culminated successfully in 1949 was led by Joseph R. SMALLWOOD, a journalist, radio broadcaster and businessman. In 2 general referenda, Newfoundlanders voted by a narrow margin to join Canada. A lieutenant-governor was appointed and Smallwood was asked to form an interim government. In the first general election Smallwood's Liberals took 22 seats, the Conservatives 5 and an Independent 1. The split represented not only the outports versus St John's but the confederates against the anti-confederates.

Premiers of Newfoundland 1949-84

	Party	*Term*
Joseph R. Smallwood	Liberal	1949-72
Frank D. Moores	Conservative	1972-79
A. Brian Peckford	Conservative	1979-

Present-day elections show that this old hostility is all but dead. Smallwood's Liberals dominated Newfoundland's politics throughout the 1950s and 1960s. Weakened by conflicts between the premier and some powerful Cabinet ministers and by adverse reactions in the press, the Liberals lost the election of 1972. The Progressive Conservative Party took office, led by Frank MOORES until 1979, when the leadership passed to Brian PECKFORD, the former minister of mines and energy in the Moores administration. In 1982 Peckford led his party to a landslide victory, winning 44 of the legislature's 52 seats. The remaining 8 seats were held by Liberals. In the early 1980s relations between the Newfoundland government and the federal government were strained because of disputes over the ownership of offshore resources, over the sale of hydropower in Labrador and over the restructuring of the N Atlantic fishing industry. A lack of negotiation and compromise brought several issues before the Supreme Court.

Education

History The first Newfoundland schools were organized by the Church of England's missionary Society for the Propagation of the Gospel in Foreign Parts (SPG), which funded a school in Bonavista in the 1720s. Later in the 18th century the SPG operated schools in St John's and in several of the larger outports. These schools were apparently open to children of all denominations. A variety of schools were organized in the early 19th century, the most significant being those operated by the Newfoundland School Society. Established in 1823 with a special concern for educating Newfoundland's poor, by the early 1840s this society had nondenominational schools in many of the Island's towns and outports. The 1836 Education Act represented the first direct government involvement with education; funds ($2100) were distributed among the societies promoting education and nondenominational boards of education were established. By 1843 the education grant was divided between Roman Catholic and Protestant school boards. The Protestant grant eventually was distributed among several Protestant denominations, including Church of England, Methodist, Salvation Army and Pentecostal. Post-Confederation amalgamation occurred among several Protestant school systems, but government-funded, church-administered education survives today. The denominational education system was protected in the Terms of Union (1948).

Administration Excepting a few small private institutions, Newfoundland's 627 schools are administered by regional denominational school boards. Representatives of each denomination and of the provincial Department of Education make up a Council of Education, which is responsible for many overall policy decisions. In 1984 the government's education budget was $529 million. In 1984 there were 8219 teachers serving 147 603 students in grades from kindergarten through grade 12 (introduced in 1983-84).

Institutions MEMORIAL UNIVERSITY OF NEWFOUNDLAND, founded in 1925 as Memorial University College, was made the province's only university by a special Act of the House of Assembly (1949). Located on the northern outskirts of St John's, Memorial had 13 147 full- and part-time students in attendance in 1983-84. Sir Wilfred Grenfell College, a 2-year college located at the Corner Brook campus of Memorial, was established in 1975. In many of its larger centres

Newfoundland has post-secondary vocational schools, including the College of Fisheries, Navigation, Marine Engineering and Electronics, and the College of Trades and Technology, both in St John's, and the Bay St George Community College on the W coast.

Cultural Life

The ancestors of most Newfoundlanders came from SE Ireland or SW England and brought with them distinct and enduring cultures. This heritage, shaped by centuries of Newfoundland's isolated, maritime way of life, has produced a vibrant, distinctive culture, expressed in dialects, crafts, traditions, cooking, art, music and writing. Old World influences have generally been replaced by those of the New World, a gradual process accelerated by Confederation and more recently through mass communications, but much of the province's distinctiveness persists. Newfoundlanders are increasingly appreciative of their unique heritage, as shown by the many successful folk festivals and heritage societies. The various levels of government have supported efforts to preserve and enhance Newfoundland's historic culture. The provincial government, primarily through its Department of Culture, Recreation and Youth, supports a provincial museum and the provincial archives in St John's, as well as smaller museums elsewhere in the province and a network of arts and culture centres in major centres. Memorial University, through its art gallery, its extension service and the work of various faculties, has served the province well.

Arts Without neglecting universal concerns and techniques, many Newfoundland artists practise distinctive Newfoundland art forms and use local themes. Poets such as E.J. PRATT, painters such as David BLACKWOOD and Christopher and Mary PRATT, theatre groups such as the Mummers Troupe (*see* MUMMING), novelists such as Percy Janes and journalists such as Ray Guy have drawn inspiration from their Newfoundland homes. Writers and musicians traditionally had to go outside the province for quality production and publishing; several local companies now provide these artists with excellent facilities.

Communications The first newspaper published in Newfoundland was the weekly St John's *Royal Gazette* (1806). By the 1830s several weekly and biweekly newspapers were established in St John's and in the major outports. They were highly politicized, reflecting and perhaps aggravating the political, religious and social tensions that periodically upset 19th-century Newfoundland. Among Newfoundland's first daily newspapers were the *Daily Ledger* (est 1859), the *Morning Chronicle* (est 1861), the *St. John's Free Press and Daily Advertiser* (est 1877) and the St John's *Evening Telegram* (est 1879). In 1983 the province had 3 daily newspapers, the *Evening Telegram* and the Corner Brook *Western Star*, both part of the Thomson newspaper chain, and the locally owned St John's *Daily News*. Thirteen weekly regional newspapers, all English language, are also published. Newfoundland's first public radio stations began operation in St John's in the 1920s. By the 1930s radio stations were broadcasting throughout the Island. In Apr 1949 the CBC began its Newfoundland operation and initiated FM broadcasting in 1975. The province's first TV station, CJON, was opened in 1955; originally a CBC affiliate, it became associated with the national CTV network in 1964 after the CBC opened its own St John's TV studios. Cable TV on the Island dates from 1977, although it is still unavailable outside major centres. Poor reception and limited program choice are continuing sources of frustration to the residents of more isolated areas.

Historic Sites Federal assistance is generous in the establishment and maintenance of historic sites. Newfoundland's rich, colourful history is honoured in several National Historic Parks, including SIGNAL HILL overlooking St John's harbour, site of one of the last French-English battles in N America; Castle Hill, near Placentia, commemorating the French fishing and military presence in Newfoundland; Port aux Choix, site of ancient Dorset Eskimo and Indian cultures; and L'ANSE AUX MEADOWS, the sole confirmed Viking site in N America, which was declared a World Heritage Site by UNESCO in 1978 — the only Canadian location so honoured to date.



Map of Newfoundland (1775) based mainly upon the surveys of Captain James Cook during the 1760s (*courtesy Public Archives of Canada/NMC-52301*).

History

People have lived in the area covered by the modern province since at least 7000 BC. Archaeological research suggests that the Maritime Archaic people were present from at least that time. There is much evidence of INUIT presence before the European occupation, especially in northern areas, and of N American Indians both on the Island and in Labrador. The Island Indians, the Beothuk, were periodically encountered by European settlers. The best known were 2 women, Mary March (DEMASDUIT) and SHAWNANDITHIT, who were captured and brought to St John's. They soon died, presumably of European diseases. Very little is known about Beothuk society and even less about Beothuk history.

Exploration At the end of the 10th century NORSE, including LEIF ERICSSON, made several voyages of exploration from Greenland to overseas lands to the W and SW, and established a temporary settlement at L'Anse aux Meadows on the Great Northern Peninsula of the Island. In 1497 John Cabot, a Venetian navigator, sailed on a voyage of discovery for Henry VII of England and discovered new lands, which are believed to have been between NS and Labrador and included a "new isle." In 1500 the Portuguese explorer Gaspar CORTE-REAL made a more thorough exploration and named several bays and capes along the E coast of the Island. In 1535-36 Jacques CARTIER demonstrated that Newfoundland was an island by sailing through Cabot Strait as well as the Strait of Belle Isle. In the 16th century Basque, Portuguese, Spanish, French and English fished the waters around Newfoundland and Labrador. The English brought the fish home or sold it to Spain, Portugal or France. The French fished mainly in northern areas. Some Spanish ships were engaged in whaling from ports in southern Labrador, and traces of their shore operations and wrecks of their ships are being researched.

Settlement In 1583 Sir Humphrey GILBERT, with a charter from Elizabeth I of England to start a colony in N America, despite finding St John's harbour filled with ships from Spain and Portugal, claimed the adjacent territory for England. Following this declaration, apparently accepted by all except the French, the area came under the control of the merchants from SW England, who are often referred to as the West Country Merchants or the Merchant Adventurers. For nearly 250 years they dominated trade in the area by demanding and receiving virtually exclusive rights to the prolific offshore fishing grounds. They succeeded in persuading British monarchs and parliaments to enact laws that would discourage and even forbid permanent settlement in Newfoundland. Colonies were begun on the Avalon Peninsula by several Englishmen with direct royal permission. John GUY established settlers at Cupids (then called Cupper's Cove) in Conception Bay and later Sir William Vaughan, Lord Falkland, Sir George Calvert (Lord Baltimore) and Sir David KIRKE made similar attempts, particularly at FERRY-

LAND on the E coast. Their efforts were frustrated by the W Country Merchants, the French and the lack of protection against the prevalent piracy. In 1633, under Charles I, the First Western Charter decreed that the captain of the first British vessel arriving in a Newfoundland harbour each spring would be admiral and governor of the harbour for that season. In effect he had dictatorial powers, and in the interest of his sponsoring W Country Merchants he usually took harsh measures to discourage settlement. House burning, lashings and even hangings were common. In 1699 William III gave permission for some settlement and limited some of the powers of the fishing admirals, but improvement was slight and those who dared winter over risked losing all their possessions and even their lives. In the 17th century the French, who were already well established on the mainland, claimed Newfoundland and set up a colony at Placentia on the S of the Avalon Peninsula in the 1660s. Under Pierre le Moyne d'IBERVILLE, they destroyed most of the settlements on the E coast of the Island and claimed St John's. Under the TREATY OF UTRECHT in 1713 the French lost all the territory they had gained on the Island, but retained exclusive fishing rights on the N shore from Cape Bonavista to Point Riche.

The lot of the determined settlers improved a little during the 18th century. In 1729, because of complaints against the fishing admirals, the first naval governor, Capt Henry Osborne, was appointed to take charge during the summer fishing season. He established districts with justices of the peace and constables and to some degree counteracted the power of the W Country Merchants. Settlers still suffered; the IRISH were particularly badly treated and one governor tried to ship them all back home. Following continued complaints to the British Crown, the first civil court was established in 1791 with John Reeves as chief justice. In 1792 a supreme court of criminal judicature was created, ending the rule of the admirals and of the naval governors' courts.

During the SEVEN YEARS' WAR, 1756-63, the French reclaimed many settlements, including St John's, but British forces under Thomas Graves and William Amherst recaptured the area. By the TREATY OF PARIS, 1763, Britain regained most of the territory taken by France, but the fishing rights on the FRENCH SHORE were confirmed and France was awarded the islands of SAINT PIERRE AND MIQUELON. During the latter part of the 18th century, Britain was at war not only with France, but also with the American colonists and with Spain and Holland. Emigration to Newfoundland was still not encouraged, but ironically, because of a prosperous trade in fish and the need for fishermen, settlement proceeded virtually unhindered; by the early 19th century the population was over 40 000.

Development Once a significant permanent population was established, petitions for better government and local representation increased. Dr William Carson and Patrick Morris, through a campaign of pamphlets and petitions to Britain, succeeded in having representative government established in 1832. It proved unworkable, and finally RESPONSIBLE GOVERNMENT with full colonial status was achieved in 1855. Settlement proliferated throughout the 19th century. The salt-cod fishery was the principal occupation and the mainstay of the economy, and there was some logging, mining and agriculture. In the late 1800s the transinsular railway began to open up the interior, and goods and services became accessible to many parts formerly isolated in winter. Representatives of the various Newfoundland governments attended all the Confederation conferences, but they chose not to join, despite substantial support of the movement.



Joseph Smallwood signing the agreement admitting Newfoundland to Confederation. On the right, Hon A.J. Walsh, chairman of the delegation, Ottawa (*courtesy Public Archives of Canada/PA-128080/NFB*).

When the French fishing rights were revoked in 1904, the northern and western coasts were available for settlement. Until about 1925 the economy was based on the primary industries — fishing, mining, and pulp and paper — but debts incurred through building railways and supporting a regiment in WWI, coupled with the Great Depression after 1929, produced bankruptcy and government collapse. Newfoundland was forced to beg Britain for assistance and eventually reassumed colonial status under a COMMISSION OF GOVERNMENT headed by a British governor and staffed by 3 British and 3 Newfoundland commissioners, all British appointees. The economy recovered remarkably towards the end of the 1930s, mainly because of increasing demand for products of the sea, mines and forests, and because of increased activity in defence-based construction in anticipation of WWII. During the war many young people joined the armed forces overseas, and at home there was full employment. The US, Canada and Britain established several army bases, 2 large naval bases and 5 airports in Newfoundland. Gander was the largest and most important airport because of its role in the transatlantic FERRY COMMAND. When the Commission Government was dissolved in 1949 it had cleared all debts and left a surplus of over $40 million. After WWII a national convention was elected to debate the question of Newfoundland's future and to make recommendations. It was decided to hold a referendum through which the people would make a choice between the Commission Government, Confederation with Canada, or a return to responsible government and Dominion status. An intensive campaign ensued between confederates, led by Joseph R. Smallwood, and anticonfederates, but after 2 referenda the confederates won by a narrow margin. Canada accepted Newfoundland at midnight on 31 March 1949 and Smallwood became premier of the first provincial government.

The next 2 decades witnessed dramatic and substantial changes in the economy and in the life-style of Newfoundlanders. The fishing industry was revolutionized as dozens of freshfish processing plants were established on all coasts and as they gradually all but replaced the old method of the family-run enterprise of catching, salting and sun-curing cod for sale to Caribbean and Mediterranean areas. Draggers operating offshore on the Banks, and smaller boats in the near-shore and inshore waters, could now catch a variety of species for delivery to the plants, where the fish were quick frozen for new markets, chiefly in the US. The number of fishermen declined greatly and opportunity for shore work in the plants increased. The pulp and paper mills at Corner Brook and Grand Falls substantially increased production, and mines at Buchans, St Lawrence and Wabana worked to capacity. New industries were launched with government backing and although most failed — including the huge oil refinery at Come by Chance, a steel mill, a rubber-goods plant, a leather-products plant and a knitting mill — a few succeeded, notably the plasterboard mill and cement plant at Corner Brook, the particleboard mill near St John's and the phosphorus plant at Long Harbour, Placentia Bay. The huge iron-ore mines of western Labrador came into production in the 1950s. Since WWII many people have moved from small communities to large towns and growth centres. As chances for local employment have diminished, young people have left the province at an annual rate of about 5000. With opportunities accessible through cheap transportation by land, air and sea, they have moved on, most to central or western Canada. The population that was 289 588 in 1935 had risen to 567 681 in 1981, but growth has since slowed and there is evidence of a levelling off.

The impact of the economic recession of the late 1970s and early 1980s was keenly felt in Newfoundland, although there was no comparison with the desperate conditions of the Great Depression in the early 1930s. Unemployment insurance, old-age pensions, social assistance and other benefits of the welfare state ensured decent living and health standards. High unemployment has most severely affected the young; it is hoped that intensified vocational and technical training programs will prepare the new generation for the anticipated resurgence in the economy with offshore oil development. The Hibernia field, described as huge and possibly larger than the North Sea deposits, is still being tested; if it is developed, many small industries and servicing enterprises could profit. Decisions of the Supreme Courts of Newfoundland and of Canada in 1983 and 1984 declared that ownership of offshore resources (specifically the Hibernia oil field) was federal. On 11 Feb 1985 an agreement was signed between the Newfoundland government and the new federal Conservative administration, giving Ottawa and St John's "joint say over offshore oil and gas management" and allowing "the province to tax the resources as if they were on land."

W.F. SUMMERS

Reading: D. Alexander, "Newfoundland's Traditional Economy and Development to 1934," *Acadiensis* (Spring 1976); J.K. Hiller and P. Neary, eds, *Newfoundland in the Nineteenth and Twentieth Centuries* (1980); H. Horwood, *Newfoundland* (1969); H. Ingstad, *Westward to Vinland* (1969); J. Mannion, ed, *The Peopling of Newfoundland* (1977); S.J.R. Noel, *Politics in Newfoundland* (1970); A.B. Perlin, "Fifty Years of Journalism in Newfoundland," *Newfoundland Quarterly* (1971); F.W. Rowe, *Education and Culture in Newfoundland* (1976); J.R. Smallwood, ed, *Encyclopedia of Newfoundland and Labrador*, vol 1 (1981) and *The Book of Newfoundland*, vols 1-VI (1967); W.F. Summers and M.E. Summers, *Geography of Newfoundland* (1965); J.A. Tuck, *Aboriginal Inhabitants of Newfoundland's Great Northern Peninsula* (nd) and *Newfoundland and Labrador Prehistory* (1976).

Newfoundland Acts In 1699 the first legislation regarding NEWFOUNDLAND was passed in the British Parliament. Formally An Act to Encourage the Trade to Newfoundland, it is better known in Newfoundland as King William's Act or The Newfoundland Act. Like previous ORDERS-IN-COUNCIL, the Act was more concerned about visiting fishermen than it was about the settlers. Despite population increases during the 18th century, settlers continued to be governed by FISHING ADMIRALS (captains of West Country ships) and justices of the peace or magistrates, all under the jurisdiction of the naval convoy commodores who spent the summers in Newfoundland waters supervising the fishery.

Between 1756 and 1800, European wars slowed settlement in Newfoundland and lessened the demand for some measure of self-

government. The following 3 decades saw rapid growth and a vociferous demand, headed by William Carson and Patrick Morris, for REPRESENTATIVE GOVERNMENT. This was aided by the British reform movement: it was not mere coincidence that the bill giving Newfoundland representative government was introduced into the British Parliament on the day that the Reform Bill received royal assent, 7 June 1832.

Representative government, consisting of an elected assembly and an appointed council, proved to be unworkable and was modified by the Aug 1842 Newfoundland Act, which integrated council with the assembly. In 1847 a new Act in effect revived the council and made it an upper house. But nothing short of RESPONSIBLE GOVERNMENT, as established in Nova Scotia and Canada in 1848, would satisfy the people. Following disputes between local factions and between Newfoundland and Britain, responsible government was awarded in 1855. It remained until Nov 1933 when, facing bankruptcy, Newfoundland asked Britain to suspend its constitution. The 1933 Newfoundland Act made this possible. In 1949 Newfoundland became a Canadian province and once more enjoyed the privileges and responsibilities of democratic government. F.W. ROWE

Newfoundland Bill The people of NEWFOUNDLAND rejected CONFEDERATION in 1867, choosing to remain a British colony until 1948, when a majority of voters indicated their willingness to join Canada. The 2 governments negotiated the Terms of Union, which, following a request from the Canadian Parliament, were incorporated by the British Parliament into the BRITISH NORTH AMERICA ACT, thus becoming part of the Canadian Constitution. Accordingly, Newfoundland (including LABRADOR) became a province on 31 Mar 1949. F.W. ROWE

Newfoundland Loggers' Strike began 31 Dec 1958 when hundreds of loggers employed by Anglo-Newfoundland Development Co at Grand Falls struck for wage increases and for improvements in living conditions at wood camps. The AND Co was determined not to settle with the loggers' union, the International Woodworkers of America. The IWA and its charismatic leader, H. Landon Ladd, had been invited to Newfoundland in 1956 by loggers who wanted it to replace the weak and ineffective Newfoundland Loggers' Association. The company, the NLA executive and Newfoundland's media fought the IWA's raid on the NLA membership, portraying its organizers as violent radicals. The IWA counterattacked in full-page newspaper ads and radio broadcasts. Newfoundland public opinion gradually went against the IWA while most loggers voted to have it as their union. For 6 weeks the strike was a normal labour dispute, but public opposition to the IWA reached such a pitch that on 12 Feb 1959 Prem Joseph SMALLWOOD intervened. He declared he would drive the IWA out of Newfoundland and had the legislature pass a law stripping the IWA of its legal bargaining rights. The CANADIAN LABOUR CONGRESS, the International Labour Organization and much of the Canadian media community condemned Smallwood for "his attempt to destroy free trade unionism." But in Newfoundland public support for the legislation grew when on Mar 10 a policeman was killed in a confrontation with picketers. Smallwood replaced the IWA with the government-sponsored Newfoundland Brotherhood of Wood Workers. The loggers quickly signed a contract with AND almost identical to the one proposed by the IWA, thus ending the strike. Two years later, Smallwood turned the NBWW over to the United Brotherhood of Carpenters and Joiners. The CLC suspended the UBCJ for its collusion with Smallwood, but the suspension was ineffective. Against the will of the loggers, the UBCJ became their official bargaining agent. Smallwood and the paper companies had successfully driven the IWA from Newfoundland.

BILL GILLESPIE

Newlove, John, poet, editor (b at Regina 13 June 1938). Newlove is noted for his "direct and visually precise" style, in which most of the traditional signs of poetry — simile and metaphor, overt symbolism, rhyme and heightened language — seldom appear, yet which is intensely rhythmic, full of punning turns and wry modulations of tone. He has unsentimentally explored the existential roots of contemporary despair, yet alongside his evocations of loss, self-hatred and self-pity, envy and anger, his poems offer moments of compassion, ecstasy and, occasionally, even pure joy. Overemphasis on the fear and loathing in his poems ignores the rich wit, irony and humour, the affirmations to be found in the scrupulous honesty of his bare-bones poetic. In the early 1960s, Newlove left the Prairies for Vancouver where he read and studied his craft. Within a few years, his poetry of drifters in contemporary space and historical time had gained him a reputation as a major chronicler of loss and alienation. From poems concerned with personal history in *Moving in Alone* (1965), he moved to poems about Canadian history, of where "we are in truth, whose land this is and is to be," notably in the encounter with native culture in *Black Night Window* (1968), and then to poems on human history, especially the history of war and cruelty in *Lies* (1972), which won the Gov Gen's Award. He moved to Toronto in the late 1960s to work as an editor. In the 1970s, he became a free-lance editor and writer-in-residence at various institutions across the country. *The Fat Man: Selected Poems* appeared in 1977 and a long philosophical poem, *The Green Plain*, in 1981.

DOUGLAS BARBOUR

Newman, Leonard Harold, geneticist (b at Merrickville, Ont 31 Aug 1881; d at Ottawa 16 Jan 1978). From 1905 to 1923 Newman was secretary of the government-sponsored Canadian Seed Growers' Association, founded by J.W. Robertson to improve agriculture by encouraging farmers to breed better strains of crop plants. He took advanced training in genetics in Sweden and succeeded Charles SAUNDERS as Dominion Cerealist in 1923. Newman's duties included licensing cereal varieties for growing in Canada and he regularly attended fall fairs to talk to farmers and explain official policies. Able to identify almost any variety of wheat he might be shown, he enjoyed challenging farmers to stump him. In 1948 he retired to the family farm settled by his grandfather, one of Colonel BY's officers, on the Rideau R and became an enthusiastic local historian.

DONALD J.C. PHILLIPSON

Newman, Peter Charles, journalist, author, newspaper and magazine editor (b at Vienna, Austria 10 May 1929). Originally named Peta Karel Neuman by his secularized Jewish parents, he came to Canada as a refugee in 1940. Envisaging a business career for his son, Newman's father enrolled him in 1944 as a "war guest" boarder at Upper Canada College where he met members of the Canadian establishment whose lives he would later document. Once he mastered English, Newman began writing, first for the University of Toronto newspaper, then for the *Financial Post* in 1951. By 1953 he was Montréal editor of the *Post*, a position he held for 3 years before returning to Toronto to be assistant editor, then Ottawa columnist, at *Maclean's*. In Ottawa, Newman produced his masterly popular political chronicle of John DIEFENBAKER, *Renegade in Power: The Diefenbaker Years* (1963). Five years later, he published a similar, but less successful, study of Lester PEARSON, *The Distemper of Our Times* (1968).

The following year he became editor-in-chief at the *Toronto Star* (later publishing some of his best journalism in *Home Country: People, Places and Power Politics*, 1973) and changed his focus from politicians to members of the Canadian business establishment. In *Flame of Power* (1959), he assembled 11 profiles of the first generation of Canada's business magnates; next he explored the lives of those who currently wielded financial power in popular studies such as his 2-volume *The Canadian Establishment* (1975, 1981), *The Bronfman Dynasty* (1978) and *The Establishment Man: A Portrait of Power* (1982). His books have sold a perhaps unprecedented 1 million copies in Canada and he has had a profound effect on political reporting and business journalism, making them more personalized and evocative. He was editor of *Maclean's*, where for a decade (1971-1982) he worked to transform the magazine from a monthly to a weekly. In 1982 he resigned to work on a 2-volume history of the HUDSON'S BAY CO.

ELSPETH CAMERON

Newmarket, Ont, Town, pop 29753 (1981c), inc 1880, located on the Holland R with easy access to the Don and Humber rivers, 25 km N of Metro Toronto. It was a natural site for a "new market" to serve surrounding settlements as well as fur traders and Indians bound for Toronto. The informal name stuck, and the town is still a market for the produce of Holland Marsh. Lt-Gov John Graves SIMCOE invited the Society of Friends (QUAKERS) to settle the area. Led by Timothy Rogers they arrived in 1801. Their meeting house (*c*1810) on Yonge St, now a historic site, was the first religious building erected by settlers N of York. The families of Elisha Beman and Christopher Robinson (father of John Beverley ROBINSON) dominated early settlement. (The spot was called Beman's Corners originally.) W.L. MACKENZIE had strong support in the region, and Samuel LOUNT was one of its Reform martyrs. Tanning and office furniture were once important manufacturing concerns. Newmarket is a regional centre and residential community, the seat of the York regional government and home of Pickering College, a Quaker foundation for boys. Robert SIMPSON and a partner opened his first store in the village.

K.L. MORRISON

News Agencies Canadian newspapers and broadcast stations depend heavily on news agencies for a regular supply of news from outside their immediate geographical area. One-third to one-half of news and editorial content comes from news agencies, also called wire services or press associations. Material has traditionally been delivered to newspapers by leased teletype circuits. Some equipment for this transmission has the capability of producing punched tapes which can be fed directly into automatic typesetters. Larger newspapers now receive agency copy more quickly through direct computer-to-computer linkups. Broadcasters can receive both print and voice reports.

Most dailies and broadcasters obtain the report of the CANADIAN PRESS (CP). United Press Canada, the major private company, has a smaller subscriber list and staff. The major domestic broadcast agencies are Broadcast News, a CP subsidiary, Standard Broadcast News, and Newsradio. TV networks use international agencies such as Visnews. Supplemental services offer alternative news reports and a wide array of interpretive and background material. Widely circulated are Southam News Service and the services of large US newspapers such as the *New York Times*, *Washington Post* and *Los Angeles Times*. The Associated Press (US), Reuters (British) and Agence France-Presse connect with the CP through exchange agreements.

PETER JOHANSEN

Newspapers Canada's first newspaper, John Bushnell's *Halifax Gazette*, began publication in 1752. Like most colonial newspapers in N America, it was an adjunct of a commercial printing operation. Moreover, it was dependent on the printing and patronage largesse of the colonial government. This reliance on revenues from sources other than readers — from governments, political parties and ADVERTISING — would remain a characteristic of Canadian newspapers.

There were no newspapers in NEW FRANCE, in part because of the opposition of French officialdom to the establishment of printing presses in the colony. The British Conquest, and the termination of the SEVEN YEARS' WAR in 1763, brought a trickle of printers from the American colonies. In 1764, 2 Philadelphia printers, William Brown and Thomas Gilmore, began the bilingual *Quebec Gazette* at Québec City. In 1785 Fleury Mesplet, a French printer who had spent some time in jail because of his attempts to persuade Québec to join the American Revolution, started publication of the *Montreal Gazette*. And in 1793, under the auspices of Upper Canada's first governor, a Québec printer started the *Upper Canada Gazette* at Newark [now Niagara-on-the-Lake], the first newspaper in what is now Ontario. Like the *Halifax Gazette*, these first papers — operating in colonies where populations were low — remained utterly dependent upon government patronage.

The development of legislative assemblies in British North America encouraged political factions. At the same time, particularly in Halifax, Saint John, Montréal, Kingston and York [Toronto], a merchant class, with an interest both in reading commercial intelligence and in advertising, was growing. Weekly newspapers sprouted up, allied with political movements and the various mercantile and agricultural interests. In Lower Canada, the Québec City *Mercury* (1805) and the Montréal *Herald* (1811) became mouthpieces for the province's English-speaking merchants, while *Le Canadien* (1806) and *La Minerve* (1826) spoke for the rising French Canadian professional interests. In Upper Canada, William Lyon MACKENZIE used his *Colonial Advocate* (1824) to argue the cause of Reformers in general and farmers in particular against the dominant professional and mercantile groups. In the Maritimes, newspapers such as Joseph HOWE's *Novascotian* (1824) of Halifax also worked to challenge the authority of colonial oligarchies.

Newspapers, Politics and the State By the early decades of the 19th century, most newspapers were allied with either the Reform (now Liberal) or Conservative Party. These early newspapers were by no means simple tools of the parties they claimed to support but rather were organs of specific leaders or factions within the parties. Thus the Toronto *Globe* (1844) was a personal organ of its publisher, the Reform politician George BROWN. The Toronto *Mail* (1872), while set up to act as spokesman for the whole Conservative Party, was quickly captured by the dominant faction led by John A. MACDONALD.

Moreover, it was not unusual for an organ to deviate from the party line. The *Mail*, for example, broke with the Macdonald Conservatives in the 1880s, forcing the party to set up the *Empire* in 1887. The relative independence of newspapers from political parties and governments varied from place to place. But in general, newspapers had more potential for independence from parties as their revenues from circulation and advertising grew. While they may not have been tools of the parties, newspapers remained closely tied into political factions well into the 20th century. The TORONTO STAR was reorganized in 1899 by a business consortium anxious to obtain an organ for the new Liberal prime minister, Wilfrid LAURIER. The Ontario Conservatives



The paper boy was a common sight on city corners in the late 19th and early 20th centuries (*courtesy Ontario Archives*).

purchased the Toronto *News* in 1908 to act as a party organ. During the first decade of the 20th century the Calgary *Herald* used the organizational apparatus of the Alberta Conservative Party to sell subscriptions. As late as the 1930s most major Québec newspapers were tied into patronage from the ruling provincial government.

In part, the politicization of newspapers continued because readers demanded partisanship. POLITICS was a serious matter in 19th-century Canada; newspapers were expected to have views. Thus occurred the phenomenon of the 2-newspaper town. By 1870 every town large enough to support one newspaper supported 2 — one Liberal and one Conservative. As well, newspapers have never cut themselves off completely from government patronage. Since 1867 the federal government has subsidized newspaper publishers by granting them special postal rates. Canada's first international wire service, Canadian Associated Press (1903), was subsidized by the federal government, as was the domestic news co-operative, CANADIAN PRESS, during the initial years after its founding in 1917.

The relationship between Canadian newspapers and the STATE has also had a darker side. Early publishers who were considered overly critical of government actions could and did find themselves in jail. Libel and criminal libel laws were used to silence bothersome editors. In the 20th century, state action was aimed primarily at left-wing newspapers. The COMMUNIST PARTY OF CANADA found itself proscribed and its publications banned at various times. The Québec government of Maurice DUPLESSIS (1936-39 and 1944-59) used its PADLOCK ACT to shut down what it considered to be communist newspapers. Limited CENSORSHIP was imposed by the federal government in 1970, following the kidnapping of 2 men during the OCTOBER CRISIS (*see* LAW AND THE PRESS).

The Rise of Advertising While partisanship remained, the financial dependence of newspapers on governments and political parties did decline throughout the 19th century. The reason has to do with the economics of newspaper publishing and with overall economic development. Newspapers faced high overhead costs, ie, newspapers were forced to incur the same initial outlays for equipment, typesetting and editorial matter whether they printed one copy or a run of 10 000. In the 1860s, when daily circulations were usually under 5000, these overhead costs were covered by party or government patronage. But as population expanded and literacy increased, publishers were able to spread these overhead costs over more readers. In addition, as a newspaper's circulation increased, merchants became more interested in it as an advertising medium. With productive capacity increasing in all industries, advertising — as a means of persuading people to buy the massive volume of goods being produced — became crucial. Early advertisers were wholesalers trying to catch the attention of other merchants, but by the 1880s retail advertising, aimed at a mass market, was dominant. By 1900 consumers were flooded with newspaper advertisements calling upon them to purchase such things as soap, patent medicines or electric belts. Big-city dailies were earning between 70% and 80% of their revenues from advertising.

Technological developments in the newspaper industry, and in the economy as a whole, hastened the trend to large-circulation, advertising-based newspapers. The spread of the TELEGRAPH during the 1850s and the laying of the Atlantic cable in 1866 increased the availability of world news to newspapers, but at the same time increased their overhead costs of production. By the 1880s, high-speed web presses and stereotyping allowed newspapers to expand their circulations in order to earn more revenue to cover these costs. In 1876 the combined circulation of daily newspapers in the 9 major urban centres was 113 000. Seven years later, it had more than doubled. Railway building, from the mid-19th century onwards, put more of the population within reach of daily and weekly newspapers. By the 1890s, typecasting machines such as the linotype were allowing daily newspapers to expand their size from the standard 4-, 8- or 12-page format to 32 or 48 pages (*see* PRINT INDUSTRY). This greatly increased the amount of advertising space available. At the same time, the development of newsprint manufactured from wood pulp provided a cheap source of supply to newspapers. The price of newsprint plummeted from $203/ton in 1873 to $50/ton in 1900 (*see* PULP AND PAPER INDUSTRY).

Daily Newspapers Early newspapers were weeklies, although a few might be published 2 or 3 times a week. Canada's first daily newspaper, the Montréal *Daily Advertiser*, began in 1833, only to go bankrupt within a year. Daily publication began in earnest in the 1840s when 2 other Montréal newspapers, the *Gazette* and *Herald*, decided to publish each day during the busy commercial season of the summer. Population growth, increased literacy and urbanization hastened the transformation from weekly to daily journalism. In 1873 there were 47 dailies in Canada; by 1900 the country boasted 112 daily newspapers. The major dailies, in turn, used the mails and the railway system to blanket the countryside with their weekly editions and, by the 20th century, with special weekend supplements such as the Toronto STAR WEEKLY or Montréal *Family Herald*.

Newspapers, first weeklies and later dailies, sprang up in the West as white settlement increased. Victoria's *British Colonist* began publication in 1858, the *Manitoba Free Press* (*see* WINNIPEG FREE PRESS) in 1874, the *Saskatchewan Herald* in 1878, and the Edmonton *Bulletin* in 1880.

The growth of a new working class in the larger cities, particularly Toronto and Montréal, encouraged new kinds of newspapers with more emphasis on local news, mass circulation, classified advertisements and (in some cases) muckraking. These newer papers, which sold for a penny a copy (a half or a third of the price of the older established dailies), included Montréal's *La* PRESSE (1884) and *Star* (1869); Toronto's *Telegram* (1876), *Daily News* (1881), *World* (1880) and *Star* (1892); and the Hamilton *Herald* (1889). The older established papers also increased circulation to attract the new classes of readers. In Toronto in 1872 each family bought, on average, one newspaper; by 1883 the average Toronto family was purchasing 2 newspapers each day.

However, in the province of Québec as a

whole, newspaper growth was initially hampered by a low literacy rate. In 1871 only 50% of Québec's French-speaking adults could read and write, compared to 90% for all Ontario adults. Unique to Québec though were daily newspapers devoted to religious ends, such as the ultramontane Roman Catholic *Le Nouveau Monde* (1867) and the Protestant *Daily Witness* (1860). In Québec, newspapers allied to the church, to nationalism and to the cause of French Canada flourished well into the 20th century. In 1910 nationalist Henri Bourassa founded *Le* DEVOIR to promote Québec interests. Papers such as *Le Devoir*, though small in terms of circulation, remained influential among the Québec intelligentsia (*see* FRENCH CANADIAN NATIONALISM).

Labour daily newspapers have been uncommon in Canada. The *Toronto Star* was started by striking printers in 1892, with the backing of the local trade union movement; but within a year it had gone bankrupt and passed out of labour hands. In 1948 the Winnipeg *Citizen* began publication with labour backing; starved for capital, it too went out of business in a year.

The number of daily newspapers peaked at 138 in 1913. By then, the pressures to curb competition and concentrate ownership had already begun. Within each town and city, newspapers vied with each other to expand circulation and thus capture advertising. The competition was costly. Losers merged with stronger papers or went out of business. In Toronto, for instance, the *Mail* and the *Empire* merged in 1895; the resultant *Mail and Empire* merged with the *Globe* in 1936 (*see* GLOBE AND MAIL). By 1949, 4 formerly independent Halifax newspapers — the *Herald, Chronicle, Mail* and *Star* — had merged into one operation with 2 daily editions. The growth of radio in the 1930s and television in the 1950s broke the print monopoly over advertising. By 1953 there were only 89 daily newspapers in the country. By 1980 that number had climbed to 117, about the same as it had been 80 years earlier. However, by 1984, only 6 Canadian cities were served by 2 or more separately owned daily newspapers. With political partisanship becoming less important to readers, the system of the 2-newspaper town had broken down (*see* MEDIA OWNERSHIP). THOMAS WALKOM

Contemporary By the early 1980s daily newspapers were a diminished but still major part of the Canadian mass-media industry. Most newspapers belonged, individually or through chains, to conglomerate enterprises with large holdings in other media or nonmedia businesses. The leading publishers were again diversifying, this time into the new screenprint medium: either online services for access on office or home computers, or videotex services for access on adapted television terminals with key pads. The Toronto *Globe and Mail*, for example, had established the Info Globe online service with a database of the newspaper's contents over several years. SOUTHAM INC, owners of the Southam chain of newspapers, and TORSTAR CORP, owners of the *Toronto Star*, had formed Infomart, a videotex marketing organization prominent in the development of the Canadian TELIDON system. *Le* SOLEIL of Québec City and *La Presse* of Montréal were early participants in videotex trials. The *London Free Press* was a pioneer in the use of videotex for informational advertising in shopping centres.

Screenprint was expected to start cutting into the newspapers' advertising revenue, and possibly their readership base, as the technology developed to provide flat, portable terminals and higher definition print and graphics. However, the convenience of the daily newspaper as a comprehensive source of news, general information and entertainment, with readability, portability and flexibility, appeared likely to sustain it for a long period.

Newspapers were the subject of study by the 1969-70 Senate Special Committee on Mass Media, under the chairmanship of Senator Keith DAVEY, and by the 1980-81 Royal Commission on Newspapers, whose members were chairman Tom KENT, Laurent Picard and Borden Spears. Both studies dwelt on the extent of concentration of newspaper ownership and the diminution of newspaper competition, the Kent commission stressing the conglomeration of newspapers with other types of business. Both studies maintained that freedom of the press embodied the principle of widespread dissemination of information and opinion from a diversity of sources, and that this could be injured by excessive concentration of the press. The Davey recommendation that the federal government establish a Press Ownership Review Board to curb newspaper mergers was unheeded. The Kent recommendation that newspaper owners should not also be permitted to hold radio and TV broadcasting licences in the same market was accepted in principle by the Trudeau government but given only limited application by the CRTC. Ottawa also put pressure on newspapers to belong to press councils. The Kent recommendations to reduce the worst cases of concentration and to offset the effects of conglomeration by measures to provide for journalistic independence and public accountability were not accepted. They were strongly opposed by the proprietors as an alleged interference with press freedom.

Mergers and closings of big-city dailies in the 20th century contrasted with the emergence of new dailies, as small towns grew into cities. An important new development since 1960 has been the appearance of tabloid newspapers in the larger metropolitan areas. Until their arrival, nearly all big-city dailies were newspapers, or mergers of newspapers, already established by the turn of the century. The tabloids repeated the experience of Canada's first mass-circulation dailies in the late 19th century (*La Presse* in Montréal and the *Star* in Toronto) by appealing to the "lowbrow" audience. The pioneer of tabloids in Canada was Pierre PÉLADEAU, with the extraordinarily successful *Le Journal de Montréal* and *Le Journal de Québec* in the 1960s. The Toronto *Sun*, rising out of the ashes of the Toronto *Telegram* in 1971, repeated this success in English Canada — adding right-wing populism to the tabloid formula of sex, sin and sport — and expanded into a chain including sister "Suns" in Edmonton and Calgary. The other main innovation in newspaper marketing occurred at the up-scale end of the market in 1980 and succeeding years when the Toronto *Globe and Mail*, now owned by the THOMSON GROUP as part of its takeover of FP Publications, made use of the new technology of telematics to publish a national edition. This edition is transmitted via satellite for printing at plants in Atlantic, central and western Canada (*see* SATELLITE COMMUNICATIONS).

These various developments provided Canadians, depending on where they lived, with roughly 4 types of daily newspaper: (1) the up-scale, national daily, represented by the Toronto *Globe and Mail* in English and *Le Devoir* of Montréal in French; (2) the down-scale tabloids; (3) small-city dailies, such as the pre-1980 Thomson papers in English and the smaller Desmarais papers in French; and (4) middle-market omnibus dailies, the largest circulation group, existing as monopolies in most larger cities, competing with tabloids in others. Those dailies were typified by Southam newspapers such as the Calgary *Herald* or Montréal *Gazette* in English, and UNIMÉDIA's *Le Soleil* of Québec City in French. A tiny fifth category consisted of for-

Newspaper Circulations (1983)
(Source: Canadian Advertising Rates and Data Catalogue)

City	*Newspaper*	*Circulation*
Vancouver	*Sun*	Mon-Thurs 230 423; Fri 265 639; Sat 273 187
Vancouver	*Province*	Mon-Thurs 142 894; Sun 179 098
Victoria	*Times-Colonist*	Mon 26 238; Tue-Sat 74 564; Sun 51 893
Calgary	*Herald*	Mon-Thurs & Sat 145 145; Sun 184 498
Calgary	*Sun*	Mon-Fri 75 552; Sun 85 400
Edmonton	*Journal*	Mon-Thurs & Sat 162 364; Fri 207 726; Sun 136 188
Edmonton	*Sun*	Mon-Fri 74 469; Sun 91 717
Regina	*Leader-Post*	67 670
Saskatoon	*Star-Phoenix*	55 618
Winnipeg	*Free Press*	Mon-Fri 172 335; Sat 241 793
Winnipeg	*Sun*	Mon-Fri 42 358; Sun 48 177
Hamilton	*Spectator*	143 572
London	*Free Press*	124 881
Ottawa	*Citizen*	Mon-Fri 180 223; Sat 226 653
Ottawa	*Le Droit*	40 397; Sat 45 578
Toronto	*Globe and Mail*	310 689 (Ont 290 321, Alta 25 711, BC 19 907, Qué 11 648, NS 9073)
Toronto	*Star*	Mon-Fri 497 909; Sat 799 038; Sun 488 680
Toronto	*Sun*	Mon-Fri 246 552; Sun 438 814
Montréal	*Le Devoir*	Mon-Fri 33 707; Sat 36 383
Montréal	*Gazette*	Mon-Fri 197 075; Sat 268 724
Montréal	*Le Journal de Montréal*	Mon-Fri 310 416; Sat 335 525; Sun 315 317
Montréal	*La Presse*	Mon-Fri 179 806; Sat 280 196
Québec	*Le Journal de Québec*	Mon-Fri 106 614; Sat 104 487
Québec	*Le Soleil*	Mon-Fri 115 655; Sat 132 499
Fredericton	*Gleaner*	26 310
Moncton	*Times-Transcript*	43 213
Saint John	*Telegraph-Journal*	35 953; Sat 67 720 morning (affiliated)
Saint John	*Evening Times-Globe*	31 637 evening (affiliated)
Halifax	*Chronicle-Herald*	76 888 morning (affiliated)
Halifax	*Mail-Star*	56 937 evening (affiliated)
Charlottetown	*Guardian and Patriot*	17 556 morning; 5 859 evening
St John's	*Telegram*	Mon-Fri 34 482; Sat 47 885

eign-language dailies: *Corriere Canadese* in Italian in Toronto, the Toronto *Chinese Express* and the Vancouver *Chinese Voice*.

The aggregate weekly circulation of all Canadian dailies (publishing 5, 6 or 7 days a week) was more than 32 million at the time of the Kent commission, or a little over 5 million a day on a 6-day publishing schedule. Toronto, Montréal and Vancouver accounted for 44% of national circulation. Circulation per capita had kept slightly ahead of general population growth over the previous decade. A market survey showed that 80% of the adult population reported reading at least 3 or 4 issues of a daily newspaper each week. Regular newspaper reading came close to matching the proportion of the population that could get prompt newspaper delivery, with readership a little lower in French Canada than in English.

The French-language market accounted for 18% of national circulation, spread among 11 newspapers: 9 published in Québec, one in Ottawa and one in Moncton. Ninety percent of French circulation was accounted for by 3 chains: Pierre Péladeau's QUEBECOR (with about half of the chain circulation), Paul DESMARAIS's Gesca (*see* POWER CORP) and Jacques Francoeur's UniMédia.

In the English-language market 59% of circulation was accounted for by the Southam (32.8) and Thomson (25.9) chains, and other ownership groups brought chain circulation to 74% of the total. Concentration in this market was heightened in 1981 when Torstar Corp added a second chain of Toronto-area weeklies to the one it already owned, and again in 1982 when the MACLEAN HUNTER media group obtained control of the Toronto *Sun* chain.

Taking both French and English markets together, only a quarter of the number of newspapers and less than a quarter of circulation was in the hands of independents, and several of these — eg, *Toronto Star, London Free Press* — belonged to multimedia conglomerates. Concentration was reflected regionally by the fact that in all but 3 provinces (Ontario, Québec and NS), single chains controlled two-thirds or more of provincial circulation. Figures prepared by Statistics Canada showed the following percentages of national circulation controlled by the 4 largest owners in Canada: in 1950, 37.2%; 1955, 34.3%; 1960, 35.7%; 1965, 43.6%; 1970, 52.9%; 1975, 62.7%; 1980, 65.1%. A further concentrative factor contributing to homogeneity in Canadian JOURNALISM was the common ownership by the daily newspaper proprietors of the dominant news agency, the Canadian Press, which was also a major supplier of news to radio and TV stations.

The Kent Commission found that the economics of the newspaper industry are conducive both to reduction of competition in local markets and to concentration of ownership. Newspapers derive about 80% of their revenue from selling 50% to 60% of their space to advertisers, and only about 20% of their revenue from selling newspapers to readers. Advertisers in most markets can reach readers more cheaply through one newspaper than through 2 or more. Thus, head-to-head competition between the same type of newspapers has disappeared from most cities, and limited variety of newspapers is only possible where the market is large enough to be segmented into distinct audiences. At the same time, the high capital cost of starting or reequipping a newspaper, combined with the economies to be realized through skilled central management, have favoured chains over independents. Once a newspaper's monopoly is established in a market, or a segment of a market, a paper has proved to be more profitable than the average business. Such newspapers serve as cash incentives to develop other enterprises in a conglomerate.

The hometown nature of the daily newspaper remains its strongest characteristic. Even with the relatively recent development in Canada of market segmentation and a metropolitan pattern of journalism, the national or regional paper must retain a firm base in the metropolis where it is published. Opinion surveys show that although audiences prefer TV for national and world news, and generally find TV the most believable medium, they still read the daily newspaper for local and regional coverage. On the average, two-thirds or more of a newspaper's editorial budget is spent in-house, rather than for outside news services and features. Newspapers try to develop a sense of common interests and common causes with their readers.

National coverage in Canadian newspapers has improved in depth and scope since the 1960s, owing largely to the efforts of the Canadian Press, Southam News and the Toronto *Globe and Mail* to provide stronger Ottawa and interregional coverage. International news coverage by Canadian journalists, however, remains spotty and was criticized by both the Davey and Kent reports. In public-affairs coverage, which continues to be the newspaper's primary social responsibility, the press has felt increasingly bound to follow the scenarios of TV, the preferred medium of the politicians, particularly at the national level and in the larger provinces. Most studies of newspaper content have concluded that newspaper journalism continues to play a strong role in setting the agenda for public debate by establishing news priorities.

As the numbers of big-city dailies declined and the remaining newspapers tended to drop unprofitable out-of-town circulation, community newspapers enjoyed a boom. From 1971 to 1980 aggregate weekly circulation of community newspapers increased from 3.8 million to 8.8 million, or from about one-eighth to more than one-quarter of aggregate weekly circulation of the daily newspapers. During this period there was a steady trend toward concentration of ownership of community newspapers into chains, and of ownership by the proprietors of dailies. Statistics Canada reported total circulation of community papers at 10.7 million at the end of 1981. This figure includes both French and English papers, as well as bilingual papers, mainly in Québec, with a total circulation of 921 000, and ethnic weeklies with a total circulation of 666 000, an apparent decline in ethnic-paper circulation from earlier years. Many community newspapers are distributed free and rely entirely on advertising for revenue.

Advertising expenditures, on which the media are so dependent, were roughly divided as follows in 1981: daily newspapers, 24%; nondaily papers, 6%; periodicals, 15%; television, 17%; radio, 11%; other print (chiefly direct mail and catalogue), 21%; and outdoors 6.0%. Thus, daily newspapers had succeeded in retaining the largest share, but had to be considered in combination with community newspapers in order to match the combination of TV and radio. Daily newspaper revenues reached $1.25 billion in 1980, nearly double the 1974 amount. After the 1980 concentrations and closings, revenues continued to increase tremendously.

Responding to market opportunities, daily newspapers have shown a trend in the larger cities from afternoon to morning (or all-day) publication, and to publishing Sunday editions. The dailies appear to have consolidated a place for themselves alongside the other media, helped somewhat by the fragmentation of radio and TV audiences owing to the multiplication of stations and channels, although competition for the advertising dollar remains intense. The possibility that screenprint services will take away some of the informational advertising for which paper-print news media are strongest appears to be one of the chief threats to which newspapers will have to respond in the long run. *See also* MAGAZINES. TIM CREERY

Reading: P. Audley, *Canada's Cultural Industries* (1983); Canada, Royal Commission on Newspapers, *Report* (1981); Canada, Senate Special Committee on the Mass Media, *Report* (1970); J. Hamelin and A. Beaulieu, "Aperçu du journalisme québecoise d'expression française," *Recherches sociographiques* (1966); W.H. Kesterton, *A History of Journalism in Canada* (1967); P. Rutherford, *The Making of the Canadian Media* (1978) and *A Victorian Authority* (1982).

Newt, *see* SALAMANDER.

Newton, Lilias, née Torrance, portrait painter (b at Montréal 3 Nov 1896; d there 10 Jan 1980). A witty and sophisticated portrait painter, Newton studied in London, Paris and Montréal. She joined the Beaver Hall Hill group in 1920 and was elected associate member of the Royal Canadian Academy of Arts in 1923 and member in 1937 (its third woman member). A founding member of the Canadian Group of Painters (1933), she taught at the Montréal Museum of Fine Arts (1937-40). Her portraits hang in most universities and many boardrooms; pictures of 4 notable colleagues — A.Y. JACKSON, Lawren HARRIS, Edwin HOLGATE, and Arthur LISMER — are at the National Gallery. Her work is distinguished by fresh colour, vigorous composition and sharp insight. Informal portraits of her son Forbes and of friends show great charm and rapport. In 1956 she painted the official portraits of Queen Elizabeth and Prince Philip for Rideau Hall. ANNE MCDOUGALL

Newton, Margaret, plant pathologist (b at Montréal 20 Apr 1887; d at Victoria 6 Apr 1971). She was a sister of Robert NEWTON. While still a student at McGill, Margaret Newton worked on the first scientific survey of wheat rust in Canada, following the epidemic of 1916, and joined the Winnipeg Rust Research Laboratory on its creation. Her research in association with J.H. CRAIGIE is summarized in T. JOHNSON's *Rust Research in Canada* and I.L. Conners's *Plant Pathology in Canada.* Newton was possibly the first Canadian woman to undertake a lifelong research career. She never married and reportedly would work until near exhaustion — and then relax by foreign travel or strenuous canoe expeditions. She retired owing to ill health, perhaps caused by 25 years of exposure to rust-disease spores. A women's residence hall at U Vic is named in her memory.

DONALD J.C. PHILLIPSON

Newton, Robert, plant biochemist, university president (b at Montréal 7 Feb 1899), brother of Margaret NEWTON. He was one of 5 children whose father disapproved of higher education; but all, including 2 girls, became scientists, 4 with PhD qualifications. After service in WWI (MC 1917), Newton became professor of field crops at U of A, whose president H.M. TORY became chairman of the NATIONAL RESEARCH COUNCIL in 1923. Newton's research was focused on wheat: winter hardiness, drought resistance and resistance to rust. He became Tory's chief adviser on agricultural science, served as director of the NRC's Division of Biology and Agriculture (1932-40), and succeeded Tory as chairman of the influential Grain Research Committee. His best university students were sent abroad to earn PhD degrees in the world's leading institutions and came home to constitute the core of the NRC's biology staff. Newton returned to Edmonton in 1940 and was president of his university 1941-50. DONALD J.C. PHILLIPSON

Niagara Escarpment, in its Ontario portion, is 725 km long, covering 1923 km^2, with a maximum height of 335 m. An escarpment may be defined as a steep rock face of great length formed by an abrupt termination of strata. The

Niagara Escarpment adds a unique visual quality to Ontario's landscape as it crosses the province from QUEENSTON, on the NIAGARA R, through HAMILTON, Milton, Orangeville, COLLINGWOOD, OWEN SOUND and Tobermory to MANITOULIN I and ST JOSEPH I. It marks part of the shore of an ancient sea centered in Michigan, which extended W from Rochester, NY, across Ontario to Michigan, then down the W side of Lk Michigan into Wisconsin. Water erosion and glaciation molded its striking features. Historically, the escarpment's waterfalls, forests and rocks provided power and building materials for a young province. In time, however, its archaeological sites, rich fauna and flora, and outstanding potential for recreation — such as hiking on the BRUCE TRAIL, skiing and nature study — created a demand for measures to preserve its scenic splendour. To resolve the complicated jurisdiction of municipalities, regions, counties and conservation authorities, the Niagara Escarpment Commission produced a plan to preserve the escarpment's ecological integrity and a unique Niagara park system of 116 units.

RAYMOND N. LOWES

Reading: William Gillard and Thomas Tooke, *The Niagara Escarpment* (1975).



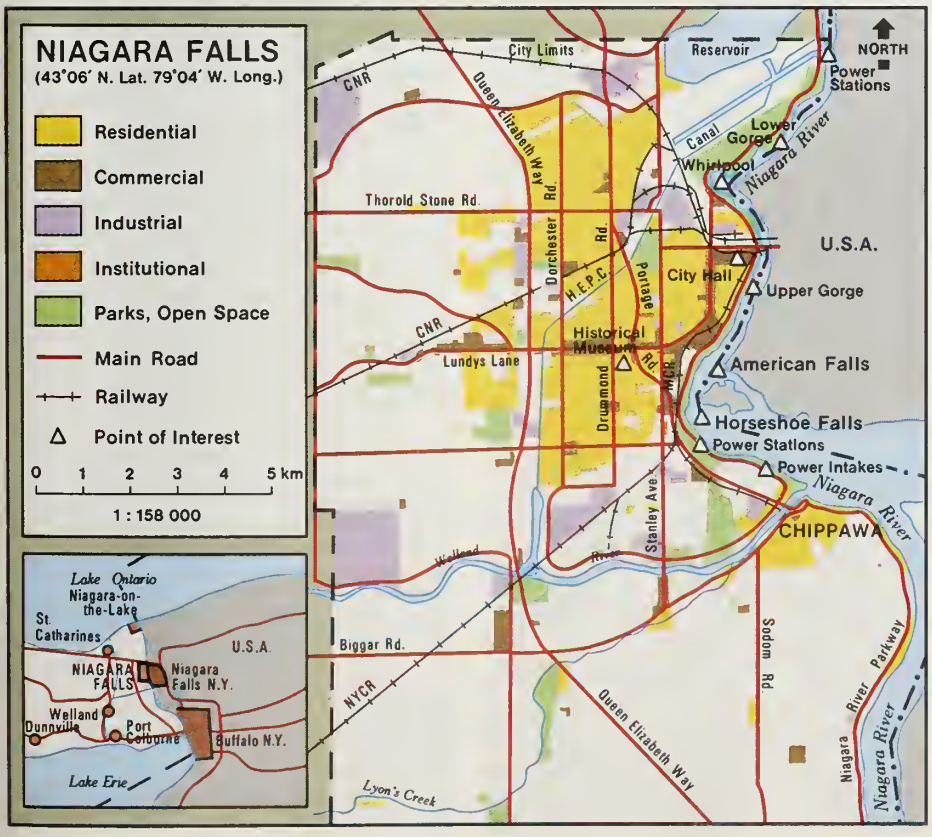
Niagara Falls (1799), watercolour by E. Henn. The falls have been a source of inspiration to visitors for centuries (*courtesy Royal Ontario Museum*).

Niagara Falls, Ont, City, pop 70 960 (1981c), inc 1904. Its fame and name are based on the resplendent NIAGARA FALLS on the NIAGARA R, but its growth has combined tourism with railhead developments and with manufacturing (including electrochemicals and abrasives) based on readily available hydroelectric power. The earliest hotel was built in 1822, and by the 1850s several small communities had developed around the attractions of the falls and the historic battlefield of LUNDY'S LANE. The first bridge was built across the gorge in 1848 and in 1853 the GREAT WESTERN RY arrived, establishing a railhead near the Whirlpool Rapids Bridge of today. In 1856 the towns of Clifton and Elgin were incorporated as the town of Clifton. The name was changed to Niagara Falls in 1881, and in 1904 the town was amalgamated with the adjacent village of the same name and incorporated as a city (pop 7000). The first power companies began operation in 1905 and 1906, and Sir Adam Beck No 1 was the largest powerhouse in the world at the time of its completion in 1921. Sir Adam Beck No 2 (1.4 million MW) was opened in 1954. Both developments required massive diversions of water, through canals and tunnels, from the falls into the powerhouses.

The falls became known in Europe and the US through the paintings and descriptions of visitors in the early 19th century, but full-scale development of tourism came after the 1850s with the railway and in the 1920s and 1930s with the automobile. In the 1930s Sir Harry OAKES bought the sites of the 2 largest hotels and donated them to the Niagara Parks Commission, making possible a well-designed open space around the falls — in contrast to the jumbled, carnival atmosphere of earlier times. The city contains probably the longest strip of motels in the world, along Hwy 20 from the E, and scenic towers ring the falls. Annual visitors are estimated at 14 million.

JOHN N. JACKSON

Reading: G. Siebel, ed, *Niagara Falls, Canada* (1967).



Niagara Falls, spectacular waterfall in the NIAGARA R, is the world's greatest waterfall by volume. It is split in two by Goat I. The American Falls are 64 m high and 305 m wide, with a flow of 14 million litres of water per minute. The Canadian, or Horseshoe, Falls are 54 m high and 675 m wide, with a flow of 155 million litres. The falls were formed some 10 000 years ago as retreating glaciers exposed the NIAGARA ESCARPMENT, diverting the waters of Lk ERIE, which formerly drained S, northward into Lk ONTARIO. The falls have eroded the soft shale and limestone of the escarpment some 1.2 m per year and now stand 11 km from their place of origin at present-day QUEENSTON. The falls were understandably of spiritual significance to the Indians, and "Niagara," meaning "thunder of water," is said to be the last remaining word of the NEUTRAL.

The awesome spectacle was first described by Louis HENNEPIN, who saw the falls in 1678, calling them "a vast and prodigious Cadence of Water." Among those who tried to describe their effect was Charles Dickens, who wrote, "I seemed to be lifted from the earth and to be looking into Heaven." With tourism, which began early in the 1800s, came daredevils who defied the falls in barrels, boats and rubber balls. The most celebrated was Blondin who performed on a tightrope over the falls (1859). Stunting was outlawed 1912. To save the area from hucksters and speculators, Ontario created Queen Victoria Park in 1887 — Canada's first provincial park. Millions of tourists visit the area every year, viewing the falls from several towers, a tunnel beneath Horseshoe Falls, an aerocar over the whirlpool, and the *Maid of the Mist*, a boat that carries sightseers to the foot of the falls. International agreements control the diversion of water for hydroelectric power. The Niagara Diversion Treaty (1950) stipulated that a minimum flow be reserved for the falls and that the rest be divided equally between Canada and the US. In Canada water is diverted from the Niagara R



Wide-angle photograph showing the American Falls on the left and Canadian Falls on the right, and the *Maid of the Mist* (*photo by John deVisser*).

above the falls and fed into the turbines of Sir Adam Beck Generating Stations No 1 (0.4 MW) and No 2 (1.4 MW) by canals and tunnels.

JAMES MARSH

Niagara Historic Frontier, stretching about 50 km along both sides of the Niagara R from Lk Ontario to Lk Erie, is dotted with HISTORIC SITES and cairns. This region was first the home of various Iroquoian and Algonquian peoples. The French arrived in the late 17th century, and tangible evidence remains at Ft Niagara (near Youngstown, NY), which surrendered to British and colonial forces in July 1759. During the AMERICAN REVOLUTION and the WAR OF 1812, Ft Niagara was the scene of considerable military activity.

On the west (Canadian) side of the river, across from Ft Niagara, stand Ft George, Ft Mississauga and Butler's Barracks, all under the auspices of Parks Canada. Ft George, built in 1796, was structurally altered before the War of 1812. Captured by the Americans in a fierce battle on 27 May 1813, it was retaken by British troops that Dec. By war's end it was tumbling into ruins. In 1937 the Niagara Parks Commission funded Ft George's reconstruction according to the original plans of the Royal Engineers. The site was transferred to the federal government in 1969 and established 1977 as Fort George National Historic Park.



Brock's Monument, Queenston Heights, commemorating the War of 1812 battle in which Sir Isaac Brock was killed (*courtesy Parks Canada*).

Battlefield sites such as QUEENSTON Heights, Stoney Creek and LUNDY'S LANE commemorate the people and events of the War of 1812. As well, Ft Erie, built in 1764 and now administered by the St Lawrence Parks Commission, was an active site from the time of PONTIAC to Confederation.

ROBERT ALLEN

Niagara-on-the-Lake, Ont, Town, pop 12 186 (1981c), located where the Niagara R enters Lk Ontario. It was settled by LOYALISTS who had served in Butler's Rangers and was named Newark and made capital of UPPER CANADA by John Graves SIMCOE. The name "Niagara" was taken when the capital moved to York, and it was changed (*c*1900) to the present name to avoid confusion with NIAGARA FALLS (19 km S). In May 1813 the Americans captured nearby Ft George, occupied the town that summer and burned it in Dec. Its heyday was the 1850s, when it was connected to Toronto by steamer and to Buffalo, NY, by railway. However, opening of the WELLAND CANAL and removal of the county seat to ST CATHARINES arrested growth. Camp Niagara (est 1871) trained militia and regulars to 1966. Regional government merged the town and township under one name (1970). Tourism, fruit growing and yacht building are chief industries. Steamer and rail connections had ceased by 1960, victims of the automobile.

Niagara-on-the-Lake is one of the best-preserved early 19th-century towns in N America. Many impressive, neoclassical and Georgian homes still exist here: Clench House (*c*1824); Kirby House (*c*1815), once the home of William KIRBY; McFarland House and Field House (both *c*1800) on the Niagara Pkwy; and Willowbank (1835) in Queenston. St Andrew's Church (1831) is perhaps the finest example of Greek Revival in Ontario. Butler's Barracks (post-1815), the Niagara Apothecary (1820) and Ft George (1796-99) have been restored. The Niagara Historical Museum (1907) displays Loyalist artifacts. The SHAW FESTIVAL was held at the Court House (built 1847) before opening its own theatre in 1973. The town is a premier tourist attraction and an architectural and historical treasure.

JOHN L. FIELD

Reading: John L. Field, ed, *Bicentennial Stories of Niagara-on-the-Lake* (1981); Peter J. Stokes, *Old Niagara on the Lake* (1971).

Niagara Peninsula lies between Lakes ONTARIO and ERIE and the NIAGARA R in SW Ontario. As the river is also the international boundary, the peninsula has played a frontier role since 1783. Physically, it includes 2 contrasting plains separated by the NIAGARA ESCARPMENT. The Ontario Plain, with fertile, sandy soils and a favourable climate, contains the Niagara Fruit Belt, where much of Canada's soft fruits and vines are grown. The wooded slopes of the escarpment, an abrupt rise of some 60 m, are etched deeply by gorges with falls at their head, most notably at NIAGARA FALLS, and are quarried for limestone. The Erie Plain, with bedrock closer to the surface, is less productive than its northern counterpart; the soils are poorly drained clay, and the climate is wetter, with shorter frost-free periods.

Subregions in the peninsula provide a rich variation of detail: shoreline bluffs along Lk Ontario, with ponded river estuaries behind sandbars; the shoreline of glacial Lk Iroquois across the Ontario Plain; the Short Hills embayment in the escarpment, with steep-sided slopes; a kame at Fonthill, the highest point of the peninsula; the buried St Davids Gorge, the plugged channel of an ancestral Niagara R; marsh areas, including peat bogs, on the southern plain; the slender Onondaga Escarpment inland from Lk Erie; and limestone headlands alternating with sandy bays along Lk Erie.

Settlement has responded to this diverse terrain. Indian villages followed the escarpment, and many trails became roads. Permanent settlement arose during the 1780s with the influx of LOYALISTS. NIAGARA-ON-THE-LAKE was established temporarily as the first capital of Upper Canada, QUEENSTON and Chippewa as portage terminals, and Fort George and FORT ERIE as garrisons commanding entry to the Niagara R. Immigrants first settled the Niagara R frontage and the Ontario Plain, then the Erie Plain. Townships, surveyed with 40 ha lots, had a road in front of each concession and between every other lot. Mills developed where rivers crossed the escarpment or could be dammed for water power, and services arose at several "corners" accessible from nearby communities.

The expanding economy was disrupted severely by American invasion during the WAR OF 1812, and by an aftermath of border mistrust. W.L. Mackenzie and some of his supporters found refuge across the border during the REBELLION OF 1837, and FENIAN raids were launched from the American side in the 1860s. Matters changed, however, with interlinking rail and highway bridges, the substantial introduction of American-owned industries, and development of the Lk Erie shoreline under American seasonal cottage and recreational properties.

As the Niagara R was unnavigable, the WELLAND CANAL was constructed across the peninsula to provide through transport by water to the continental interior. First opened in 1829 but continually enlarged, the canal had water power available at every lock, where streams were crossed, and from hydraulic raceways. A line of new settlement was added to the peninsula: ST CATHARINES became an industrial town; Port Dalhousie and PORT COLBORNE grew as ports; and THOROLD and WELLAND were founded, together with Port Robinson and Allanburg on the main canal and Wainfleet and Dunnville on the feeder canal. Niagara-on-the-Lake lost its premier position, and its county functions were transferred successively to Dunnville, Welland and St Catharines.

Railways strengthened existing settlements. Routes constructed during the 1850s along the

2 lakeshores, the Niagara R and the Welland Canal were augmented by 2 southern routes during the 1870s and a transverse HAMILTON-Buffalo line in the 1890s. Settlement expanded at border crossing points, especially Clifton (now Niagara Falls) at the Suspension Bridge and Victoria (Bridgeburg, now Fort Erie) at the International Bridge. Welland, at the hub of the peninsula, expanded "Where Rails and Water Meet" (its civic motto), as did Merritton. Railways also encouraged the emergence of fruit farming, which replaced wheat and mixed farming N of the escarpment; cottage and recreational developments along the shoreline of Lk Erie; and tourism at Niagara Falls. St Catharines became a spa, and religious campgrounds were introduced at Niagara-on-the-Lake, Niagara Falls, Crystal Beach and Grimsby Beach.

The infrastructure was again strengthened through hydroelectric developments at Niagara Falls, and at DeCew Falls (St Catharines) from the Welland Canal. As generating stations, storage reservoirs and power-transmission lines were added to the landscape, towns obtained a new impetus for expansion. Major industries developed, expecially along the Welland Canal in St Catharines, Thorold, Welland and Port Colborne, and at Niagara Falls and Chippawa on the Niagara R. By 1981 the Niagara region housed about 368 000 persons. The principal industries include automotive parts, chemical and electrical products, metal fabrication, primary metals, pulp and paper, shipbuilding, and food and drink, including wineries. St Catharines is the principal service centre.

An extensive interurban streetcar network connecting the towns was replaced by highway improvements, especially the QUEEN ELIZABETH WAY (opened 1939) through the fruit belt to Fort Erie in the 1930s. Outward sprawl from its own towns and sporadic growth into the peninsula from the W now present severe problems. The annual loss of agricultural land on the most productive soil in Canada is severe; external shopping centres have denuded the historic urban cores of much retailing strength; and the escarpment as a vital scenic landscape is threatened by linear developments. Conservation, urban quality and respect for the environment have become major issues, together with the economic future of old, established manufacturing industries. JOHN N. JACKSON

Reading: John N. Jackson and John Burtniak, *Railways in the Niagara Peninsula* (1978).

Niagara River, 55 km long, issues from Lk ERIE and flows N over NIAGARA FALLS to Lk ONTARIO. The upper section is navigable to a series of rapids above the falls, and in fact the first ship built on the Great Lakes, La Salle's GRIFFON, was built here. The river is extremely deep, and beneath the falls flows through a spectacular gorge. Its average flow at Queenston is 5760 m^3/s — greater than the Fraser, Columbia or Nelson. It is crossed by several bridges, notably the Peace (1927) at FT ERIE and the Rainbow (1941), which connects the cities of NIAGARA FALLS, Ont, and Niagara Falls, NY. JAMES MARSH

Nichol, Barrie Phillip, "bp Nichol," writer, sound poet, editor, teacher (b at Vancouver 30 Sept 1944). bp Nichol is recognized as one of Canada's leading experimental writers. He first achieved international recognition for concrete poetry in the 1960s and he has published and recorded his work in many different places and ways. He has performed sound poetry as one of the group The Four Horsemen and in solo concerts has explored theoretical possibilities in the Toronto Research Group; he has published a wide range of poetry and prose in books and pamphlets. In 1970 he won the Gov Gen's Award for poetry. All Nichol's writing forms a unity, but his long ongoing poem, *The Martyrology* (1972-), is the central work. D. BARBOUR

Nichol, Robert, businessman, politician, militia officer (b at Dumfries, Scot *c*1774; d near Queenston, UC 3 May 1824). A successful merchant in Norfolk County, UC, he was elected to the House of Assembly in 1812, 1816 and 1820. During the WAR OF 1812 he served as quartermaster general of militia. Mercurial and capricious, he led the opposition in the Assembly after 1817, though often working closely with the administration and criticizing unrelentingly "the base and wicked Executive." He was an early promoter of canals, and his Assembly report on the resources of the province defined for a generation a strategy for economic development. Nichol described himself with detachment as "more of the Epicurean than Stoic" with "not sufficient stability." ROBERT L. FRASER

Nicholls, Sir Frederic, capitalist, business lobbyist (b in England 23 Nov 1856; d at Battle Creek, Mich 25 Oct 1921). Nicholls played a crucial role in promoting early manufacturing in Canada. Educated as an electrical engineer in Germany, he came to Canada in 1874. A Conservative in politics, he was active in creating the NATIONAL POLICY in the late 1870s. He was the founder and editor (until 1893) of the *Canadian Manufacturer,* and prominent in Toronto press, yachting and charitable organizations. Nicholls was one of the first to exploit the possibilities of electric energy in Canada. In 1891 his Toronto Incandescent Light Co first brought electric LIGHTING to the city, and soon enjoyed a monopoly over the city's electric lighting and power needs. He went on to develop the power-generating potential of NIAGARA FALLS with the Electrical Development Co, and the manufacture of electric equipment with the Canadian General Electric Co. In 1896 he was president of the National Electric Light Assn of America. After the rise of the "people's power" movement in Ontario in the 1900s, Nicholls found much less scope for private power development. He was later involved in numerous Canadian-incorporated utility companies in South and Central America and the Caribbean. In 1917 he was appointed to the Canadian Senate.

DUNCAN MCDOWALL

Reading: H.V. Nelles, *The Politics of Development* (1974).

Nichols, Jack, painter (b at Montréal 16 Mar 1921). Nichols taught himself to draw with the encouragement of Louis Muhlstock in Montréal and the instruction of F.H. VARLEY in Ottawa (1936-40). He was commissioned to paint for the Canadian merchant marine in 1943 and was appointed a navy war artist in 1944. He crossed the Channel on D-Day (6 June) with the British and painted the Normandy landings and actions near Brest. His subjects were always servicemen engaged in their everyday activities. Nichols followed Carl SCHAEFER in winning the Guggenheim Fellowship for creative painting (1947-48). After the war he taught at UBC and at U of T. In his day he was famous for his melancholy, nostalgic drawings and lithographs.

JOAN MURRAY

Nicholson, Francis, soldier, governor of NS (b at Downholme, Eng 12 Nov 1655; d at London 5 Mar 1727/28). He led 2 unsuccessful attacks on Canada via the Hudson R and Lk CHAMPLAIN (1709 and 1711). In 1710, he captured PORT-ROYAL with 500 marines and a flotilla under Commodore George Martin. He was made governor of Nova Scotia and Placentia in 1712, but spent only Aug to Oct 1714 in the new colony. He was recalled and dismissed, ostensibly for maladministration. JAMES MARSH

Nickel (Ni), the 24th most abundant element in the Earth's crust, comprises about 0.008% of crustal ROCKS. Nickel is malleable and ductile. Its high melting point (1455°C), strength and hardness make it desirable for many technical applications. It takes a high polish and in alloys provides strength and resistance to corrosion and heat. Possibly its earliest use was as an unknown element in an ancient Chinese white metal alloy (*paktong*) used in tableware, candlesticks and other ornamental and household articles. The Swedish scientist Axel Cronstedt discovered the existence of nickel in 1751. The major contemporary use for nickel, as an alloying element in stainless steel, consumes nearly 50% of the total supply. Other major uses are in high-nickel alloys, foundry steel and electroplating. The presence of nickel and copper MINERALS near the present city of SUDBURY, Ont, was known as early as 1856, but it was not until 1883, during construction of the CANADIAN PACIFIC RAILWAY, that the significance of the discovery was recognized. By 1890 most ore bodies in the district, comprising the world's largest source of nickel, had been located.

Canada has been the world's largest producer for several decades but its share of world production has declined from 76% in 1950 to about 25% in 1984. In that year total Canadian nickel production was estimated at 174 000 t valued at $1.25 billion. Other major producers are the USSR, New Caledonia and Australia. Principal markets for Canadian nickel are the US and western Europe. Canada's domestic market accounts for less than 2% of world consumption. The principal Canadian producers are INCO LTD and Falconbridge Ltd. Inco operated mines at Sudbury, Ont, at THOMPSON, Man, and at Shebandowan in northwestern Ontario. Falconbridge operated mines at Sudbury. All Canadian mines are based on sulphide ores. Most nickel mines in Canada are underground, but some are also open cast. After the ore is broken, it is sent to the concentrator where it is crushed and the sulphide minerals concentrated by flotation. The concentrate is smelted to produce nickel matte, which is sent to a refinery where cathodes, anodes, pellets and other products are made. *See* COINAGE. R.G. TELEWIAK

Nickinson, John, soldier, actor-manager (b at London, Eng 2 Jan 1808; d at Cincinnati 9 Feb 1864). He stimulated the development of theatre in Toronto and was father of an acting family. He joined the 24th Regiment at age 15 and was posted to Québec C and Montréal where he performed with the garrison amateurs, notably at Montréal's Theatre Royal in 1833. Discharged in 1836, he played his first professional season in Albany, moving in 1837 to New York, where he specialized in dialect comedy. He established a pattern of playing winter seasons in New York and summers in Canada often as an actor-manager. In 1851 Nickinson put together his own company, loosely built around his acting family (Charlotte Morrison, Eliza Peters, Virginia Marlowe, Isabella Walcot and John Jr), and toured the Great Lakes and Lower Canada. Between 1853 and 1858 he successfully ran Toronto's Royal Lyceum Theatre, eventually turning it over to his son-in-law, Owen Marlowe. He acted briefly in New York before stage-managing Pike's Opera House in Cincinnati, Ohio. His daughter, Charlotte Morrison (d 1910) managed the stock company for Toronto's Grand Opera House 1874-79.

DAVID GARDNER

Nicol, Eric, humorist, playwright, journalist (b at Kingston, Ont 28 Dec 1919). Nicol was raised in Vancouver and has long written a column for the Vancouver *Province* which has provided a foundation for his many humorous collections, such as *Girdle Me a Globe* (1957, Leacock Medal for Humour). These works are characterized by verbal shenanigans put in service to play up the foibles of middle-class, urban family life, with occasional diversions into history as it is popularly misunderstood. Nicol is a jack-of-all-trades, having produced everything from *Van-*

couver (1970), a lively history of the city, to *A Scar is Born* (1968), an account of the unsuccess on Broadway of one of his many stage plays. He has written many radio plays and TV scripts, as well as on professional sports (eg, *The Joy of Hockey*, 1978). He frequently works in close collaboration with cartoonists.

Nicola-Similkameen were an enclave of Athapaskans living in the Nicola and Similkameen river valleys of S-central BC (and, marginally, N-central Washington state), surrounded by Interior Salish (*see* SALISH, INTERIOR). One theory regarding Nicola-Similkameen settlement in this area suggests they originated from a Chilcotin Athapaskan war party that stayed and intermarried with the Thompson and Okanagan Interior Salish in the mid-1700s. Another suggests that the Nicola-Similkameen had a long history in this area, having moved from a more northerly Athapaskan homeland many hundreds of years ago, but archaeological data have not supported this theory.

The few words of Nicola-Similkameen that have been recorded suggest that this language was related to Chilcotin, about 250 km to the N, but analysis of artifacts from archaeological excavations indicates that Nicola-Similkameen PREHISTORY is closely linked with that of the neighbouring Lillooet, Thompson and Okanagan areas. By the early 1900s few people remained who spoke the Nicola-Similkameen language, as it had become secondary to the languages of those who now occupied their territory — the Thompson and Okanagan. The Nicola-Similkameen language is now extinct. The last person who had even a partial knowledge of this language died around 1940. However, there are still some geographical placenames both in the Nicola and Similkameen river valleys that are recognized by Interior Salish as being in the Nicola-Similkameen language, and some Thompson and Okanagan people are aware of their Nicola-Similkameen ancestry.

Very little information concerning Nicola-Similkameen culture has been recorded. They, like their Interior Salish neighbours, generally lived in semi-subterranean dwellings (pit houses) during the winter and in tule-mat lodges at other times of the year. The Nicola-Similkameen subsisted primarily on lake fishing. Salmon were obtained mainly through trade, as anadromous fish were not available either in the upper Nicola R or along the entire length of the Similkameen R. The Nicola-Similkameen diet was supplemented by elk, deer and small game, as well as vegetal foods.

Thompson and Okanagan encroachment into Nicola-Similkameen territory was the result of several factors, perhaps the most important being the introduction of the HORSE to the Plateau area in the 18th century. The horse extended travel for the purposes of trade and food harvesting, with the result that Thompson and Okanagan peoples came to utilize areas occupied by the Nicola-Similkameen. By the mid-1800s the Nicola-Similkameen were under the influence of the Thompson and Okanagan. Epidemic diseases, intermarriage with the Interior Salish, and the increasing presence of non-Indians further hastened the demise of the Nicola-Similkameen in the latter half of the 19th century. *See also* NATIVE PEOPLE: PLATEAU and general articles under NATIVE PEOPLE.

DOROTHY KENNEDY AND RANDY BOUCHARD

Reading: F. Boas, "Fifth Report on the Indians of British Columbia," *British Association for the Advancement of Sciences, Annual Report* (1895); G.M. Dawson, "Notes on the Shuswap People of British Columbia," *Transactions of the Royal Society of Canada* 9(2), (1891).

Nicolet, Qué, Town, pop 4880 (1981c), inc 1872, is situated some 3 km from the mouth of the Rivière Nicollet at the eastern end of Lac St-Pierre. Named for Champlain's associate, Jean NICOLLET, it grew slowly from its founding in the early 1700s. Although situated on a vast plain, Nicolet has taken a particular shape. Long blocked to the N by private institutional holdings and to the S by agricultural land, it grew only eastward, along the river and was thus subject to springtime flooding and often suffered from landslides. In the early 19th century it became a major agricultural town and an important crossroads for the townships of the S shore. With its economic activity based on the forest and dairy industries and retail commerce, Nicolet was increasingly the centre for backcountry agricultural parishes. This was the town's golden age: several religious communities settled there and a diocese was formed in 1877. Its population at the time of the 1891 census was 2518. In the 20th century, however, Nicolet failed to establish a viable industrial structure to match the economic growth in its hinterland. DRUMMONDVILLE, VICTORIAVILLE, Plessisville, Princeville and SHERBROOKE all industrialized with the help of American and British capital. Nicolet lost the title of regional capital and its intellectual and religious roles replaced its commercial one. Today, it is a small service centre. RICHARD CHABOT

Nicollet de Belleborne, Jean, interpreter, explorer (b at Cherbourg, France *c*1598; d at Sillery, Qué 27 Oct 1642). Like BRÛLÉ he lived among the Indians to learn their languages, spending 2 years on Allumette I with the Algonquin and later staying with the Nipissing, 1620-29. He was the first European to explore the American Northwest on a fruitless search for the MER DE L'OUEST which took him to Green Bay and the Fox and Illinois rivers. He finally settled at Trois-Rivières, Qué, where he continued to act as an interpreter for the missionaries. On a mission to save an Iroquois prisoner, his shallop was overturned and he drowned. His "memories" recounting life among the Nipissing have come down to us in the JESUIT RELATIONS. JAMES MARSH

Nielsen, Erik Hersholt, politician (b at Regina 24 Feb 1924). Of Anglo-Danish ancestry, Nielsen flew in 101 Squadron in WWII, winning the DFC for "courage and devotion to duty." Rejoining the RCAF, 1946-51, he served as a legal officer and earned a law degree at Dalhousie. He opened a law practice in Whitehorse in 1952 and was elected Conservative MP for the Yukon in 1957. Tenacious and combative in the House, he built a reputation based upon tough cross-examination of Liberal ministers, knowledge of parliamentary practice and loyalty to party and leader. Minister of public works in the CLARK government 1979-80, he was deputy Opposition House leader 1980-81 and Opposition House leader 1981-83. After Clark's resignation as party leader, Nielsen was interim national head of the PCs, 2 Feb-11 June 1983. Brian MULRONEY named him deputy leader of the national PC Party in 1983, deputy prime minister and president of the Privy Council in 1984, and minister of national defence in 1985. NORMAN HILLMER

Nighthawk, medium-sized BIRD of the goatsucker family (Caprimulgidae) characterized by a very short, exceptionally wide bill, enhanced by a ring of projecting bristles, possibly used to capture insects in flight. Nighthawks have large eyes; small, weak feet; long, pointed wings; and soft plumage of mottled blacks, browns, greys and whites. Most active at twilight and night, they spend the day perched lengthways along a limb or fallen log, take cover in a natural cavity, or on the ground, camouflaged by their plumage. Nighthawks are known for their seemingly erratic wing beats, for regularly repeating nonvarying calls for extended periods, and for producing a booming sound with their wing feathers during steep, high-speed dives. Common nighthawk (*Chordeiles minor*), occurring throughout all but arctic Canada, prefers to deposit its 2 eggs on open ground. Whip-poor-will (*Caprimulgus vociferus*) of eastern and central Canada lays 2 eggs on the forest floor and forages near the ground. Common poorwill (*Phalaenoptilus nuttallii*) inhabits semiarid areas in southern BC and occasionally Alberta, laying 2 white eggs on bare ground, often under a shrub. This was the first bird species known to hibernate. When disturbed at the nest, these birds often hiss, snakelike, and feign injury.

PHILIP H.R. STEPNEY

Nightshade, common name for several PLANTS of nightshade family (Solanaceae); properly, refers only to certain species of genus *Solanum*. Seven species of *Solanum* occur in Canada, of which only *S. carolinense* (horse- or ball-nettle), found in southern Ontario, is native. The most familiar nightshade is *S. dulcamara*, climbing nightshade or European bittersweet, found across Canada. It is an attractive vine with potatolike, purple or blue flowers and glossy, poisonous, red berries. Common, deadly or black nightshade (*S. americanum*) is poisonous to humans, and to browsing animals and poultry, causing similar symptoms in each (particularly paralysis and stupefaction). It need not be fatal, depending on amount ingested and maturity of plant. Tubers of cultivated POTATO (*S. tuberosum*) are poisonous if they become green from exposure to sun and their foliage is toxic to ruminants. The family is important as a source of food, drugs and ORNAMENTAL plants, and also contains many other poisonous members: belladonna or "deadly nightshade" (*Atropa belladonna*), not native to N America, is a garden plant with black berries which are poisonous to children; thornapples (jimsonweeds or Jamestownweeds, genus *Datura*), ornamentals with showy flowers, contain poisonous alkaloids in all parts; TOMATO vines (*Lycopersicon esculentum*) are poisonous to cattle; TOBACCO (*Nicotiana*) contains the toxic alkaloid, nicotine. *See* POISONOUS PLANTS.

J.M. GILLETT

Nigog, Le, arts magazine fd 1918 in Montréal by architect Fernand Préfontaine, writer Robert de Roquebrune and musician Léo-Pol Morin. It was the brainchild of Préfontaine, who held a salon for cultivated friends at his Westmount home. Some of them, like Préfontaine himself, had been so impressed by their experience of Parisian artistic life that they came home determined to do something about a Québec which they found intellectually behind the times. The resulting review, *Le Nigog* (named for an instrument used by Indians to spear salmon), sought to educate French Canadians about contemporary art and literature and attracted some 30 collaborators, including 5 Anglophones, to its team. The editors won themselves immediate enemies when they proclaimed the primacy of form over subject matter as the condition of a universal art. Regionalists were horrified: the formalist claim destroyed the serenity with which they had supported the thinking of the establishment. The torture, however, lasted only one year and 12 issues (408 pages). The venture, which had opened up new horizons to Québec youth, gave early expression in French Canada to the views of the French modernists. *See* LITERARY PERIODICALS IN FRENCH.

ARMAND AND BERNADETTE GUILMETTE

Nijinsky, champion colt by NORTHERN DANCER (b 1967). Bred in Oshawa, Ont, by E.P. TAYLOR's stables, Nijinsky was sold as a yearling and trained in Ireland. Winning 11 of his 13 races, including the Irish Sweeps Derby, he was the first horse in 35 years to win the English triple crown. Nijinsky has been second only to his father in his role as stud, siring 67 stakes winners (to 1983). JAMES MARSH



Canadian voyageurs boarding the *Algoma* at Port Arthur, Lake Superior, on their way to Egypt, where for months they helped haul boats up the Nile (*courtesy Public Archives of Canada/C-71203*).

Nile Expedition In early 1884 British Gen Charles Gordon went to the Sudan to rescue Egyptian garrisons cut off by a Muslim uprising led by the Mahdi; but he allowed himself to become trapped in the capital, Khartoum. In Mar 1884 Britain organized a rescue expedition under Garnet WOLSELEY, who had commanded the Anglo-Canadian force sent in 1870 to put down the RED RIVER REBELLION. Wolseley believed the Nile R offered the only reliable route to Khartoum and that Canadian VOYAGEURS could help ensure passage of a large expedition. On the clear understanding that the 386 "voyageurs" (most of them in fact lumbermen) were volunteers in British pay, PM Macdonald's government did not obstruct recruitment by Gov Gen Lord Lansdowne. For 6 months the recruits helped row, paddle, pole and drag the expedition's boats up the Nile, but in vain. Two days before the expedition sighted Khartoum on 26 Jan 1885, the city had fallen to Mahdists. Gordon had been killed. The expedition failed in its main purpose, but for Canadians it was an exotic opportunity to prove themselves against others from all over the growing British Empire. ROY MACLAREN

Nimmons, Philip Rista, jazz musician (b at Kamloops, BC 3 June 1923). Nimmons formed his big band, Nimmons 'N' Nine (later Nimmons 'N' Nine Plus Six), in Toronto in 1953, after classical studies at the Juilliard School, New York (clarinet), and the Royal Conservatory of Music, Toronto (composition). The band made several more albums, including recordings of Nimmons's most ambitious works, *Atlantic Suite* (1974), *Transformations* (1975) and *Invocation* (1976). Extremely popular through regular CBC broadcasts and concert tours, the band was active only sporadically by 1980. Long involved in music education, Nimmons began teaching at U of T in 1973, and has helped establish jazz programs elsewhere. MARK MILLER

Nine-Hour Movement, international workers' attempt to secure shorter working days; in Canada, Jan-June 1872. Beginning in Hamilton, the demand for the 9-hour day (some workers were expected to labour as long as 12 hours) spread quickly to Toronto and Montréal, gathering support in Ontario towns from Sarnia to Perth. Echoes were heard as far E as Halifax. For the first time Canadian labour organized a unified protest movement, developed tactics of resistance, and cultivated articulate working-class leaders. Nine-Hour leagues united union and non-union workers, and in May labour representatives formed the Canadian Labor Protective and Mutual Improvement Association. Some newspapers popularized labour's causes. In Mar-Apr an unsuccessful Toronto printers' strike reminded labour that employers were strongly antagonistic to workers' initiatives and that trade unions were actually illegal in Canada. On May 15 Hamilton's "nine-hour pioneers" defied opposition with a procession of 1500 workers. Skilled, respectable craftsmen emerged as labour leaders. James Ryan, a Great Western Railway machinist-engineer recently arrived in Canada, was Hamilton's central figure. In Toronto his counterpart was cooper John HEWITT, and in Montréal, James Black.

Although some groups won concessions, the movement was unsuccessful. Employer hostility helped its defeat, as did the waning of post-Confederation prosperity. Equally significant were divisions within the working class. Women and the unskilled figured peripherally at best, ensuring that the struggle touched certain sectors more fully than others. All this, in conjunction with the apparent failure of militant strikes and workplace action to win decisive victories for workers, fed the attempt to secure rights politically through LABOUR LAW. The Nine-Hour Movement was not an utter failure. Its struggle in 1872 indicated that labour had a public presence and that its interests, institutions and political stance reflected its unique social position and economic needs. It represented a necessary, if ambiguous, beginning in labour's capacity for self-government. The right to associate in trade unions was obtained. Working-class activists won major concessions immediately after 1872: repeal of repressive legislation, passage of laws strengthening workers' hands against employers, and franchise extension. The nine-hour pioneers gave way to the Canadian Labor Union. BRYAN D. PALMER

Niosi, Bert (Bartolo), bandleader (b at London, Ont 10 Feb 1909). He was known as "Canada's King of Swing" during his residency (1932-50) at the Palais Royale dance hall in Toronto. He joined CBC radio's "Happy Gang" (1952-59) and served as musical director (conductor, arranger) for several CBC TV series, including "The Tommy Hunter Show" (1965-76). Niosi was most notably a clarinetist and alto saxophonist, but he also played trumpet and trombone with his dance band. Two brothers were also dance band and radio musicians: Joe (1906-77), a bassist, and Johnnie (1914-65), a drummer. MARK MILLER

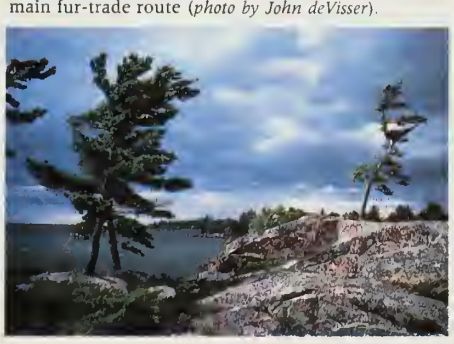
Nipawin, Sask, Town, pop 4376 (1981c), inc 1937, is located 200 km NE of Saskatoon. The town is named for a height on the SASKATCHEWAN R just upstream from the present townsite (in Cree, "place where one stands"), which commanded a wide view of plain and river and served as a popular lookout point for the Indian bands that frequented the area. Nipawin is situated at a point on the Saskatchewan R where the prairie and woodland meet. Camping, fishing and other recreational activities are popular and 2 regional parks are located in the area. The soil to the S of the town is rich, and crops grown in the region include wheat, oats, barley, alfalfa and canola. DON HERPERGER

Nipigon, Lake, 4848 km², elev 320 m, 165 m deep, located in northwestern Ontario, 100 km NE of THUNDER BAY, drains S into Lk SUPERIOR through the Nipigon R. The name may be derived from the Ojibwa *Animi-bee-gong* ("continuous water"). In the 18th century, the Cree who occupied the area were gradually displaced by the present inhabitants, the Ojibwa. European visitors included RADISSON and DES GROSEILLIERS (1658), Father Allouiz (1667) and DULHUT, who in 1684, in response to competition from the HBC, built Ft La Tourette on the NE shore of the lake. Later posts were established by the NWC and HBC, but none grew into major settlements. With its limited population, unspoiled environment and abundant fish and wildlife, the area is ideal for outdoor recreation. The lake supports a small commercial fishery and the adjacent forests supply pulpwood for mills in Red Rock and Thunder Bay. Since 1940 water has been transferred S from the ALBANY R watershed, via the Ogoki Diversion, into Lk Nipigon, increasing its natural capacity and allowing the generation of 266 000 kW from 3 hydroelectric plants on the Nipigon R.
DAVID D. KEMP



Nipissing, Lake, 831 km², elev 196 m, fifth-largest in Ontario excluding the GREAT LAKES, is located 50 km NE of GEORGIAN BAY. Its name derives from an Indian word meaning "little water." Lk Nipissing runs in an E-W direction to a length of 80 km. Because it parallels the prevailing winds, navigation is frequently treacherous. It is comparatively shallow (about 10 m in most places) and is consequently well aerated, which is conducive to healthy plant and fish life. Dozens of rivers and streams drain into Lk Nipissing, the largest being the Sturgeon R. Historically its 2 most important outlets were the Mattawa R, which links it to the the OTTAWA R system, and the FRENCH R, which issues from its SW end, draining into Georgian Bay. Along this Ottawa-N Georgian Bay route travelled the early French explorers — the first being Étienne BRÛLÉ

The shore of Lake Nipissing, Ont. The lake was on the main fur-trade route (*photo by John deVisser*).



in 1610 — tracing a path followed by fur traders for the next 200 years. Permanent settlement around the lake dates from 1874 at Nipissing village in the SE and from 1882 at NORTH BAY when the CPR reached its NE shore. From the 1880s through to WWI Lk Nipissing was a major transportation route for settlers and lumbering, as steamships plied it regularly. Since then it has served mainly as a tourist and recreation waterway. MATT BRAY

Niverville, Louis de, painter (b at Andover, Eng 7 June 1933). Self-taught, Niverville worked 1957-63 as a graphic designer for the Canadian Broadcasting Corporation in Toronto alongside Dennis BURTON and Graham COUGHTRY. The turning point in his work, when he considers he really started to paint, was in 1966-67 with a mural for Expo Theatre in Montréal. After that he developed a formidable technique, particularly with collage, to express an astonishing, visionary world often wrought from childhood memories. Niverville's work is characterized by fresh and provocative thought. He directs his dreams, orchestrating their curious juxtapositions, strange happenings and colours into his paintings. JOAN MURRAY

Nixon, Harry Corwin, politician, premier of Ontario (b at St George, Ont 1 Apr 1891; d there 22 Oct 1961). He won acclaim for his political longevity, spending 42 years as an Ontario MP. Elected among the UNITED FARMERS OF ONTARIO in 1919, he eventually led that group's remnant into farmer Mitchell HEPBURN's revitalized Liberal Party and to the first Liberal victory in a quarter century (1934). Throughout Hepburn's regime, Provincial Secretary Nixon's stability helped balance the premier's mercurial temperament and after "Mitch" and his chosen successor, Gordon D. CONANT, resigned, the party chose Nixon as leader and thus premier (May 1943). An election followed 3 months later, and voters ousted the Liberals. Nixon continued to represent his rural constituency until his death. BARBARA A. MCKENNA

Nobbs, Percy Erskine, architect (b at Haddington, Scot 11 Aug 1875; d at Montréal 5 Nov 1964). As director 1903-10 and then professor of design (until 1940) at McGill School of Architecture, Nobbs was an important force in early Canadian architectural education. His training under Scottish Arts and Crafts architect Robert Lorimer led him to pioneer study of Canada's vernacular architecture, which he regarded as the key to functional, environmentally sensitive modern design. His works include notable buildings and extensions at McGill, numerous commissions in the Montréal region, and the development plan (with Frank Darling) and early academic buildings at the University of Alberta. SUSAN WAGG

Reading: Susan Wagg, *Percy Erskine Nobbs* (1982).

Noise, unwanted or unmusical sounds, especially those that are random or irregular. The attitude that noise is not conducive to the well-being of sentient creatures is as old as history. The Babylonian story of the Flood, as recorded at about the time of Hammurabi (2000 BC), attributes the event to the anger of the gods over the noise of men. Egyptian priest Ipu-ner lamented, "Noise passes through the land leaving a trail of sadness." In his ethical directives to doctors, Hippocrates (400 BC) stated, "Noise must be avoided and kept well removed from the sick." Some of the sources of noise in those times may be gleaned from the history of Sybaris, a Greek colony in southern Italy (600 BC), where noisy trades, such as blacksmithing and stonemasonry, were prohibited within city walls. Impact noises were evidently the Sybarites' main concern. This was not the case in Imperial Rome where the main noise came from traffic. In that walled city of one million people, traffic congestion was so great that goods vehicles were allowed on the streets only at night. The continual movement of steel-rimmed wheels on stone-paved streets created a clatter that caused Marcus Martial (80 AD) to complain: "I have Rome right beside my bed at night." In England in the days of Henry VIII, the method of maintaining "the peace, quiet, rest and tranquility of the citizens" was still primarily by prohibiting certain noisy activities at least during resting hours (9 PM to 4 AM). Carts using the streets daily within the city of London could not "have wheels shod with iron, but bare, under pain of six shillings."

One problem that inhibited noise control before the 20th century was the inability to measure noise levels. The ear is an unreliable measuring instrument, a problem further complicated by the ability to become habituated to frequent or regular background sounds. Electronic amplifiers solved the problem and made sound-level meters convenient and reasonably standardized, allowing correlations between exposure to noise levels and quantitatively measured effects on people. "Boilermaker's ears," a loss of hearing resulting from long-term exposure to extreme noise, had long been recognized but, in the middle of this century, a more general relation was established between noise exposure and hearing loss. Subjective reactions (eg, annoyance) have yielded to ever-improved methods of measurement. Sound-level meters are calibrated in decibels (db) and have weighting networks discriminating against certain frequencies. For example, the A-weighting network, most widely used in dealing with human response, gives less weight to low frequencies because they produce less annoyance, hearing loss, etc.

Noise levels may be divided into 3 ranges according to their effects on people. Zero decibels is the approximate threshold of hearing. Levels of 0-40 db are generally judged as quiet and annoy only if they contain strong tone components. Those between 40 and 80 db may be a nuisance, depending on their nature and the conditions under which they occur. For example, the level of conversational speech at a distance of 30 cm averages about 60 db. A full orchestra may play for extended periods at 80 db and well above that for brief periods, yet we willingly pay for exposure to it. Nuisance noises generally occur outdoors in urban and suburban environments and are the subject of noise bylaws. Significant causes include car traffic, which is all-pervasive, truck and public transportation traffic (road and rail), which is more restricted, and air traffic, which is usually more localized but can have adverse effects even far from civilization. An important part of nuisance noise may come from air conditioners, lawnmowers, snowblowers, etc. These noises are annoying because they may startle and distract, and interfere with understanding speech or with rest and sleep. The limit set by bylaws for environmental noise may vary from a low of 40 db in suburban, purely residential areas at night, to a high of 75 db in a purely industrial area during the day.

Distance can be a very effective protection from environmental noise: in a uniform atmosphere, each time the distance doubles, the noise from a single source is reduced by 6 db. For example, most passenger cars travelling at 60 km per hour produce a noise level of 65 db at 15 m, 59 db at 30 m and 53 db at 60 m. Unfortunately, distance often cannot be controlled at will. Distance is the primary means of keeping air-traffic noise down in residential areas. Buildings, rock formations and forests act as noise barriers, most effective at short distances. House design can affect noise levels in the indoor environment: maximum wall attenuation (about 45 db), double windows with forced ventilation and sound-absorbing materials inside the house all help reduce noise. Noise levels of 80-120 db are uncommon in our environment, but are common in some industries and at airports.

Noise may cause physiological damage, especially to the inner ear; duration of exposure is fundamentally important. The Canadian government (like most other Western governments) has set a limit of 90 db to the noise level to which unprotected industrial workers may be constantly exposed during a working day. Many governments set this limit at 85 db. For higher levels, permissible exposure time is lower. Exposure without protection to levels above 115 db is usually not permitted. Noise levels above 120 db are rare except near powerful sources such as jet or rocket engines. Sound may be felt at 120 db; it will cause pain in the ears at 130 db. At 160 db, or higher, combustible sound-absorbing materials may be ignited by the heat into which the sound energy is transformed. White noise, which has nearly uniform energy distribution over the audible frequency range, is often used to mask low-level noise with annoying characteristics. It may also be used to mask low-level speech from neighbouring areas, thus preventing distraction and ensuring privacy. White noise is not usually effective when the offending noise is above about 40 db. Humans are not the only animals to suffer from excessive noise. For example, in wild bird populations, noises in the 40-80 db range may interfere with nesting success. Even normally acceptable sounds may be a source of debilitating stress, eg, birds may desert their breeding territories in response to excessive playbacks of territorial songs.

In comparison with other countries, Canada has little noise abatement legislation and the legislation that exists is aimed primarily at private individuals. Such laws as do exist to regulate various kinds of noise pollution are controlled by different levels of government. Noise from traffic, industry, etc, is regulated by municipal governments. Ottawa was the first Canadian city to pass a quantitative noise bylaw (1970). Aircraft noise is controlled by the Air Services Division of the federal Department of Transport. Canadian airports that have noise abatement policies for aircraft takeoffs and landings include Montréal International, Pearson International and Winnipeg International. No regulations exist to control small plane or helicopter noise. Partial curfews (affecting flights from midnight to 7 AM) are in place at Montreal and Toronto airports. WORKERS' COMPENSATION boards have authority to investigate industrial noise.

A great deal of research has been done at the NATIONAL RESEARCH COUNCIL OF CANADA on reducing noise at the source; for example, noise in suction rolls (eg, in paper mills) may be reduced by designing quiet drilling patterns. Attempts to block sound once it is produced resulted in development of hearing protectors with liquid-filled cushions, which are used at airports around the world. Controlling noise in the community by community and road design and by legislation has received a great deal of attention, as has the transmission of sound under the complex conditions prevailing in the real world. The effects of various levels of noise on sleep characteristics have been studied for about 15 years. University of Toronto Institute of Aerospace Studies has been involved in examining AERODYNAMIC noise, both at boundary layers and in jets. At McMaster University, the chief effort in this field has been on community reaction to traffic noise. G.J. THIESSEN

Reading: R. Murray Schafer, *The Book of Noise* (1973).

Non-Medical Use of Drugs, Royal Commission on the (Le Dain Commission), investigated the role governments and courts should play in prohibiting and regulating the use and distribution of drugs (particularly opiate and

marijuana but also alcohol, barbiturates, amphetamines and others) used for nonmedical purposes. The inquiry was commissioned when nonmedical drug use was in part symbolic of a more widespread controversy over life-styles and political participation, and it operated in an atmosphere of controversy. It broadened its interpretation of its mandate to include a discussion of the social values promoting drug use. Hearings were held across Canada, sometimes in camera with drug users, sometimes in coffee houses. The testimony of those affected by governmental and court actions was greatly emphasized. The inquiry produced 4 reports (1973); the final one contained extensive scientific documentation and recommended that policies should be adopted to discourage nonmedical drug use and that sanctions should be tailored to fit the crime. The inquiry did not recommend decriminalization of nonmedical drugs, although one of the 2 dissenting commissioners did. Most of the recommendations have not been legislated, but in enforcing existing legislation the courts have followed the direction advocated by the inquiry. *See* DRUG USE, NONMEDICAL.

LIORA SALTER

Non-Partisan League, an agrarian protest movement imported into Canada from N Dakota in 1915. The league became a political force in the Prairie provinces after its 1916 victory in the N Dakota state election. A number of leading urban radicals, including J.S. WOODSWORTH, William IRVINE and Salem BLAND, provided organizational assistance. The league hoped to replace the party system with a form of direct democracy where CABINET domination of the legislature would be replaced by constituency control of MLAs. Issues were to be decided on their merits rather than as a result of partisan difference. Although the league itself had disappeared as a political force by 1921, its influence continued to be felt in western Canada. Farmers, partly won over by its rhetoric, became more class conscious, and the old party system was swept away by a succession of new groups, the PROGRESSIVES, the UNITED FARMERS OF ALBERTA, SOCIAL CREDIT and the CO-OPERATIVE COMMONWEALTH FEDERATION.

J.T. MORLEY

Nonsuch set out for HUDSON BAY from Gravesend, Eng, 3 June 1668, with Sieur DES GROSEILLIERS and a small crew and anchored off the mouth of the RUPERT R on Sept 29. A second sailing vessel, the *Eaglet*, with Pierre RADISSON aboard, was forced to turn back. The 2 French traders had persuaded Prince Rupert and several English investors to finance the voyage to prove that the vast fur resources of interior N America could be tapped via Hudson Bay. The *Nonsuch*'s crew wintered in James Bay and reached England on 10 Oct 1669 with a cargo of furs that the press reported "made them some recompense for their cold confinement." The charter for the HUDSON'S BAY COMPANY was granted on 2 May 1670.

In 1968 a replica of the *Nonsuch* was built in England to honour the 300th anniversary of the voyage. It was shipped to Montréal in 1970 and displayed on the Great Lakes and Pacific coast before being installed in a specially built museum in Winnipeg. The replica is considered to be the most accurate reconstruction of a 17th-century ship.

JAMES MARSH



Nonsuch, replica (1968) of the ship that in 1668 carried Sieur des Groseilliers on his historic voyage into Hudson Bay. It is housed in the Manitoba Museum (*courtesy Manitoba Museum of Man and Nature*).

Noorduyn Norseman The first bush plane of all-Canadian origin, it was designed after consultations with bush pilots and built in Montréal by R.B.C. (Bob) Noorduyn. It was a rugged, single-engined craft, with the large cabin, loading door and high wing that were prime requirements for bush aircraft. It first flew Nov 1935, and over 900 were built in all, many seeing service in the RCAF and 7 other air forces. Amphibious and capable of landing or taking off in tight spots, it became a standard workhorse of the Canadian North. In 1982, 41 were still registered in Canada; 4 are in museums. (*See* BUSH FLYING).

JAMES MARSH

Nootka ("It goes around") is the popular but erroneous name for the score of ethnically related tribes along the Pacific coast of Vancouver I and around Cape Flattery (US). Locally, "Nootka" misnames only NOOTKA SOUND and its Mowach'ath people. The island groups are also popularly termed "Westcoast" and those of the cape, "Makah," a Straits Salish word. In 1978 *Nuu-Chah-Nulth* ("All Along the Mountains"), was officially adopted by the Westcoast tribes as their name. *Aht* is another superseded anthropological designation taken from the suffix "ath" ("people of") on the tribal names. "Nitinat" refers only to the Nitinat Lake tribes.

Linguistically, Nootka is one of the 2 main divisions of the Wakashan family, the other being Kwakiutl. Its dialects (and tribes) are Northern Nootka (Ch'i:qtlis'ath, Qa:'yo:kw'ath, 'I:hatis'ath, Noch'a:ł'ath, Mowach'ath, Machł'ath), Central Nootka (Hishkwi:'ath, Mano:his'ath, 'O:ts'o:s'ath, 'A:ho:s'ath, Qiłtsama'ath, Tla'o:kwi'ath, Yo:lo'ił'ath, T'okw'a:'ath, Ho:choqtlis'ath, Ts'isha:'ath, Ho:pach'as'ath, Ho:'i:'ath), Nitinat (Di:ti:da:tx, Tło:'o:wisa:tx, Qua:bad'owa:tx, P'a:chi:da:tx), Makah (Qwidishcha'atx) and Ozette ('Osi:ł'atx). Speakers of Nitinat, Makah and Ozette can grasp the Northern and Central Nootka dialects, but not vice versa.

The Nootka date back at least 4000 years in their land. Territories were defined by tribe, but in total stretched from Cape Scott (N Vancouver I) to past Ozette Lk (Washington state) in the S. Relations were generally friendly with the culturally and linguistically related KWAKIUTL on the NW, but less so with the more alien Coast Salish groups to the E and S. Trade and intermarriage occurred in all directions. White contact dates from PÉREZ HERNÁNDEZ's visit in 1774, and the initial focus was the sea-otter trade. Acquisition of guns intensified warfare, with well-armed groups such as the Mowach'ath, 'A:ho:sath and Tla'o:kwi'ath nearly exterminating others such as the Machł'ath, 'O:ts'o:s'ath and T'okw'a:'ath. Introduced diseases and alcohol so reduced and debilitated the Nootkans that in the second half of the 19th century colonialization was almost unopposed. Population, estimated at 30 000 at first contact, plunged to only about 2000 in the 1930s, but is now rebounding. No land surrender was signed on Vancouver I, but in the late 19th century small INDIAN RESERVES were demarcated with a total area only half that of the Cape Flattery Reservation established in the US by treaty in 1855 (*see* INDIAN TREATIES). Curtailment of hunting and fishing, including prohibition of the vital salmon weir traps, deprived Nootkans of their traditionally rich economic base.

Nootkans were accomplished woodworkers, outstanding products being fine cedar CANOES and big multifamily houses (*see* HOUSE; NORTHWEST COAST INDIAN ART). Hunting/fishing gear and techniques were refined. Fish (particularly salmon and halibut), sea mammals and shellfish were mainstays of their diet, supplemented by fowl, deer, elk, bear and plant foods. Clothing was comparatively uncomplicated. The seasonal round involved moving by large canoes between winter concentrations in sheltered inlets and smaller summer camps scattering to the outside coast. WHALING with harpoons and floats was a cultural highlight, both economically important and prestigious. Spirit powers were believed to animate all things, and power seeking was common. Any undertaking was prepared for by secret purificatory rituals entailing bathing and scrubbing in cold waters.

Society was closely ranked, with a continuous gradation from chiefs to commoners and a slave class of war captives. Lineages were traced through both male and female connections. Property rights were keenly held, including intangibles such as names, songs and stories. Chiefs had most of the rights and were wealthy. Intensive ceremonialism occasioned frequent feasting and entertainment with song, dance, contests and theatricals (*see* POTLATCH). Especially elaborate celebrations were the Wolf Ritual cycle of a general secret society, girls' puberty rites and marriage. A zestful sense of life prevailed by the sea.

Historically the Mowach'ath provided the setting for the NOOTKA SOUND CONTROVERSY, 1789-94, with Chief MAQUINNA (actually Moqw'ina) their leading participant. In 1811 Chief Wikaninish of the Tla'o:kwi'ath attacked the crew of the TONQUIN after provocation. In 1864 the Ahousat captured the schooner *Kingfisher*, and a punitive expedition was sent against them — the Denman naval expedition. The Bering Sea fur sealing, about 1870 to 1911, was carried out by Nootkans transported there with their canoes. In the 1980s they live mainly by fishing and logging. Traditional culture and language are weakened but a strong native identity persists. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE.

EUGENE ARIMA

Nootka Sound, BC, is an inlet on VANCOUVER I's western coast, 270 km NW of VICTORIA. From a cluster of forested islands near the mouth of the sound, 3 deep inlets (Tahsis, Tlupana and Muchalat) penetrate inland. One of these reaches 65 km inland to Strathcona Provincial Park, another to the sawmilling community of Tahsis. The first inhabitants of the region were the NOOTKA, who made their living by hunting and fishing. They were the only Canadian Indians to specialize in WHALING and were the first in BC to meet Europeans. The coastal environment was particularly bountiful in fish of many varieties, and the semisedentary Nootka developed an elaborate culture.

The sound was likely first explored by James COOK in 1778. Cook called the inlet King George's Sound, then Nootka, thinking this was its Indian name. Soon after, the region became a centre of trade and then of competition among Russia, England and Spain. In 1789 a Spanish force occupied the sound and built a fort; 2 months later a British force arrived and a quarrel developed. In the ensuing NOOTKA SOUND CONTROVERSY, Spain eventually agreed to a convention (1794) according to which both nations were free to navigate and fish in the Pacific, to trade and establish settlements. At first the Nootka prospered from the sea-otter fur trade that followed European explorations, but the introduction of diseases such as smallpox virtually wiped them out. The main Indian settlement at Yuquot ("windy place") is still important for the remaining Nootka, many of whom work in pulp mills at Gold River and CAMPBELL RIVER. *See* NORTHWEST COAST.

ALAN F.J. ARTIBISE

Nootka Sound Controversy, involved the competing claims of Spain and Britain for control of trade and navigation on the NORTHWEST COAST and in the Pacific Ocean, 1789-94. Spain claimed the Pacific as its exclusive territory by right of the Treaty of Tordesillas (1494). Britain argued that navigation was open to any nation, and territorial claims had to be backed by effective occupation. In July 1789 Esteban MARTINEZ, Spanish commandant at NOOTKA SOUND (in present-day Vancouver I), seized several British merchant ships. John Meares, part owner of these ships, reported the seizure to his government in his *Memorial* of 30 Apr 1790. Britain demanded compensation and threatened war, but Spain declined to pay compensation and prepared for war, hoping its long-standing Bourbon ally, France, would provide assistance. France, undergoing revolution, refused. In a series of negotiations Spain was obliged to accede to British requests and compensate the British for their losses. Under the third Nootka Convention of 11 Jan 1794 Spain and Britain recognized each other's rights of trade at Nootka Sd and in other Pacific coast areas not already controlled by Spain. Subjects of either nation could erect temporary buildings at Nootka, but not permanent garrisons or factories. Neither nation could claim exclusive sovereignty. Nootka Sd was to be maintained as a free port by Spain and Britain, and to be open to other nations. On 28 Mar 1795 both countries completed their withdrawal from Nootka Sd. The controversy ended in symbolic victory for British mercantile and political interests. BARRY M. GOUGH

NORAD (North American Air Defence Agreement), announced on 1 Aug 1957; renamed North American Aerospace Defence Command in 1981, it integrates the air-defence forces of the US and Canada under a joint command at Colorado Springs, Colo. The agreement has occasionally been a focus of controversy. PM John DIEFENBAKER and Minister of National Defence George PEARKES, just installed in office, hastily accepted the advice of the Canadian military and agreed to integrate the RCAF with the USAF for the air defence of the continent. The decision was taken without adequate preparation (the formal signing did not take place until 12 May 1958, one indication of subsequent concerns), and the government was roasted for its haste by the Liberal Opposition, who themselves would almost certainly have accepted a similar agreement had the 1957 election turned out differently.

Technically the agreement has been a success, co-ordinating 2 air forces in a difficult task and keeping Canadian airmen in touch with doctrine and policy — and keeping them flying. But because the concurrence of the 2 governments is required before formal alerts or action, there has been difficulty, most notably in 1962 during the CUBAN MISSILE CRISIS. The Americans went on standby alert as soon as the crisis was apparent, but the Diefenbaker government delayed for a period of days, angering the Kennedy administration and provoking much criticism in Canada. The matter was complicated by the fact that the BOMARC MISSILES at the 2 Canadian Bomarc bases had no nuclear warheads, another consequence of divisions in Cabinet; and the Bomarc itself was greatly resented by partisans of the CF-105 AVRO ARROW aircraft, which had been cancelled by the government 3 years earlier in a decision that some (unfairly) blamed on NORAD.

Despite arguments that the threat from Soviet manned bombers no longer exists, NORAD has been kept in place by successive governments. The renaming of the command in 1981 reflected a new emphasis on defence against guided missiles. In 1983 the Canadian component consisted of CF-101 interceptor aircraft (beginning to be replaced by CF-18s) and, as from the beginning, a Canadian officer was the deputy commander at Colorado Springs. J.L. GRANATSTEIN

Reading: C. Gray, *Canadian Defence Priorities* (1972).

Noranda Mines Limited, with head offices in Toronto, is a multinational, multi-product company. The company was incorporated in 1964 as an amalgamation of Geco Mines Ltd (incorporated in 1953) and Noranda Mines Limited (incorporated in 1922 to acquire mining claims in Ontario and Québec from a private syndicate). The company grew through acquisitions in mining and related industries, and today it is a diversified natural-resource company. Its principal activities are in mining, manufacturing and forest products, with its subsidiary, Noranda Sales Corporation Ltd, handling worldwide sales. Noranda Mines has properties in Canada, the US and overseas, including S America and Australia. In 1983 it had sales or operating revenue of $3 billion (ranking 27th in Canada), assets of $6.1 billion (ranking 14th) and 51 700 employees. Brascade Resources holds 35% and Zinor Holdings 16%.

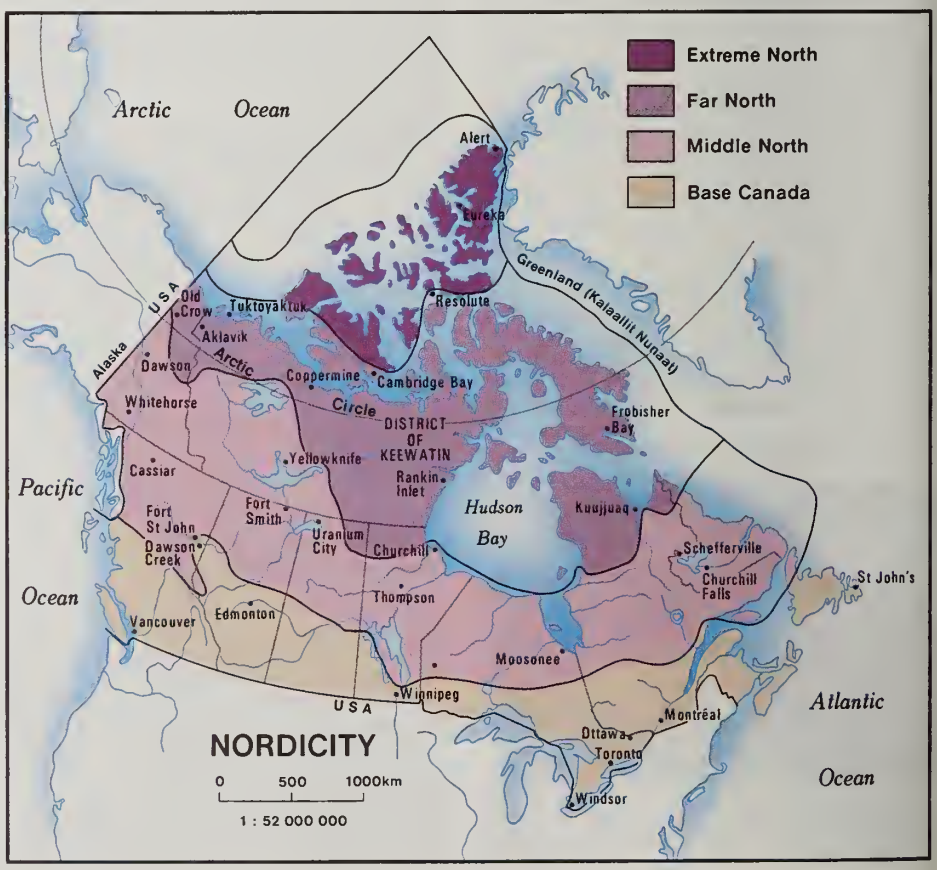
DEBORAH C. SAWYER

Nordicity, concept developed in Canada from the 1960s that refers to the perceived state or degree of northernness of high-latitude situations. Depending on the area under consideration, nordicity may be determined by CLIMATE, BIOGEOGRAPHY, GEOGRAPHY, psychology or other factors. The concept deals with the description and comprehension of phenomena defined as nordic (ie, in this context, occurring in any northern area of the Northern Hemisphere). How severe is the northern zone of Canada? How has this frigid periphery of N America been perceived? To understand these questions it is necessary to recognize that the NORTH has cultural as well as physical dimensions and is more than a simple collection of latitudes. Objective, calculated geographic nordicity expresses a certain image of this cold region, but there may be as many mental nordicities as there are citizens.

Geographic Nordicity

Definitions of the North are primarily functions of the criteria chosen to judge the situation. Originally, the Arctic was defined as a region of polar night or day, with a frozen subsoil and without trees or agriculture. The first development of the nordicity concept involved creation of an all-encompassing physical and human geography. A nordic index was devised for calculating and quantifying the number of "polar values" (called VAPO) and establishing the nordicity of a space or phenomenon. This index is based on 10 criteria, each expressed on a scale of 0-100. The criteria divide into 3 groups: one locational variable, 5 natural and 4 human factors. With reference to location, 45° N lat is assigned 0 VAPO; 90° N, 100 VAPO. Summer-heat values range from more than 150 days above 5.6°C, 0 VAPO, to 0 days, 100 VAPO. Similarly, with annual cold, 550 degree days below 0°C is assigned 0 VAPO; 6650 days, 100 VAPO. The human factors are more difficult to quantify but, for example, degree of economic activity ranges from "interregional centre with multiple services, heavy investment," assigned 0 VAPO, to "no production, none foreseen," 100 VAPO. A table outlining these variables allows an arithmetic evaluation of the nordic character of cold regions and facilitates understanding of the factors most important to this evaluation. Another useful tool is the isonord, a line on a map joining points that have equal polar values.

This evaluation process provides information for the task of fixing the southern limit of the North. Formerly, that limit was determined by a single factor, eg, an isotherm (10°C in July), a latitude (often, the ARCTIC CIRCLE), an administrative boundary (60°N lat), or a topographic feature (Hudson Str). No one factor is now considered definitive, but nordicity does increase abruptly above isonord 200, suggesting a fundamental break running across Canada. This isonord runs along the southern edge of Long Range in Newfoundland, sweeps along the lower Côte-Nord and Minganie and runs N of



the Saguenay depression in Québec and Lk of the Woods, Ont. It passes through Lk Winnipegosis, Man, and touches Montreal Lk, Sask. In Alberta, it runs N of the agricultural ecumene (ie, inhabited area) of the Peace R country to the oil and gas fields of Fort St John, BC. In BC, the CORDILLERA complicates the delimitation of the true North. Pockets of discontinuous PERMAFROST lodge in the summits of peaks in southern parts of the province; temperate conditions are found in the bottoms of northern valleys. However, considering all criteria and despite the anomalies, the boundary of the cordilleran North can be fixed between 53 and 55°. Throughout Canada, the boundary consists of a swath of land dozens of kilometres wide.

The nordicity index and the zonation it signifies can have several uses. Apart from defining the North's southern limits, it allows subdivision of the polar world into zones. Moreover, it has been used for the classification of documents, construction of a scale of workers' allowances, analysis of the evolution through time of tourist potential, estimation of the cost of services, and for a study by the Fisheries Board of Canada. This index would provide a more realistic basis for determining royalty zones in the development of northern PETROLEUM than does the simple division by latitude now used.

Canada's northern limit has been fixed by the federal government at 200 nautical miles (370 km) from shore in the Arctic Ocean. Thus the nordic political territories include parts of 7 provinces, the YT and the NWT. Including the waters within the North and the oceanic water belt, the nordic space occupies about 70% of Canada's territory. This seems a more exact estimate than the official 39%, which includes only the landmasses and fresh waters of the YT and NWT. Inside this immense zone (one-third water), the population in 1971 was less than 300 000 resident inhabitants, a demographic mass comparable to that of Alaska and Iceland. Canada's nordicity is more severe than that of Scandinavia or even Siberia, a fact that discourages settlement. The Canadian North consists of hundreds of small settlements scattered over a territory larger than Europe. A web of technical and social services keeps these isolated worlds in touch with the South.

Northern Zones

The idea that the North could be divided into broad East-West bands appeared repeatedly in works of the mid-19th century. For example, in 1832 Joseph Bouchette divided western Canada as follows: everything S of 56° N lat, everything between 56° and 65°, everything from 65° to the Arctic Ocean. Thematic divisions between boreal forest and TUNDRA, between subarctic and arctic, between seasonal and permanent pack ice, between regions of partial and total light, between Indian and Inuit lands, all reflect other zonal gradations. The regional subdivisions of the North include 3 major regions of about 1 million km² each, the boundaries of which do not follow lines of latitude.

Middle North Bounded by isonords 200 and 500 VAPO, the region has a subarctic climate, stretches from Labrador to the YT and includes many lakes and bogs. It has been the domain of pioneering thrusts, of "vertical" corridors for the extraction of MINERAL RESOURCES and the production of HYDROELECTRICITY. The Middle North includes about 90% of the North's permanent inhabitants. About 85% of the Middle North lies within provincial boundaries, a fact that receives insufficient political attention. Examples of midnordic nordicity include Churchill, Man, 450 VAPO; Dawson City, YT, 435; Yellowknife, NWT, 390; Cassiar, BC, 377; Labrador Sea, Nfld, 297; Red Lake, Ont, 220.

Far North spans the area between 500 and 800 VAPO. Natural factors (eg, limited summer heat, tundra landscape) and human factors (eg, presence of Inuit and rarity of major RESOURCE exploitation) again combine to express a total zonal situation. Being partly composed of interconnected bodies of water, the Far North allows a certain amount of penetration by boat in summer. Since only about 20 000 inhabitants live in this quarter of the Canadian landmass, the ecumene of primary activity is extremely extensive. The Far North is an arctic desert that has few residential oases and is economically very weak. Its population, unlike that of the Middle North, consists mostly of indigenous people. Examples of this nordicity include Resolute, NWT, 775 VAPO; Old Crow, YT, 624; Hudson Bay (centre), 622; Aklavik, NWT, 511.

Extreme North This hypernorthern region, which covers less than 10% of Canada's landmass, includes heavily iced marine waters with a nordicity in the 850 VAPO range. It is a region of ice (on land, at sea and in the depths). The Extreme North is almost devoid of settlements, with the exception of a few white outposts such as Alert (NWT). Government expenditure is usually larger than private. Alert has 878 VAPO; Eureka, NWT, 857; the Barnes Ice Cap, 804.

Nordicity Compared by Polar Value (VAPO) Criteria

Nordic Criterion	*Schefferville, Qué*	*Verkhoianski, USSR*[1]	*Keewatin, NWT*[2]
Latitude	21	44	42
Summer heat	37	62	60
Annual cold	42	100	75
Types of ice	60	90	75
Total precipitation	0[3]	90	90
Plant cover	40	40	80
Accessibility by land	20	50	100
Air service	20	40	100
Resident population	20	50	90
Economic activities	35	65	100
Total[4]	295	631	812

[1] Considered the pole of coldness in the Northern Hemisphere
[2] Interior portion
[3] Too much precipitation to fit concept of nordic aridity
[4] For comparison, the North Pole has 1000 VAPO

Historic Nordicity

Like any region defined by natural and psychological factors (the latter heavily influencing settlement), the North has varied in size over its history. Even if, in the course of a generation, the boundaries of permafrost, sea ice and boreal forest barely change, the factors involved in settlement and abandonment of habitations, in economic development and in the creation of mental perspectives are constantly evolving. At the beginning of the Age of Discovery, Canada was considered all north because of the severe winter conditions. As Morris Zaslow has noted: "In the immediate post-Confederation period, anything beyond Lake Nipissing was termed North." In Québec and central Labrador, iron-ore exploration and hydroelectric development have caused this outland to lose some of its former polaricity. According to the nordic index, in 1941 the future site of Schefferville, Qué, had 533 VAPO; 25 years later, 295. Settlement caused its denordification. Thus, in the last century, as a result of a redefinition of zones, the real Canadian North has become less widespread and the average nordicity of the country has become lower. A quantitative denordification of about 25% has occurred.

Between 1881 and 1971, the resident population of the North multiplied sevenfold (43 060-292 702). The present nordic space, especially the Middle North, has been overrun by Canadian and foreign immigrants, but this penetration has been uneven in time and space. The movement had begun by 1881 (first census year). At that time, the future province of Newfoundland/Labrador accounted for more than half of all the whites resident in the Canadian North. By 1910, 8000-10 000 northerners (whites and Amerindians) lived in the NWT, the YT, Manitoba, Ontario and Québec, but the influx only became important in the course of the 20th century. Between 1911 and 1941 settlement patterns once again modified the regional pattern. As a result of mineral exploration and agricultural development along the pioneer fringes of western Canada, Alsama (Alta-Sask-Man) had 50% of the nordic population and became the main nordic mega-region; Manitoba stood first among the provinces. Since the mid-20th century, a strong natural increase in the indigenous population and increases in governmental administration and oil exploration have caused an increase in Canada's northern population. Thus, the YT, the NWT and Newfoundland/Labrador have experienced increased growth percentages. In 1971 Alsama was still first, followed by the territories (counted as one). BC, Ontario and Québec accounted for only 22% of the nordic population of the country.

Developmental Nordicity

The North has known at least 5 developmental visions since Martin FROBISHER's mining projects of the 16th century. An initial period of optimism, based on the hope of discovering a NORTHWEST PASSAGE, ended when that proved unprofitable. The resulting view, that the North was almost totally useless, led to suggestions that nordic lands should be sold or given away. A more recent political vision is of the North as an unlimited reservoir of natural resources. The final visions are an ideology of nondevelopment ("Freeze the Arctic") and one of integrated planning that respects nordic culture.

At least 2 categories of nordicities of exploitation must be identified: nordicity of use and normative nordicity. The first can be seen inductively through examination of the activities of entrepreneurs and employers who lack specialized training for work in the North. Clearly, the nordicity of use has influenced economic and political growth both in private and government frameworks. Many activities in the North seem to have been determined by southern Canadian interests, by federal jurisdiction over the territories, and by inadequate appreciation of Amerindian ethnicity. These activities have resulted in exploitation poorly adjusted to northern conditions. Normative nordicity, corresponding to the vision of an ideal and theoretical good, is based on the triple principle of cultural, ecological and regional respect for the North. Its objective is a coherent plan, not a laissez-faire philosophy. These 2 developmental nordicities are widely separated ideologically. Happily, this gulf has been somewhat diminished by a series of measures: recognition of certain Amerindian rights (eg, in the JAMES BAY AGREEMENT); development technologies that increasingly respect arctic regions (CONSTRUCTION, resource extraction, TRANSPORTATION); changes in administrative policies; educational programs that are more appropriate to northern cultures; Amerindian political activity. Thanks to an increasingly developed multidisciplinary study of all aspects of the North, a new political economy of the North with a nationalist tone and a new GEOPOLITICS encompassing Canada as a whole are developing. The process of entry of the North into Canadian affairs is far from complete. *See* RESOURCE MANAGEMENT.

LOUIS-EDMOND HAMELIN

Reading: Louis-Edmond Hamelin, *Nordicité canadienne* (1975, rev 1980, tr *Canadian Nordicity: It's Your North, Too,* 1979).

Norman, E. Herbert, diplomat, scholar (b at Karuizawa, Japan 1 Sept 1909; d at Cairo, Egypt 4 Apr 1957); he studied at U of T and Harvard, and, having joined the Dept of External Affairs, was posted to Japan, 1940-42. In 1946 he

returned there with the Allied occupation's Office of Counter Intelligence, and published extensively on Japan. His career was blighted by charges that he had been a Communist during the 1930s. The charges were true enough, but Minister of External Affairs Lester B. PEARSON affirmed his confidence in Norman, kept him in the diplomatic service, and sent him as ambassador to Egypt. When the US Senate again publicized charges that Norman was a security risk, he committed suicide. ROBERT BOTHWELL

Norman Wells, NWT, Settlement, pop 420 (1981c), is located on the N bank of the MACKENZIE R, 145 km S of the ARCTIC CIRCLE and 684 air km NW of YELLOWKNIFE. It was the first settlement in the NWT to be established entirely as a result of nonrenewable-resource development. During WWII an oil pipeline was built between Norman Wells and Whitehorse, YT; it was abandoned after the war. Oil and gas fields in the area produce over a million barrels of crude oil per year, and the community is a major supplier of fuel to northerly locations, as well as a transportation centre for air and river traffic. Further oil-field expansion and a pipeline link to the S began in the early 1980s. ANNELIES POOL



Norman Wells, NWT. The pipeline, dredge, trench and work camp are visible (*photo by Jim Merrithew*).

Normandy Invasion On 6 June 1944 the 3rd Canadian Infantry Division and the 2nd Canadian Armoured Brigade were part of the Allied forces which attacked the Normandy coast in Operation *Overlord*. By the end of D-Day, the Canadians had penetrated about 9 km inland. In the following weeks, under highly effective tactical air support, in which Canadians played a considerable role, the Allies thrust deeper inland while fighting the counterattacking German forces. By month's end they were strongly established in Normandy. After the Americans captured the Cherbourg Peninsula (June 26) and prepared to break out from Saint-Lô, FIRST CANADIAN ARMY, commanded by Lt-Gen H.D.G. CRERAR, was ordered to push SE of Caen to gain ground and wear down the enemy. They aided British forces in threatening a breakout, thereby retaining the German Panzer divisions in the east away from the American front. On July 9, British and Canadian infantry and armour seized Caen after fierce fighting. During July and most of Aug, 2nd Canadian Corps, commanded by Lt-Gen G.G. SIMONDS, attacked the German positions time and again. Falaise was captured Aug 16, and in the final attack on Trun and Chambois, Canadians and Poles joined with American troops to complete the victory. Of the 206 703 casualties suffered by the Allies, Canada lost 18 444. The German Army lost about 371 400. *See* WORLD WAR II. R.H. ROY

Noronic, Great Lakes steamer of the Canada Steamship Lines Ltd, built at Pt Arthur, Ont, in 1913. She was consumed by fire in Toronto at dockside on 17 Sept 1949. There was a tragic delay in summoning the fire department and 118 people died. JAMES MARSH

Norpak Corporation, *see* ELECTRONICS INDUSTRY.



John Norquay, Manitoba's only premier of mixed European and native ancestry (*courtesy Provincial Archives of Manitoba*).

Norquay, John, politician, premier of Manitoba (b near St Andrews, Man 8 May 1841; d at Winnipeg 5 July 1889). One of Red River's most distinguished sons, Norquay successfully moved from the fur trade and the river lot into modern business and politics after Manitoba entered Confederation. His great-grandmother was a native woman and his paternal ancestors were jacks-of-all-trades at fur-company posts. He was one of the best students in Red River schools and was successively a teacher, farmer and fur trader between 1857 and 1870, when he was elected to Manitoba's first legislature. He rose quickly to prominence in the House, was a Cabinet minister (1871-74, 1875-78), and became premier upon the retirement of R.A. DAVIS on the basis of his strong following among "old" (pre-1870) settlers and French-speaking Manitobans.

The Norquay government successfully extended Manitoba's boundaries and secured larger federal subsidies, but it eventually foundered upon Canada's railway policy. Caught between PM John A. MACDONALD's guarantee of a CPR freight monopoly and Manitoban demands for rail competition, Norquay chose to fight Ottawa in 1887 by building a railway to the US. Macdonald intervened and, by an apparent double cross, precipitated a financial scandal and the collapse of the Norquay ministry. Though he briefly led a small opposition to the new GREENWAY government, Norquay's sudden death in 1889 prevented him from restoring his reputation in Canadian public life.

Norquay was widely liked in Manitoba. His name has been kept alive not only because he was the province's only premier of mixed European and native ancestry but because of his amiable disposition and considerable talents.

GERALD FRIESEN

Norris, Hannah Maria, Baptist missionary (b at Canso, NS 30 Nov 1842; d at Toronto 14 Sept 1919). Though baptized a Congregationalist as a child, Hannah was raised in a strong Baptist community and eventually received adult baptism in that church. In 1869 Norris determined to go to Burma as a missionary and appealed to the Baptist women of NS to support her plans. On 18 June 1870 in Canso the first Canadian woman's missionary aid society was formed for this purpose. Other locals were set up, and in 1884 the Woman's Baptist Missionary Union of the Maritime provinces was organized, an example followed elsewhere in Canada and by many other denominations. Norris went to Burma and eventually married the Rev W.F. Armstrong. She became committed to building a school for all nationalities in Rangoon, and travelled widely in search of funds for this project. She remained in Burma until 1919 when she returned to Canada. WENDY L. MITCHINSON

Norris, Malcolm Frederick, Métis leader (b at St Albert, Alta 25 May 1900; d at Calgary 5 Dec 1967). Widely recognized as one of this century's most important and charismatic MÉTIS leaders, Norris was born into one of Edmonton's founding families but rejected privilege to fight racial discrimination. A brilliant orator in English and Cree and a consummate Métis politician, he was a key figure in the Association des Métis d'Alberta et des Territoires du Nord Ouest, the Indian Assn of Alberta and the Métis Assn of Saskatchewan. Outspoken on behalf of Indians and Métis, he was active in the CCF and in the Communist Party, promoting reforms for native people. A tireless and militant democrat and protagonist in many battles with government, he warned native leaders to avoid the dependency of government funding, a warning today regarded as prophetic. MURRAY DOBBIN

Norris, Tobias Crawford, politician, premier of Manitoba (b at Brampton, UC 5 Sept 1861; d at Toronto 29 Oct 1936). Although his name has been virtually forgotten, Norris was a towering political figure in Manitoba early in the 20th century. Originally a homesteader, he gradually moved into professional auctioneering and was well known across western Canada. Elected an MLA in 1896, Norris led the Liberal Party in Manitoba 1910-26, serving as premier 1915-22. During his term of office his government dealt with wartime conditions and the return to peace. The Norris government has been called "the centre of reform activity in Canada" for its time. It was responsible for TEMPERANCE legislation, female suffrage, compulsory education, workman's compensation and minimum-wage legislation, as well as the establishment of a public-nursing system, rural farm credit, regulation of industrial conditions, and a mother's allowance for widowed dependent mothers. Under Norris, road construction and public-works programs were expanded at the same time that the province was brought out of debt. After his retirement from politics in 1928 he served on the Board of Ry Commissioners until his death. J.M. BUMSTED

Norse Voyages In mid-985 or 986 an Icelandic flotilla led by ERIC THE RED set out to colonize SW Greenland. Near summer's end BJARNI HERJOLFSSON, a trader, belatedly sailed to join them but was blown far off course. He coasted N to the latitude of southern Greenland, then turned E to complete his intended voyage, becoming the first European of certain record to have reached the American mainland. His landfall was probably eastern or northeastern Newfoundland, from which he coasted N at least to the termination of Labrador. The more southerly lands he found were well forested. About the turn of the century Eric's eldest son, LEIF ERICSSON, decided to exploit Bjarni's discovery. Sailing to the region of Bjarni's landfall, he wintered in a protected harbour while his men cut a cargo of vines, valued as fasteners in shipbuilding, and timber. His camp was the genesis of the legendary *Vinland,* which historians have variously located from Florida to Hudson Bay.

About 1004 a colonizing venture consisting of 160 people in 4 ships, with domestic animals, including cattle, sailed from Greenland under Icelander Thorfinnr KARLSEFNI. The flotilla evidently crossed Davis Str at its narrowest point to

Baffin I, then coasted southwards. Landings were made and the regions named according to their nature: *Helluland* ("rocky land") accurately describes the mountainous Baffin I and Labrador coasts S nearly to Nain, whereas *Markland* ("wooded land") correctly describes the balance of the Labrador coast.

The expedition may have been seeking Leif's Vinland but, if so, was unsure of its location. A camp was established at *Straumfiord* (Str of Belle Isle), probably at Epaves Bay on the northern tip of Newfoundland (*see* L'ANSE AUX MEADOWS) where traces of sod-walled structures believed to be of Norse provenance have been excavated. The expedition wintered there, but in the spring several parties set off to look for Vinland or some comparable settlement site. One, commanded by Thorvaldr Ericsson, reconnoitred W along the N shore of the Gulf of St Lawrence, perhaps as far as Sept-Îles. Most members of the expedition, under Karlsefni, sailed southwards along the W coast of Newfoundland and located a promising settlement site which they called Hop, probably near present-day St Paul's Bay. Here the cattle were put out to pasture and houses were built. Early the following spring the settlement was visited by INUIT. A conflict, for which the Norse were evidently responsible, ensued and several settlers were killed. The remainder returned to Straumfiord. That summer Karlsefni again explored southwards and again met and fought with natives, apparently Indians. Meanwhile Ericsson reconnoitred the Labrador coast N to Lk Melville, where he fought with Inuit and was himself killed. By early autumn, about 1006, the Norse had concluded that they could not maintain a settlement in the new lands and the survivors began departing for Greenland and Iceland.

Documentation of this early period, eg, in the medieval *Greenlanders' Saga* and *Eirik the Red's Saga*, is surprisingly full, but after about 1007 only fragmentary references are to be found. Nevertheless, we know that as late as 1349 Greenlanders were still voyaging to Markland for timber; and the archaeological work of T.E. Lee in Ungava indicates a major Norse presence there, perhaps as late as the mid-14th century. It is unreasonable to believe that the continuity of the Norse voyages and discoveries was ever seriously sundered or that they were unknown to the N European maritime community. The Greenland and Iceland Norse deserve full recognition, not only for having made the first known European exploration of Canada, but for having lit the way for the great age of western exploration which began in the 15th century.

FARLEY MOWAT

Reading: Helge Ingstad, *Westward to Vinland* (1969); Farley Mowat, *Westviking* (1965).

North, in strictly geographic terms, refers to the immense hinterland of Canada that lies beyond the narrow strip of the country in which most Canadians live and work, but generally refers to the NORTHWEST TERRITORIES and the YUKON TERRITORY. The North is a varied land, with mighty rivers, forested plains, "great" lakes that extend from the Mackenzie Valley to the edge of the Canadian SHIELD, an inland sea (Hudson Bay), the beaches, bars and islands of the arctic coast and the arctic seas themselves, in winter covered by ice and snow, in summer by floating fields of ice. Immense flocks of birds migrate to the Arctic each summer; other wildlife include whales, walrus, narwhals, seals and caribou — the staple of the native peoples.

Biologists divide the North into 2 great regions, called "biomes," comprising the boreal forest and the TUNDRA. The boreal forest, characterized by spruce trees and MUSKEG, is a broad band of coniferous forest extending across Canada from Newfoundland to Alaska. The tundra,



Polaris Mine, Little Cornwallis Island, NWT. It is natural to think of developing the North and extracting its resources, but large-scale economic development may have serious repercussions for the native population (*photo by Karl-Heinz Raach*).

which reaches from the boreal forest northward to the Arctic Ocean and comprises 20% of Canada's landmass, is treeless and is sometimes called "the barrens," although it includes landscapes as varied and beautiful as any in Canada — plains, mountains, hills, valleys, rivers, lakes and sea coasts.

The tundra and the boreal forest meet along the TREELINE, a transitional zone usually many kilometres wide. This biologically important boundary, which separates forest and tundra, also separates the traditional lands of the Indians and the INUIT. The treeline may also be viewed as the southern limit of the Arctic, the boundary between the Arctic and the Subarctic. Arctic or subarctic, however, the region is one of great climatic contrasts. In midsummer it is never dark, but in midwinter the only daylight is a combined sunset and sunrise. Although summer can be pleasantly warm, with temperatures in excess of 20°C, the season is short and the weather often raw and damp. Both rainfall and snowfall are light. Because, in the true Arctic, precipitation is as low as that in the driest parts of the Canadian prairies, the Arctic may be described as semidesert. It is remarkable, therefore, that the land surface in summer is predominantly wet and swampy and dotted with innumerable shallow ponds, fens and water-filled frost cracks. In southern Canada the ground freezes in the winter, but downward from the surface, and thaws completely again in the spring. In the subarctic and arctic regions, frost has penetrated below the maximum depth of summer thaw and a layer of frozen ground called PERMAFROST remains permanently beneath the surface. The seasonally thawed active layer of the soil holds the water, like a sponge, from rain and melting snow, which cannot drain through the frozen ground. The combination of climate and topography in the northern biomes have produced unique plant and animal populations. The species that thrive in the North are tough, in order to survive, but they are also vulnerable. Because of the fragility of this region, it would not be difficult to cause irreparable injury to the environment and to the peoples who depend upon it.

Peoples of the North It is not always easy to remember, on a flight over the unbroken boreal forest, the tundra or the sea ice, that the Canadian North has been inhabited for many thousands of years. The populations that have occupied this great area were never large, but their skills as travellers and hunters made it possible for them to make use of virtually all of the land without altering the environment. Because of extremely slow rates of plant growth and decay, signs of ancient occupation — old house remains, tent rings, fire-cracked rocks — are visible almost everywhere and it is not difficult for archaeologists to find, on or close to the surface, a wealth of artifacts and other evidence revealing the richness, diversity and breadth of aboriginal society.

The Inuit (formerly known as Eskimos) occupy the shores of the Arctic Ocean and of Hudson Bay. Although the Inuit speak closely related dialects of the same language, regionally there are differences among them reflected in technology and social organization that even today complicate anthropological generalizations. The Inuit themselves perceive important differences between their various groups; the Inuvialuit of the Mackenzie Delta see themselves as distinct from the COPPER INUIT, their neighbours to the E and the Copper Inuit — or Qurdlurturmiut — emphasize that they are unlike the NETSILIK, the Aivilim or the IGLOOLIK, who live still farther E. And within each of these broad groups finer divisions and distinctions exist, reflecting different patterns of land use and of changes in dialect and hunting techniques.

The Indians of the Mackenzie Valley are part of the Athapaskan group and regard themselves, notwithstanding dialectical variation in their languages, as "the people," the DENE. The Indians of the Yukon are largely Athapaskan, yet these northern Indians are by no means all the same, for they speak several languages — KUTCHIN (sometimes called Loucheux), NAHANI, TAGISH, Hareskin, SLAVEY, DOGRIB and CHIPEWYAN.

The native peoples came originally from Asia, crossing the land bridge over the Bering Strait during the last ice age (*see* BERINGIA; PREHISTORY). The Athapaskan Indians arrived 10 000 to 15 000 years ago, eventually to occupy large tracts of land, including the Mackenzie Valley and the Yukon. The Inuit arrived about 5000 years ago, spreading throughout the Arctic, including all the coastal areas, practically all of the islands of the Arctic Archipelago to the Ungava Peninsula and as far E as the Gulf of St Lawrence and Newfoundland. The Dene were established in the forestlands of northern Canada and the Inuit inhabited the northern rim of the New World at least 5000 years before Martin FROBISHER made his landfall off Baffin Island in 1576 or Samuel HEARNE reached the Arctic coast in 1772.

Although for both the Inuit and the Dene the dog team was the usual means of travel and the

caribou the principal source of food and most important source of winter clothing, each of these peoples had its own way of hunting, of raising children and of regarding the environment and the spiritual powers they believed were integral to their world. Their respective knowledge of the land and of its life constitute distinctive ethnoscientific traditions.

During the past 160 years, the MÉTIS have also been categorized as northern native peoples. The first Métis who moved into the North in the early 19th century settled around Great Slave Lake; they trace their ancestry to the unions between French COUREURS DE BOIS and Indian women in the early days of the fur trade. In the aftermath of the NORTH-WEST REBELLION of 1885, many Métis moved north and settled in the Mackenzie Valley. Other Métis, sometimes called "country-born," are the descendants of unions between Hudson's Bay Company men — mainly of Scottish origin — and Dene women. The children of these unions usually intermarried with the original Dene inhabitants, so close family ties exist between the Métis and the Dene.

Future of the North The issues that concern the North today result from the presence of the white man, whose advent was spearheaded by the explorers seeking to extend the fur-trade empire. The explorers were followed by clergy, who were followed by representatives of government. The pattern of historical development in every region of Canada was reflected in the North, with one difference. The opening of the prairies by the construction of the CPR was followed by agricultural settlement, the establishment of many centres of white population and widespread diffusion of European language and culture. In the North, however, where agricultural settlement is out of the question it is nonrenewable resources, eg, gold, silver, lead, zinc, copper and oil and natural gas, that have spurred economic development. These industries do not promote widespread white settlement, but rather "instant" towns, eg, Faro in the Yukon and Pine Point in the NWT, with imported labour forces. A large part of the white population is transient; even government employees are likely to regard their service in the North as a tour of duty limited to a few years. The native people therefore constitute, in the NWT, a majority of permanent residents, and in the Yukon a very substantial minority. These facts bear significantly on the future of the North, for they make possible what was not possible when the West was opened up — the preservation of the great herds of migratory animals, the development of the native economy, and the establishment of political institutions that fully recognize the special place of the native peoples.

The northern economy is mixed. The people living there have traditionally depended on renewable resources, eg, hunting, trapping and fishing for employment. The mining industry largely employs white people, as does the oil and gas industry, although the latter has also sought to employ native people. The federal and the territorial governments are now the largest employers of both white and native people. The North is perceived as Canada's last frontier. It is natural to think of developing it, of subduing the land, and extracting its resources to fuel Canada's industry. Because many people are committed to the view that the economic future of the North depends solely on large-scale industrial development, policies concerning the North have often weakened or destroyed that sector of the economy based on renewable resources and those who earned a living by hunting, trapping and fishing have been regarded as unemployed. These policies have brought serious pressures to bear on the native population, many of whom, if they continue to live on the renewable resources, may experience relative poverty and suffer the loss of a productive way of life. If they relinquish traditional ways of life, which are considered culturally important and a source of self-respect, then the devaluation of that way of life can have widespread and dismaying consequences.

The Inuit, the Dene and the Métis say the North is their homeland; they do not oppose industrial development in the North; they believe, however, that they are entitled to a measure of control over the pace of such development and a share in the wealth it may create. In their view, these goals will only be achieved if new political institutions that truly reflect the interests of the native peoples are established in the North. This implies a new set of political and economic priorities for northern development. It depends on the recognition of native LAND CLAIMS, for it is through their claims that the native people seek to preserve their languages, their art, their culture, their values — their very identity.

Development of the North need not be defined exclusively in terms of large-scale, capital-intensive technology. The possibilities of the renewable resource sector need not be ignored, eg, the fish and mammal resources of the NWT can provide sufficient protein for a human population in that region 2 to 4 times the present size. Development might also include a greatly expanded program of wildlife management and a carefully regulated harvest, with active involvement of native people. At the same time there is no reason why native people cannot enjoy access to the economy of the dominant society.

The Dene, the Inuit and the Métis are advancing proposals for new political arrangements in the Yukon and the NWT. Whatever the outcome of these proposals, they are evidence of a renewed determination — and a new capacity — on the part of native people in the North to defend what they believe is their right to a future of their own.

Canadians share a mass culture with the US but it is Canada that has a distinct northern geography and special concern for the North (*see* NORDICITY). Canada's achievements in the development of the North are in many ways unsurpassed, eg, the exploration and mapping of the Arctic by land and sea, the development of fur-collecting posts, the mining industry's discovery of uranium off the shores of Great Bear Lake in the 1930s and its extraction of iron ore from the arctic islands in the 1980s. The Canadian oil and gas industry and its engineers lead the world in the development of technology for the recovery of oil and gas in arctic waters. Progress tends to be equated only with industrial and technological advancement. Ultimately the form that northern development takes — political, social and economic — will reflect the beliefs that Canadians hold about the kind of society they want to build. In the North, however, the questions that lie beneath the surface of our national life cannot be avoided. For many Canadians these questions make the North not simply a geographical area but a state of consciousness. T.R. BERGER

North Bay, Ont, City, pop 51 268 (1981c), inc 1925, located on a northern bay of Lk NIPISSING, at the junction of Hwys 11 and 17, some 360 km N of Toronto and 340 km NW of Ottawa. Traditional "Gateway to the North," the city is administrative seat for the Dist of Nipissing. North Bay lies roughly along the "Nipissing Route" where the FUR TRADE portage of La Vase connected the waters of Trout Lk and the Ottawa and Mattawa rivers with Lk Nipissing, the French R and Georgian Bay. Its development awaited the slow progression of settlement up the Ottawa Valley and from southern Ontario which was initiated by the arrival of the CPR (1882). Later rail connections were made to Toronto (1886) and to the resource areas north-



ward (1904). Town status was achieved in 1891, and by 1914 North Bay was a regional supply centre and key rail point. It did not "boom" in the manner of many northern centres, but it also avoided the "bust" cycle so intimately associated with such resource-based growth. The city's geographically advantageous position has aided a variety of economic endeavours. It remains a major fur centre, and its wild fur auctions are among the largest in the world. Wood and wood products remain important. Recently, a variety of processing and general manufactures have supplemented traditional industries. North Bay also benefits from income generated by a military base and, more so, from an important tourist industry focused on scenic Lk Nipissing and the "Near North" regions. North Bay's population is largely of British origin (about 60%) with a strong French Canadian presence (about 25%) and notable elements of Dutch, Italian, Scandinavian and German stock — all enjoying the convenience of a prosperous urban life with proximity to the "Near North." PETER KRATS

Reading: W.K.P. Kennedy, *North Bay: Past, Present Prospective* (1961).

North Cape, also called North Pt, is the northern extremity of PEI, dividing NORTHUMBERLAND STR from the Gulf of St Lawrence proper. From the shoreline a low cliff of PEI's characteristic red sandstone leads to shallow water, with irregular reefs extending N and E to North Point Reef 8 km offshore. North Point Light, beamed from a 19 m white octagonal tower, and a light and whistle buoy 2.8 km N of the cape are important aids to navigation. Principal occupations are fishing and agriculture. Silver fox farms were also common here until the demise of the industry in the late 1930s. P.C. SMITH

North Pole Earth's northernmost geographic point, located at the northern end of the Earth's axis. The pole lies in the Arctic Ocean more than 7200 km N of ELLESMERE ISLAND, at a point where the Arctic Ocean is 4087 m deep and usually covered with drifting pack ice. The pole experiences 6 months of complete sunlight and 6 months of total darkness each year; from it, all directions are south. Because the Earth's surface areas near the N and S poles receive the sun's rays at the most slanted angle, they absorb the least heat. Centrifugal force causes Earth to bulge outwards at the equator; hence, it is slightly flattened at the poles. However, during the International Geophysical Year (1957-58) it was found that Earth is very slightly pear shaped, with the North Pole at the smaller end. This bulge (about 15 m high) covers millions of square kilometres around the pole.

The North Pole did not become a goal of ARCTIC EXPLORATION until fairly late; the few early expeditions that tried to reach it were looking for a polar route to the East rather than for the pole itself. Sir Edward PARRY left Spitzbergen to try to reach the pole in 1827 and attained 82°45'; further expeditions, American and British, took place in the 1860s and 1870s. It is widely accepted today that the pole was first reached by the American explorer Robert E. Peary, who started from Ellesmere I on 1 Mar 1909. With Peary on his final dash were his dog driver Matthew Henson and 4 Inuit. It is claimed that they arrived at the pole on Apr 6 and remained there 30 hours. A competing claim was made by F.A. Cook, a former traveller with Peary, who said he had reached the pole on 21 Apr 1908 and had remained there 2 days. The controversy still con-

tinues, but Peary's claim seems the more valid and has been accepted by the US Congress and geographical institutions in many countries. In 1926 Richard E. Byrd and Floyd Bennett made the first airplane flight over the pole; in the same year, it was reached by dirigible by the international team of Roald AMUNDSEN, Lincoln Ellsworth and Umberto Nobile. The pole was visited by the US nuclear submarine *Nautilus* in 1958.

Since 1907 various Canadians have invoked what is known as the "sector principle" as a possible legal basis to a claim for sovereignty in the polar region. By this claim Canada would have jurisdiction over a wedge-shaped segment between the line of longitude 60° W of Greenwich (N from a point on the meridian that is near Ellesmere I) and the meridian 141° W of Greenwich (forming the border between the YT and Alaska); these meridians converge (as do all meridians of the Northern Hemisphere) at the North Pole. The theory has not received general acceptance as a legal basis for a claim. *See* GEOMAGNETIC POLE.

HUGH N WALLACE

Reading: A. Cooke and C. Holland, *The Exploration of Northern Canada, 500 to 1920* (1978); M. Zaslow, ed, *A Century of Canada's Arctic Islands* (1981).

North-South Institute, a nonprofit corporation est (1976) to undertake professional research on relations between industrialized and developing countries. The institute organizes seminars and conferences and publishes reports on research projects, eg, the effect of Canada's trade and industrial policies on the Third World. In 1980 the institute began an independent evaluation of the CANADIAN INTERNATIONAL DEVELOPMENT AGENCY. The institute has received major funding from the Donner Canadian Foundation, the International Development Research Centre and CIDA. Headquartered in Ottawa, it is governed by a board of directors.

GREGORY WIRICK

North Vancouver, BC, City (pop 33 952, 1981c) and Dist (pop 65 367), is located in southwestern BC, adjacent to the city of VANCOUVER. Situated on the N shore of Burrard Inlet, N Vancouver extends from the Capilano R on the W to beyond Deep Cove on the E. The north shore mountains — such as Crown, Grouse, Seymour, Hollyburn and, highest and most famous, the Lions — form a scenic backdrop. The city of Vancouver is surrounded by the Dist of North Vancouver (area 17 819 ha) except at the waterfront. Elevations in the area range from sea level to 1400 m. The district (inc 1891) is governed by a mayor and 6 aldermen, as is the city (inc 1907), which is centered on Lonsdale Avenue.

History The rich forests on the N shore of Burrard Inlet first attracted settlers to the area. In 1862 T.W. Graham and Co acquired a 194 ha timber stand in what is now North Vancouver, and timber was soon shipped from the quickly erected Pioneer Mills. A small waterfront mill town developed into the largest settlement on the inlet. An American, Sewell P. Moody, bought Pioneer Mills in 1872 and gave his name to the settlement of Moodyville. In 1886 the N shore became North Vancouver after Vancouver was incorporated. The Second Narrows Bridge, completed 1925, provided a fixed link with Vancouver; Lion's Gate Bridge (1938) provided a second link.

Economy North Vancouver is an important shipping port for lumber, ore and grain, and has numerous manufacturing establishments and shipyards — the RCMP schooner ST ROCH was built here 1928. The Burrard Dry Dock Co is one of the largest shipyards in Canada. The extension of the Pacific Great Eastern Ry (now BC Ry) from Squamish in the 1950s increased the city's importance as a transshipment point. Tourists are attracted by the facilities for fishing, sailing, skiing and mountain climbing in the area's 75 parks. In Capilano Canyon Park, the famous Capilano Suspension Bridge, 70 m above the river, stretches 137 m across the canyon. Cleveland Dam, north of the park, releases most of the water for Greater Vancouver consumption from Capilano Lk. In the eastern part of the Dist is Mt Seymour Provincial Park.

Cityscape North Vancouver is a popular residential and tourist area. Attractions include the park and Tilford Gardens, the Grouse Mt Skyride, the Capilano Salmon Hatchery, Capilano College and many museums and art galleries.

ALAN F.J. ARTIBISE

North West Company, a major force in the FUR TRADE from the 1780s to 1821. Managed primarily by Highland SCOTS who migrated to Montréal after 1760, or came as LOYALISTS escaping the American Revolution, it also drew heavily on Canadien labour and experience. The name first described Montréal traders who in 1776 pooled resources to reduce competition among themselves and to resist inland advances of the HUDSON'S BAY COMPANY. In 1779 a new temporary organization took the name. Its 16 shares were held by 9 partnerships including business leaders Simon MCTAVISH, Isaac Todd and James Mcgill, and several experienced winterers in the Indian country. A 1780 reorganization joined McTavish, the FROBISHER brothers, the McGills and the ELLICES, with Peter POND as their agent in the Athabasca country.

Pond's inland encounter with opposition trader Jean-Etienne Waddens and the latter's murder in Mar 1782, along with increased American and HBC competition, clarified the need for a more unified, formal and permanent organization. In the winter of 1783-84, the NWC therefore became an enduring multiple partnership controlled by the Frobishers and Simon McTavish, with annual trade valued at about £100 000. A powerful rival remained, however. Gregory, McLeod and Co backed John Ross and other traders not included in the NWC, and intense rivalry ensued 1784-87. Pond was again linked with murder — that of Ross in Athabasca. Coalition was again the answer, and in mid-1787 the NOR'WESTERS and Gregory, McLeod amalgamated. Dominated by the Montréal firm of McTavish, Frobisher, and Co, dynamic entrepreneurs thus came together — men such as the MCGILLIVRAYS and, from the ranks of their former rivals, Roderick MCKENZIE and Alexander MACKENZIE. While McTavish and Frobisher handled Montréal affairs, Alexander Mackenzie led inland expansion. The Athabasca trade was reorganized with a new base, Ft Chipewyan on Lk Athabasca. A far-flung system of canoe brigades, provisioned by PEMMICAN from the plains, furnished transport and brought out up to 20 000 MADE BEAVER annually. It also gave Mackenzie the support needed to explore the Mackenzie R to its mouth in 1789.

Armorial bearings of the North West Company (*courtesy Picture Division/Public Archives of Canada*).



During 1790-91, McTavish attempted unsuccessfully to have Britain end the HBC monopoly. Later efforts to lease transit rights from the HBC through its depots on Hudson Bay were rebuffed as well. The only remaining option was to intensify direct rivalry with the "English," who were extending their own network of inland posts. Through the 1790s the Nor'Westers prevailed. Their control of over two-thirds of the Canadian fur trade by 1795 was complemented by Mackenzie's reaching the Pacific overland in July 1793. Potential rivals in Montréal were muted by a 1792 agreement to cooperate.

In 1794 JAY'S TREATY settled the boundary between US and British territory, challenging the Montréalers' access to Detroit, Lk Michigan, the depot of Grand Portage on Lk Superior and the SW trade beyond. Reorganization in 1795 accommodated Montréal interests who, displaced from the south, sought a place in the northern trade. But NWC winterers, notably Alexander Mackenzie, were aggrieved at their standing in the company. In 1797, Forsyth, Richardson, and Co, which had remained outside the 1795 agreement, began to back the winterers, and in 1798 formed the New North West or XY COMPANY. Joined by Alexander Mackenzie in 1800 (after his NWC commitment ended), the XY Co opposed the NWC from the Great Lakes to Athabasca. Simon McTavish's death, however, enabled reconciliation and the merger of the firms in Nov 1804.

Meanwhile, NWC-HBC confrontations increased. NWC acquisition of Québec's King's Posts extended the company's activities as far as Lk Mistassini, inland from Hudson Bay. During 1803-06, the Nor'Westers maintained a base on James Bay, and although this enterprise proved unprofitable, rivalry intensified elsewhere. In EXPLORATION, the NWC kept the upper hand, with Duncan McGillivray, David THOMPSON and Simon FRASER crossing the Rocky Mts and the latter 2 reaching the Pacific. When Thompson reached the Columbia R mouth in July 1811, he encountered a new post which had been erected by the American John Jacob Astor's PACIFIC FUR COMPANY. Isolated from its source of support by the WAR OF 1812, Astoria was sold to the Nor'Westers in Oct 1813. The fort was returned to the Americans by the TREATY OF GHENT. Two new NWC western trade districts proved profitable for some years, but hopes to develop a China trade and a liaison with the EAST INDIA COMPANY bore little fruit.

One factor limiting such developments was a deteriorating situation east of the Rockies. The HBC posed trade challenges and, with the Earl of SELKIRK, was planning an agricultural colony in an area pivotal to the Nor'Westers' transportation and provisioning networks. NWC attempts to block the plan by buying up HBC stock in London and by discouraging prospective colonists in Scotland failed. The stage was thus set for a series of bitter and costly clashes at RED RIVER COLONY, Ft William and elsewhere. The SEVEN OAKS INCIDENT, 19 June 1816, was the worst event in a conflict neither side could win. In 1815-19, repeated clashes and seizures of men and goods in Athabasca exacerbated bad feeling. In June 1819, 7 NWC partners and numerous men were seized by a HBC force under William Williams, the new governor in chief of RUPERT'S LAND, at the Grand Rapid of the Saskatchewan R. Both the prestige of the Nor'Westers and their business that year were thus impaired, despite successes in impeding the inland activities of HBC officers John Clarke and Colin Robertson.

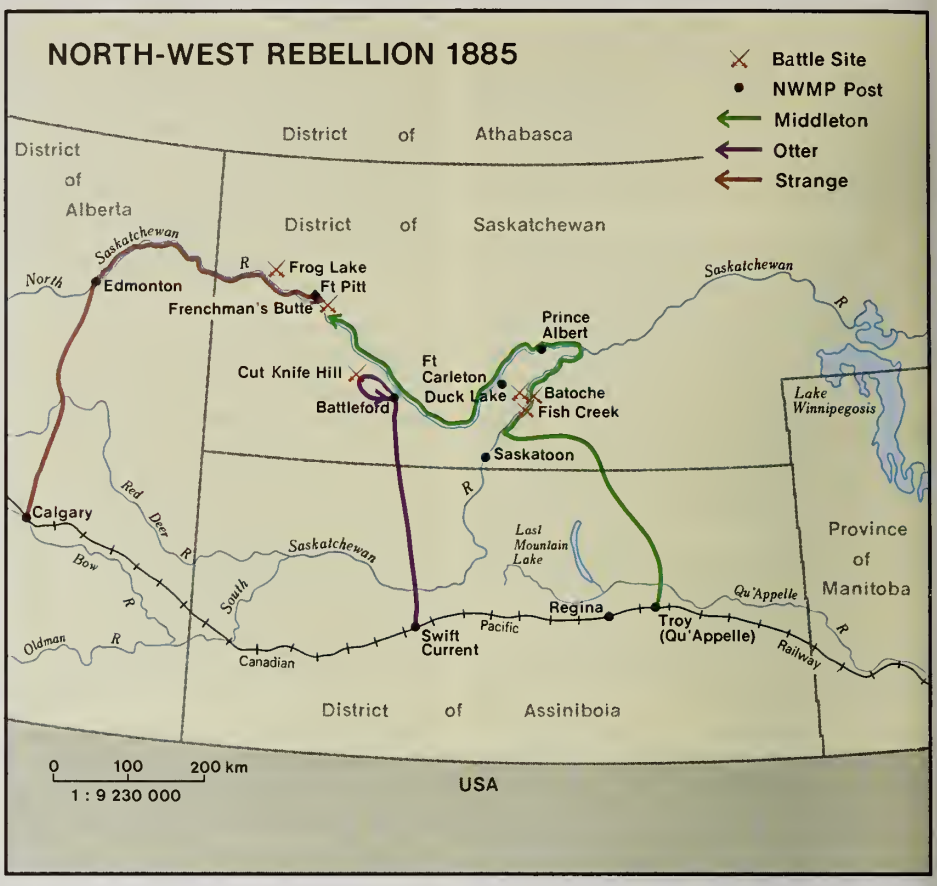
By 1820, strong forces were building towards a resolution of the conflict. NWC partners, concerned about their future, varied in their support for William McGillivray's aggressive measures against the HBC. Splits between the wintering partners and the Montréal agents deepened. Their partnership agreement would expire in 1821, and clearly its terms would need radical revision. Britain was drawn into the broader NWC-HBC struggle, as each company lobbied for official support. The COLONIAL OFFICE wished the restoration of peace and a settlement of the serious territorial and legal issues which reached beyond the conflict and were aggravated by it. In 1821 a parliamentary Act granted exclusive trade to the HBC and to William and Simon McGillivray and Edward Ellice of the NWC, in an effort to placate all parties by devising coalition, not amalgamation. A Deed Poll designated 53 field officers, 32 NWC and 21 HBC, as shareholding chief factors and chief traders, under the charge of HBC governors William Williams and George SIMPSON, the latter a newcomer. The name, charter and privileges of the old HBC provided a stable foundation for the new firm, while the Nor'Westers' skills and experience contributed a scope and dynamism that served the company well. JENNIFER S.H. BROWN

Reading: Jennifer S.H. Brown, *Strangers in Blood* (1980); M.W. Campbell, *The North West Company* (1957); E.E. Rich, *The Fur Trade and the Northwest to 1857* (1967); W. Stewart Wallace, ed, *Documents Relating to the North West Company* (1934).

North-West Mounted Police, a paramilitary police force est Aug 1873 to maintain law and order, and to be a visible symbol of Canadian sovereignty, in the newly acquired North-West Territories (including present-day Alberta and Saskatchewan). The NWMP helped Indians make the transition to INDIAN RESERVES after treaties were signed and assisted incoming settlers. "Royal" was added to its name in 1904, and in 1919 the RNWMP merged with the Dominion Police to form the ROYAL CANADIAN MOUNTED POLICE.

North-West Rebellion began 26 Mar 1885 at DUCK LAKE, NWT (now in Saskatchewan), with a skirmish between MÉTIS and the NORTH-WEST MOUNTED POLICE. There had long been unrest in the North-West, arising from the federal government's indifference to the grievances of the population since the RED RIVER REBELLION. Of greatest concern was recognition of the legal rights to land occupied for up to 15 years but not yet surveyed. Petitions requesting redress of grievances had been presented to Ottawa as early as 1878. When the discontented voices went unheeded, many people spoke of violence. The Métis called Louis RIEL back from exile in Montana in June 1884. As tensions mounted during the severe winter of 1885, the possibility of a peaceful settlement waned; after Duck Lake, negotiation was impossible.

The Canadian government reacted with as much speed as possible, considering that the CPR N of Lk Superior was not completed. CPR manager William VAN HORNE quickly arranged for Canadian troops to be transported across the gaps, enabling them to reach Qu'Appelle by Apr 10. Indians under BIG BEAR had already killed or captured some whites and Métis at Frog Lake on Apr 2. Maj-Gen Frederick MIDDLETON, commander of the Canadian militia, intended to send a 3-pronged attack from the CPR line N towards the settlements. Maj-Gen T.B. Strange was dispatched to Calgary, and was to progress N towards Edmonton. Lt-Col William OTTER was to move N from Swift Current towards Battleford, where NWMP officers warned of the threat the area's Cree presented to the civilian population. Middleton himself was to move N from Qu'Appelle towards Batoche. On Apr 24 at FISH CREEK, the Métis and Middleton's forces fought an indecisive battle, and on May 2 at Cut Knife Hill, Otter withdrew in the face of stiff resistance from POUNDMAKER's Cree. Only at BATOCHE, May 9-12, were government forces able to win decisively; this battle broke Métis resistance. Riel was taken into custody May 15, and Métis leader Gabriel DUMONT escaped to the US. Big Bear remained at large until July 2, after encountering and retreating from government forces on May 28 at Frenchman's Butte. Most of the Indian and Métis leaders were imprisoned and were later granted amnesty. Riel was hanged in Regina on 16 Nov 1885.



The long-term strategy of the Métis and Indians who joined Riel had not initially included military resistance. Riel hoped to win concessions from the Canadian government through negotiation, essentially the same strategy that he had used successfully during the 1869-70 Red River Rebellion. Dumont disagreed, believing that the Métis and Indians could successfully wage a guerrilla campaign against the more cumbersome columns of the advancing North-West Field Force and Canadian militia. Historians have suggested that other settlers in the North-West might have joined the Métis if Dumont had been allowed to exploit the early victories. However, few whites were willing to support the use of violence.

The North-West Rebellion cost the Canadian government some $5 million; 38 government troops and 72 Métis and Indians were dead. Riel and 11 Indians were hanged. Both Big Bear and Poundmaker were sentenced to 3 years in prison. The rebellion focused national attention on western grievances, and some concessions were subsequently granted to the white population. Its most significant effect, however, was that it caused increased strain between English and French Canada. WALTER HILDEBRANDT

Reading: R.C. Macleod and Bob Beal, *Prairie Fire* (1984); Desmond Morton, *The Last War Drum* (1972); G.F.G. Stanley, *The Birth of Western Canada* (1936).

North-West Schools Question, a conflict between church and state for control of education in the North-West Territories (now Saskatchewan and Alberta). In 1875 the federal NORTH-WEST TERRITORIES ACT introduced the principle of SEPARATE SCHOOLS for Protestant (mostly anglophone) and Roman Catholic (mostly francophone) religious minorities in the region. In 1884 the first local school legislation created 2 denominational school systems under one Board of Education with autonomous Protestant and Catholic sections. As the Protestant majority grew, legislative and administrative measures by 1892 had transformed denominational schools into a system of state-controlled "national" or public schools, with a few separate schools in which the religious influence became minimal. In 1894 Catholic appeals to the federal government for more control over education failed.

The issue was revived in 1904-05 during negotiations for provincial autonomy for Alberta and Saskatchewan. Early in 1905, amidst national controversy, Minister of the Interior Clifford SIFTON resigned in protest against a vague school clause in the AUTONOMY BILLS. Deep feelings, especially in Ontario and Québec, severely tested Canadian unity and threatened

The governor general's bodyguard at Humboldt [Sask], 1885 (*courtesy Public Archives of Canada/C-751*).



to split the Liberal Party. A compromise clause proposed by Sifton after his resignation was accepted by PM Laurier to avoid the impending split; the clause, which became part of the new provinces' constitutions, preserved the educational conditions of 1892 as expressed in the territorial school law of 1901. With the bishop of St Albert, Emile Legal, unwilling to follow his metropolitan, Adélard Langevin of St-Boniface, into opposition, and with the Liberals in firm control of the first elections in the new provinces, the question quickly disappeared as a national issue. *See also* MANITOBA SCHOOLS QUESTION; NEW BRUNSWICK SCHOOL QUESTION; ONTARIO SCHOOLS QUESTION; SEPARATE SCHOOL. M.R. LUPUL

North-West Territories Act The original Act of 1875 established permanent institutions of government for the Territories, as well as amending and consolidating the diverse legislation pertaining to the region. Under the Temporary Government Act of 1869, renewed annually, the region formerly known as "Rupert's Land and the North-Western Territory," acquired from the HUDSON'S BAY COMPANY in 1870, was governed by an appointed lieutenant-governor and council. The 1875 Act provided for the gradual addition of elected members to the council as the increase in the population warranted it; when there were 21 elected members, the appointive members would be dropped. The Act also covered real estate, wills, rights of married women, the administration of justice and the prohibition of intoxicants. Perhaps most controversial was section 11, intended to establish and guarantee Protestant and Roman Catholic schools; debate over the resulting NORTH-WEST SCHOOLS QUESTION climaxed during passage of the AUTONOMY BILLS of 1905.

By amendment in 1877 French and English were given equal status in the government and courts of the region. In 1891 the Territorial legislature was empowered to "regulate its proceedings" and promptly discarded the official use of French.

In 1888 the federal government established a legislative assembly of 25, elective except for 3 nonvoting legal advisers. In 1891 the assembly was made wholly elective, and in 1897 a full Cabinet government was granted. Although eventually given the forms and many of the responsibilities of provincial government, the local government was never given control of public lands and natural resources, or a wide tax base; nor was adequate compensation provided by Ottawa to meet the demands for local services. This fueled the autonomy movement leading to provincial status for Alberta and Saskatchewan in 1905.

In 1912 the Act (now the Northwest Territories Act) was amended to take into account the region's more restricted size and population, and government by appointed officials was restored. In 1951 elective members were added to the council, and by 1966 they constituted a majority of the council. That year 2 federal constituencies were created. The following year the commissioner and Territorial administration were moved from Ottawa to Yellowknife, and by 1970 the government once again had powers superficially similar to those of provincial governments. In 1975 the assembly was made fully elective, and it chose some of its members to sit on the executive council; but the commissioner and 2 appointed assistants who also sat on the council continued to have great influence on local government policy, and were ultimately responsible to Ottawa, not to the elected assembly. DAVID J HALL

Northcott, Ronald Charles, curler (b at Innisfail, Alta 31 Dec 1935). Northcott began curling in Vulcan, Alta, in 1950 and was vice-skip on the 1953 Alberta High School champions. He joined the Calgary Curling Club in 1958, and between 1961 and 1978 competed in 9 Alberta championships. Northcott represented Alberta at 6 Canadian championships (Briers) and won Canadian and world championships in 1966, 1968 and 1969; he was also all-star Brier skip in each of those years. Voted Calgary's athlete of the year in 1966 and 1968, he received the Order of Canada in 1976. RAY KINGSMITH

Northern Dancer, racehorse (b at Oshawa, Ont 27 May 1961). Bred at E.P. TAYLOR's National Stud Farm, Northern Dancer was unsold as a yearling, but as a 2-year-old won the Remsen Stakes, NY, the Flamingo and Florida Derbies, and the Summer Stakes, Coronation Futurity and Carleton Stakes in Canada. Northern Dancer was the first Canadian-bred horse to win the Kentucky Derby (1964) and went on to win the Preakness, finish third in the Belmont and win the QUEEN'S PLATE. Known for his stamina, Northern Dancer was also very fast — only Secretariat has bettered his Kentucky Derby record of 2 minutes flat for the $1\frac{1}{4}$ mile course. Retired to stud, Northern Dancer has become the leading sire of stakes winners in this century, including Epsom Derby winners NIJINSKY and The Minstrel. JAMES MARSH

Northern Georgia Strait Coast Salish At the time of European contact in the 1790s, the people inhabiting the coast of BC in the northern Strait of GEORGIA area were the Pentlatch, the Comox and the Sechelt. Their languages are identified by these same names and belong to the Coast Salish division of the Salishan language family. In the early 1800s the Pentlatch, who lived along the E coast of Vancouver I from the vicinity of Kye Bay in the N to the approximate area of Parksville in the S suffered greatly from disease and from Indian raiding parties from the W coast of the island. Gradually the Pentlatch became absorbed by their northern neighbours, the Comox. The last speaker of the Pentlatch language died in 1940 and today no one is identified as Pentlatch.

The Comox of Vancouver I were also the victims of tribal hostilities in the early 1800s. Their northern neighbours, the Lekwiltok, began to expand vigorously southward, displacing the Island Comox from their territory that had previously extended from around Salmon R to Kye Bay (*see* KWAKIUTL). The remaining Island Comox descendants live on the Comox Indian Reserve, with a population of about 100. Through intermarriage, the people living at Comox adopted both the ceremonials and the language (called Kwakwala) of the Lekwiltok. The Island Comox dialect of the Comox language is almost completely lost.

The Comox-speaking Coast Salish people along the eastern shore of the northern Georgia Strait fared better. Sometimes referred to as Mainland Comox, they are composed of the Homalco, Klahoose and Sliammon, living in the area from Bute Inlet in the N to Stillwater in the S. Formerly the Homalco and Klahoose occupied the protected waters of Bute and Toba inlets, respectively, as well as the adjacent islands. By the late 1800s, when INDIAN RESERVES were established, their main villages were located at Church House near the entrance to Bute Inlet, the present home of about 10 Homalco, and at Squirrel Cove on Cortes I, the home of about 30 Klahoose. Since most Homalco and Klahoose people, along with the Sliammon, live on the reserve at the mouth of Sliammon Cr (N of Powell River), formerly a traditional Sliammon village and now a modern village of about 450, the term Sliammon is commonly used to designate all 3 of these groups. The Sechelt Indians, who traditionally occupied Jervis Inlet, both sides of the Sechelt Pen and the adjacent islands, number 500 and live on reserves adjacent to the town of Sechelt.

Like other northwest coast Indians, the northern Georgia Strait Coast Salish had access to a wealth of natural resources, including the 5 species of PACIFIC SALMON, rockfish, seals, shellfish, deer, mountain goats, bear and migratory birds. Vegetable foods provided the necessary complement to fish and meat. An inventory of a traditional HOUSE would indicate that the giant western red cedar was the most versatile of plant materials. Its strong, easily split wood was used for making house planks, dugout CANOES, boxes, barbecuing sticks, drying racks and bowls. Its inner bark was pounded until soft and used for mats, ropes, clothing and ceremonial costumes (*see* NORTHWEST COAST INDIAN ART). The art of cedar-root basketry is still practised by some women. *See also* NATIVE PEOPLE: NORTHWEST COAST and general articles under NATIVE PEOPLE.

DOROTHY KENNEDY AND RANDY BOUCHARD

Reading: H. Barnett, *The Coast Salish of British Columbia* (1975); Dorothy Kennedy and Randy Bouchard, *Sliammon Life, Sliammon Lands* (1983).

Northern Lights, or aurora borealis, dynamic displays of multicoloured luminosity appearing in the day or night sky in high latitudes in the Northern Hemisphere. At any instant of time, the auroras are arrayed along a band (the auroral oval) with the North GEOMAGNETIC POLE near its centre. The band is normally about 500-1000 km wide, its average position in Canada being over Yellowknife, NWT, to the West, and Grande rivière de la Baleine, Qué, to the East. During intense activity the oval may expand as far S as Miami, Florida (Aug 1972), and beyond. The luminosity can fluctuate violently, particularly near local midnight when explosive bursts of activity called substorms are triggered. Auroras originate in the ionosphere, the upper atmosphere, 100-300 km above the Earth's surface. They are caused primarily by energized electrons (1-20 kilo-electron volts) which are accelerated towards the ionosphere from a region 5000-10 000 km above the Earth's surface. These energetic electrons bombard the upper atmosphere and "excite" atmospheric constituent particles (primarily oxygen and nitrogen). When these particles return to less excited states, they give off light. Green or red light comes from excited atomic oxygen; purple light from excited molecular nitrogen.

Current theory states that the energy driving auroras is obtained from the solar wind, a gas composed primarily of protons and electrons, blowing away from the SUN at supersonic velocities of 300-1000 km/s (*see* PHYSICS). The solar magnetic field is embedded in the gas and is pulled by the wind deep into interplanetary space. The wind interacts with the Earth's magnetic field, distorting it to form the magnetosphere (ie, the comet-shaped cavity, blunt end towards the sun, carved in the interplanetary medium by the Earth's magnetic field). The magnetosphere is broken at each pole by a cleft region. Some solar-wind plasma, slowed and heated by interaction with the magnetosphere, enters the cleft region and penetrates directly to the ionosphere causing the dayside auroras. However, most of the particles leaking into the magnetosphere are trapped behind the Earth, and through processes analogous to convection end up flowing towards the Earth. Some of these particles are accelerated into the nightside ionosphere causing brilliant auroras. The amount of energy leaking into the magnetosphere is regulated predominantly by the strength of the interplanetary magnetic field and its direction in relation to the Earth's magnetic field lines at the outer boundary of the magnetosphere. Activity also varies with sunspot and solar-flare occurrence. Parallel phenomena in the Southern Hemisphere are known as the aurora australis.

Auroras are the visible portion of the dissipation of the energy which has entered the magnetosphere from the solar wind. This energy is also dissipated through ohmic heating

(ie, heat generated by electric current flow through a resistor). This process involves giant currents, sometimes in excess of one million amperes, which flow through the resistive ionosphere in the region of luminous auroras. These currents create magnetic fields which can make compass needles show direction incorrectly and which can cause surges in power lines resulting in electric-power outages.

The northern lights have haunted the imaginations of spectators for centuries. To the Inuit, the *arsaniit* are the sky people enjoying a ball game. Some Indians view the lights as ancestral spirits dancing before the Great Spirit. CENTAUR (Cleft Energetics, Transport and Ultraviolet Radiation) is a joint Canada-US research project studying auroras and related phenomena.

GORDON ROSTOKER

Northern Railway of Canada The railway was designed to link the 3 lakes for which it was originally named — the Ontario, Simcoe and Huron Railway. It opened May 1853 when the locomotive *Toronto* (made in Toronto) hauled the first steam train in present-day Ontario from Toronto to Mitchell's Corners (present-day Aurora). The line was soon extended to Bradford and Allandale and by 1855 the entire stretch to COLLINGWOOD was completed, including a branch to Lk SIMCOE. The railway made Collingwood a prosperous transshipment point from the midwestern US and tapped the rich timber reserves of Simcoe County. It was largely responsible for the hegemony TORONTO managed to establish over the northern hinterland, but was a financial failure itself. On the verge of bankruptcy, it was reorganized 1858 as the Northern Railway of Canada. Branches were built from Collingwood to Meaford (1872), Allandale to Gravenhurst (1875), and eventually to Huntsville and North Bay. The railway merged with the Hamilton and North Western Ry (1879) and was taken over by the GRAND TRUNK RAILWAY in 1888, eventually becoming part of the CN system.

JAMES MARSH

Northern Review, literary magazine appearing irregularly, 1945-56, edited by John SUTHERLAND. It represented the end of the era when Montréal was the leading centre of modern Canadian POETRY IN ENGLISH. It arose from the merger of the earlier rivals, *Preview* and *First Statement*. *Preview* was founded in Mar 1942 by a group including Patrick Anderson, the journal's driving spirit, and F.R. SCOTT; later P.K. PAGE and A.M. KLEIN joined the editorial group. *Preview*'s orientation was cosmopolitan; its members looked largely towards the English poets of the 1930s for inspiration. *First Statement* was founded in Sept 1942 by Sutherland, who was soon joined by Irving LAYTON and Louis DUDEK. Its writers attacked the "colonialism" of *Preview* and advocated a poetry related to local conditions and ways of speech; this meant that in practice they looked to American models, notably Ezra Pound and William Carlos Williams. First Statement Press also published poetry chapbooks, and when the rival magazines submerged their differences and united in *Northern Review*, the press continued, publishing books by Layton, Anderson, Anne WILKINSON and Raymond SOUSTER. The group that originally embarked on *Northern Review* included Scott, Klein, Layton, Anderson, Page, A.J.M. SMITH, Dorothy LIVESAY and Ralph Gustafson, but in 1947 several members of the board resigned over a controversial review Sutherland published without consulting his associates. In 1948 Layton left, and the review became largely an expression of Sutherland's increasingly conservative attitude, though it still attracted good writers, including Mavis GALLANT, Brian MOORE, Marshall MCLUHAN and George WOODCOCK. It came to an end with Sutherland's death in 1956.

GEORGE WOODCOCK

Northern Telecom Limited, *see* ELECTRONICS INDUSTRY.

Northumberland Strait is a tidal water body between PEI and the coast of eastern NB and northern NS, extending 225 km WNW to ESE from Cap-Lumière, NB, to Cape George, NS, with a width of 4-17 km. It is 68 m deep at its eastern end but less than 20 m over a large central area. Preglacial and glacial valleys eroded into red sandstone and siltstone lead from both ends into the floor of the Gulf of ST LAWRENCE. The retreat of glacial ice from the strait and surrounding area about 13 000 years ago was followed by flooding by the sea. Soon after, isostatic uplift excluded the sea from the central area, which became an isthmus joining opposite coasts. By 5000 years ago, the rising sea level had flooded this link, establishing the present strait, which has been slowly deepening. A generally shallow depth causes strong tidal currents, water turbulence and a high concentration of suspended red silt and clay, which led early French colonists to name the strait "la mer rouge." Shallowness is also largely responsible for the warmest summer water temperature in eastern Canada (July 16°C) and a consequent concentration of summer tourist activity, as well as a prolific shellfish and lobster fishery. Equable climate and extensive tillable soils form the basis for mixed agriculture and vegetable growing (particularly potatoes) on both coasts. The strait is crossed by 2 ferries — Cape Tormentine, NB, to Borden, PEI, and Cariboo, NS, to Wood I, PEI.

The strait's coastal areas were settled by ACADIAN French from the early 16th century, and by English, LOYALISTS and SCOTS in the 18th century. The principal coastal towns are CHARLOTTETOWN and SUMMERSIDE, PEI; PICTOU, NS; and SHEDIAC and Richibucto, NB. The strait was named for HMS *Northumberland*, flagship of Admiral Colville.

I.A. BROOKES

Northwest Coast, the name given by 18th-century navigators and traders to the great arc of Pacific coast and offshore islands stretching from present-day northern California to an ill-defined point along the Alaska coast at Prince William Sound or even Cook Inlet. Modern anthropologists identify the native culture of the NW Coast as that, within rough limits, between Yakutat Bay, SE Alaska, and Trinidad Bay or Cape Mendocino, Calif. Along this narrow coastal belt the Indians developed high levels of civilization based upon the sea's plentiful resources. Warmed by the N Pacific Current and deluged along most of its length by heavy annual precipitation, the NW Coast produced dense coniferous forests and abundant vegetation.

The NW Coast was one of the last temperate ocean frontiers to be explored and settled by Europeans. Despite the attractions of the N Pacific as the western end of a possible NORTHWEST PASSAGE, the region remained isolated. Distance, the limitations of shipbuilding technology and Spain's jealous control over most of the N and S American littoral prevented intrusion by all but the most hardy. Apocryphal voyages by Lorenzo Ferrer Maldonado (1588), Juan de FUCA (1592) and Bartholomew de Fonte (1640) confused cartographers, who prepared charts bearing no resemblance to reality. In 1579 Francis DRAKE may have reached 48° N lat before returning southward to the approximate latitude of present-day San Francisco and then crossing the Pacific, but his exact northernmost location remains a matter of conjecture. In 1602 Sebastian Vizcaíno discovered Monterey Bay for Spain and sailed to about 43° N lat. Until the 18th century, however, Spain was occupied with its earlier conquests and remained content to claim rather than to explore the coastline. Although one Spanish transpacific galleon crashed at present-day Nehalem Bay, Ore, in the latter 17th century, none of its crew survived to carry word back to Mexico.

During the 18th century interest grew in the unexplored N Pacific. Russian expansion into Siberia resulted in expeditions by Vitus BERING to Bering Str (1728) and in 1741 by Bering and Aleksei Chirikov to the NW Coast around 55° N lat. Rumours of this activity impelled the Spanish Crown to order voyages northwards from Mexico. In 1774 Juan Pérez Hernandez reached about 55° N. He touched at the Queen Charlotte Is and at Nootka Sd (Vancouver I) but did not land to take possession for Spain. In 1775 a new expedition under Bruno de Hezeta and Juan Francisco de la BODEGA Y QUADRA sailed northwards to investigate the Russian presence. Bodega y Quadra reached about 58°30′ N lat and discovered Bucareli Bay, Prince of Wales I. Spain dispatched another major expedition in 1779, but government secrecy prevented information on the NW Coast from reaching the public.

The challenge to Spain came from Britain rather than Russia. In 1777-78, James COOK crossed the Pacific via Hawaii to the NW Coast. Cook was to search for a Northwest Passage and to explore the unknown coastline. He spent nearly a month at Nootka Sd before continuing northward to Alaska and the Aleutian Is. Later in Macau and Canton, Cook's men discovered a potentially lucrative trade in the sea-otter pelts they had obtained on the NW Coast. The publication of Cook's voyage abruptly ended the coast's isolation. After 1785 commercial expeditions from London, Bombay, Calcutta, Macau and American ports such as Boston opened the maritime FUR TRADE. By 1792 there were at least 21 trading vessels on the coast. Trading captains included George Dixon, John Meares and Charles William Barkley. The trade in sea-otter pelts had begun in 1786; it reached its apogee in the 1790s before declining after 1812.

The Spaniards were ignorant about the burgeoning maritime fur trade until 1788, when they renewed their own voyages to check Russian encroachments southward from Alaska. Esteban José MARTÍNEZ discovered 6 Russian posts in Alaska and, after hearing from the traders that Russian ships would soon occupy Nootka Sd, he persuaded the Mexican viceroy to authorize a voyage to occupy the sound for Spain. In 1789 Martinez arrived there and found British and American vessels. His seizure of the British vessels sparked the NOOTKA SOUND CONTROVERSY, a clash of imperial interests which almost precipitated a European conflict. However, 3 Nootka Conventions provided for a peaceful sharing of the northern ports and resources. Spain withdrew in 1795, abandoning the fur trade to the British and Americans. Meanwhile, scientific expeditions of the Comte de Laperouse (1786, France), George VANCOUVER (1791-94, Britain), Alejandro MALASPINA (1791, Spain) and the SUTIL AND MEXICANA (1792, Spain) explored the resources and indigenous inhabitants of the NW Coast.

The major impact of the maritime fur trade was to introduce the coastal Indians to firearms, metal tools and manufactured items. The European traders employed some violence and also introduced alcohol and diseases, but the nature of the fur harvest meant that they did not create permanent shore bases. Even before the beginning of the 19th century, however, some observers noted a decline in the number of sea otters and predicted the demise of the trade. This fact, combined with resistance from the Chinese (the major market) reduced the coast's appeal.

The coast's isolation was not to return. In July 1793, Alexander MACKENZIE of the NORTH WEST COMPANY arrived overland down the Bella Coola R to Pacific tidewater. In 1808 Simon FRASER descended the river that was to carry his name, and in 1811 David THOMPSON reached the mouth of the Columbia R. There he discovered that

American traders from John Jacob Astor's PACIFIC FUR COMPANY had arrived by sea to construct Astoria. With the amalgamation in 1821 of the NWC and the HUDSON'S BAY COMPANY, the European presence ceased to be transitory. In 1821 Russia claimed the coast southwards to 51° N lat as its territory, but British and American protests led to the 1824 settlement of the ALASKA BOUNDARY at 54°40'. To compete with the maritime fur traders, the HBC built a string of permanent forts. After negotiation of the OREGON TREATY in 1846, the HBC's far western interests centered on Vancouver I, which became a colony in 1849. Although there was subsequent competition between the fur traders and settlers, the latter won out. With the emergence of colonies and boundary agreements separating the Russian, British, American and Spanish (later Mexican) spheres, the Northwest Coast as a concept ceased to exist except as a historical memory. *See* SPANISH EXPLORATION.

CHRISTON I. ARCHER

Reading: Glynn Barratt, *Russia in Pacific Waters, 1715-1825* (1981); Warren L. Cook, *Flood Tide of Empire* (1973); Robin Fisher, *Contact and Conflict* (1977); Barry M. Gough, *Distant Dominion* (1980).

Northwest Coast Indian Art More than 3000 years ago Indians of the BC coast (and adjacent areas of Washington and southeastern Alaska) developed artistic traditions that are heralded throughout the world for their imaginative and stylistic qualities. Objects made in these traditions are so highly formalized and distinctive that once some of the basic principles have been grasped, they can be easily identified. The "form line" is the primary design element on which Northwest Coast art depends; it is the positive delineating force of the painting, relief or engraving. Formlines are continuous, flowing, curvilinear lines that turn, swell and diminish in a prescribed manner. They are used for figure outlines, internal design elements, and in abstract compositions.

While native people in general do not make a distinction between what is art and what is not, nor do they have a term which corresponds to the English word "art," Northwest Coast Indian people consider recognition of meaning and form traditions to be most important. Throughout the region, special objects were made originally for the purpose of displaying certain inherited privileges and rights of their owners. Although ways of reckoning kinship vary between groups, people claiming common descent also claim rights to ancestrally derived territories, spirit powers, names, songs, dances, crests and other "properties" that both contain and display their family's wealth and identity.

Potlatches are events of great pomp and formality arranged to celebrate the handing down of names, rights and privileges from one generation to the next. These privileges, together with the associated artifacts, are publicly displayed and their transfer committed to the collective memory of the potlatching community. Another defining feature of the POTLATCH is the distribution of wealth objects (and money in more recent times) by the host group to the guests, who include people from other villages and tribes. Acceptance of gifts constitutes validation by the guests that the host group is transferring its inheritance in the approved manner.

Crests, or heraldic art, are objects associated with the potlatch. A crest itself is a concept, usually but not always referring to animals (both natural and imaginary, eg, thunderbirds), which is given a conventionalized representation. Details of the crest images vary widely, according to personal and stylistic preferences. Not all animal representations in Northwest Coast art are crests. Common crest-bearing artifacts are totem poles, painted housefronts and screens (room dividers), ceremonial robes and headdresses, staffs, feast dishes, spoons and ladles. Crests are jealously guarded possessions — they are a legacy from the ancestors, acquired in myth time from supernatural animals or images of supernaturals, to be held in perpetuity by their descendants. To display a crest of another group is an insult to the integrity and identity of that group.



Haida argillite dish, 27 x 22 cm, attributed to Charles Edenshaw. Haida carvers began working argillite early in the 19th century (*courtesy UBC Museum of Anthropology*).

Winter Dances (now held throughout the year) are elaborately staged performances featuring masked dancers and ingenious mechanical devices that create illusions of death and resurrection and other astounding manifestations of supernatural power and presences. In this context, animal representations, most notably MASKS, are related to but conceptually distinct from the potlatch proper. During these initiation rituals, encounters with supernatural powers occur, either as spirit possession or theatrical simulation (the distinction is not always clear to observers).

Shamanic Art Scholars believe that the winter dances developed out of an ancient guardian spirit complex, most highly developed among shamans (mystic healers). The visionary experience is described as the appearance of an animal spirit helper or guardian in a dream or trance. From them, the dreamer drew knowledge and special powers. Northwest Coast shamans used special objects, often made of wood, ivory or bone, in which their spirit helpers were commemorated. These objects include amulets, soul catchers (carved tubular objects believed to be containers for lost souls) and Janus-faced globular shaman's rattles, which are among some of the great masterworks of Northwest Coast art (*see* SHAMAN).



Haida rattle (pre-1880), wood, 25.3 x 12.6 cm (*courtesy UBC Museum of Anthropology*).

Artists

Northwest Coast societies were unique in aboriginal Canada in that they sustained a group of professional male artists who were largely freed from the general food quest by the support of wealthy patrons who commissioned works for potlatches and winter dances. It appears that while most men made objects for personal and family use, the specialists were responsible for the exceptional art objects preserved and treasured in museums. Such artists were trained from youth as apprentices by master artists who, in most cases, were their uncles or fathers. As well as making the objects, they were responsible for the stagecraft involved in ritual use. While all women wove (basketry and textiles), some women past their child-rearing years specialized as did their male counterparts.



Tlingit basket, spruce root, 16 x 14.3 cm (*courtesy UBC Museum of Anthropology*).

Women's Art In weaving, all of the techniques found elsewhere in N America were used, except true loom (heddle) weaving. The Inland TLINGIT excelled in false embroidery; the HAIDA in "self-designed" twined spruce-root hats; the Coast SALISH in cherry-bark imbrication on coiled baskets; and the NOOTKA (Westcoast) women in twined cedar-bark hats with onion-shaped tops, overlaid with strands of beargrass woven in conventionalized whale-hunting scenes.

An exceptional formline weaving technique was developed in the north, becoming a specialty of the Chilkat Tlingit in the 19th century. Chilkat blankets are the highest-valued examples of the weaver's art, worn by chiefs as far south as the Southern KWAKIUTL. The warps are shredded cedar bark twisted with mountain goats' wool; the wefts are pure wool. The warps were hung from a horizontal bar and the double weft strands were twined across them. Designs were made in formline crest designs, copied from patterned boards painted by men (*see* CHILKAT BLANKET).

The Coast Salish made twill-plaited blankets in geometric designs out of goat wool, cattail fluff and (reportedly) the hair of a small fluffy dog, extinct since early contact times. With the introduction of domestic sheep around 1850 and of Scottish knitting techniques, Coast Salish women began producing knitted Cowichan sweaters, which have since become a successful cottage industry. Basketmaking has continued with some vitality among the Coast Salish and Westcoast women, and is being revived among the TSIMSHIAN and Haida. Woven blankets were replaced by Hudson's Bay Co woolen blankets



Chilkat blanket collected from the Haida (pre-1870), wool and cedar bark trimmed with otter fur; yellow, black, blue, white; 158 x 132 cm (*courtesy UBC Museum of Anthropology*).

— both for dancing and as potlatch gifts. Crest designs were sewn on woolen blankets in buttons, shells, and applique.

Men's Art Men worked a variety of materials — wood, stone, horn, copper, bone, antler, leather, ivory and abalone shells since aboriginal times; silver, gold and bronze in historic times, and works on paper and canvas in recent years. Knives, adzes, chisels, gouges and awls were made of stone,.shell and beaver teeth, and hafted with sculptural forms. Metal was especially sought after from Europeans, and in the 19th century native paints were replaced by Western products.

Containers — bowls, dishes, boxes, chests, ladles, canoes — are a specialty. Boxes are made by a kerfing technique in which a single board is steamed and bent in 3 corner folds with a bottom and fourth corner attached by pegs. Stone, wooden and shell dishes and bowls are carved in animal shapes.

Styles

A series of conventions in Northwest Coast art permits the parts of animals to represent the entire creatures — eg, a raven's beak, beaver's teeth, whale's flukes. Two animals frequently share a single body, or a single animal is split at the face or along the backbone to create 2 bilaterally symmetrical profiles; animal parts are rearranged from their biological locations; some are placed inside other animals, or intertwined with them. All these conventions create great formal and iconographic complexities.

Most obviously in the winter dances, but also widely recognizable in other Northwest Coast iconography, is the theme of transformation or metamorphosis between beings of the land, sea and sky, and ultimately between the domains of the living and the dead. A special type of transformation mask has double faces operated by strings so that an outer (usually animal) face opens to reveal a human face within. Masks frequently have movable eyes, jaws and other parts.

Three major styles have been identified — Northern, Central and Southern, corresponding to the major cultural divisions used by anthropologists.

Tsimshian soul catcher (*c* 1890), wood, 16 x 7 x 3 cm. Northwest Coast shamans used these objects to commemorate their spirit helpers (*courtesy UBC Museum of Anthropology*).



The Northern Province, composed of Tlingit, Haida, Tsimshian, Niska, Gitksan and Northern Kwakiutl, exhibits a defining style of 2-dimensional painting, engraving and shallow relief carving based on a formline aesthetic. Formline compositions in the 19th century were most highly developed on housefronts, screens and chiefs' chests. The works of individual 19th-century masters of the formline aesthetic are being identified according to art historical principles by modern scholars.

Formline painting was based on a 3-colour scheme of primary black lines (aboriginally, charcoal and lignite), secondary red lines (ochres) and tertiary blue-green elements (copper minerals). Pigments were mixed with a medium derived from dried salmon eggs and paintbrushes were made of porcupine hairs. Designs were rendered freehand, although templates were frequently used for the recurring ovoid shapes.

A northern painting style was highly developed at contact, in which painted designs extended to the limits of the field (varying according to the object being decorated). All of the constituent elements in these designs harmonize according to a subtle and sophisticated aesthetic.

Sculpted formlines also occur as surface decoration on northern sculpture, including totem poles, headdresses, masks, rattles, canoes, canoe paddles, staffs, and various forms of bowls, dishes and boxes. Early in the 19th century, Haida carvers began working a soft, black shale (argillite) in order to make curios for sailors and traders, and later for settlers and tourists. Argillite carvings are still made in the Queen Charlotte Is, although the technical mastery of the early pieces has not yet been recovered in modern times.

The Central Province By 1880, elements of northern formline painting had been incorporated by the Southern Kwakiutl and Westcoast people, who adapted them to a prehistoric Old Wakashan style encountered by Captain James COOK a century earlier. The Westcoast people developed a new and distinctive combination of formlines, geometric and naturalistic elements. The Kwakiutl continued to evolve an exuberant, colourful and flamboyant manner all their own. In the early 20th century they added orange, yellow and green paint to the repertoire. The BELLA COOLA borrowed many stylistic and ceremonial elements from their Kwakiutl neighbours, creating a style easily recognized by the heavy and bulbous features of its masks, and the typical use of a medium blue paint.

The Southern Province Painting and relief carving in the Coast Salish area is geometric — circles, chevrons, crescents, rows of dots, triangles and T-shapes. In recent years, scholars have noticed that these elements revealed a negative (recessed) formline-type design which is considered by some to be possibly ancestral to the northern formline tradition. Strong, simplified human and animal sculptures — house pots, coffins, grave posts, and a single-mask type, the protruding-eye Sxayxway — were also made. The Southern tradition barely survived into the 20th century, although it too is enjoying a revival since the 1970s.

European Contact

After millenia of what appears to be continuous development, native artistic traditions and society were severely disrupted by European contact which, from the native point of view, amounted to an invasion. Although in the first century of white intrusion, native art and culture flourished under the stimulus of money, the FUR TRADE, new metal tools and other aspects of European technology, the native population became decimated and demoralized by alcoholism and disease, by white schools for native children, by political and religious suppression



The Raven and the First Men (1980), contemporary yellow cedar Haida sculpture by Bill Reid, 210 x 180 cm (*courtesy UBC Museum of Anthropology*).

of the potlatch and by other forms of colonial oppression. By 1910 the traditional social structure and belief system was in such severe dislocation that white observers predicted its complete collapse and the inevitable assimilation of a remnant population into Canadian society. Except for a handful of Southern Kwakiutl artists who maintained their skills through traditional apprentice training, the great artistic tradition developed over 3000 years degenerated into souvenir production for infrequent tourists. It looked like the end of one of humankind's most distinctive cultural achievements.

The Contemporary Revival In 1958 Haida carver Bill REID and Nimpkish carver Douglas Cranmer began recreating traditional Haida houses and totem poles for UBC Museum of Anthropology. Reid has since become the acknowledged leader of the Northwest Coast artistic revival. In 1980 there were an estimated 200 men (and a few women) seriously engaged in artistic production in all the former styles. A sizable collector's market has developed around their work, and some experts believe that certain new pieces achieve the technical skill of 19th-century masters. By 1984 native artists, eg, Charlie EDENSHAW, Robert Davidson, Joe David, Norman Tait and Douglas Cranmer, were becoming cultural leaders, using their skills as artists to fan the dying embers of traditional custom and belief. *See also* INDIAN ART; PICTOGRAPHS AND PETROGLYPHS.

MARJORIE M. HALPIN

Reading: M. Barbeau, *Totem Poles* (1950) and *Haida Carvers in Argillite* (1957); F. Boas, *Primitive Art* (1927, repr 1955); R.L. Carlson, ed, *Indian Art Traditions of the Northwest Coast* (1983); P. Gustafson, *Salish Weaving* (1980); Marjorie M. Halpin, *Totem Poles: An Illustrated Guide* (1981); A. Hawthorn, *Art of the Kwakiutl Indians* (1967); B. Holm, *Northwest Coast Indian Art: An Analysis of Form* (1965); P.L. MacNair, A.L. Hoover and K. Neary, *The Legacy: Continuing Traditions of Canadian Northwest* (1980); C. Samuel, *The Chilkat Dancing Blanket* (1982).

Northwest Coast artist Leonard Duncan with a wooden sculptured whale at Ksan, BC (*courtesy National Film Board/Photothèque*).





Map of the "North and Polar Regions," 1598, showing W. Barents's explorations (Davis Strait is seen in the upper-left portion). The 300-year search for a route through these northern waters was a long chapter of frustration in the history of exploration (*courtesy Public Archives of Canada/NMC-21063*).

Northwest Passage The search for a water route through the Arctic, N of the Canadian mainland, to the supposed wealth of the Far East was a chapter of frustrations in the history of EXPLORATION in Canada. For over 300 years, after it was realized that N America blocked the route to the Orient, expeditions probed the inhospitable sea and land environments seeking a commercial route to the Pacific. Martin FROBISHER (1576) and later John DAVIS (1585) reported the barren obstacle of Baffin I, but noted ice-blocked westward-leading passages N and S of the large island. Exploration in the early 17th century was sidetracked into the broad opening of Hudson Str, but no sea routes were found W of Hudson Bay.

In 1819 Edward PARRY, in command of ships of the British navy, explored the opening N of Baffin I and W of Lancaster Sd to Melville I. This route through Viscount Melville Sd is the widest passage through the arctic islands, but Parry reported it blocked by eastward-moving heavy ice floes even in Aug. After 1829 John ROSS confirmed the extension of Boothia Peninsula N from the mainland, which blocked any sea route through that part of the central Arctic, but he missed the narrow opening through Bellot Str. The many expeditions after 1845 in search of the lost Sir John FRANKLIN finally defined the coastal outlines of most of the arctic islands and reported an uncertain ice-free period for ships of only 1-2 months in Aug and Sept. In 1854 Robert MCCLURE became the first person to traverse a route from W to E, partly by sledge over the sea ice from Banks I to near Devon I. As a result of the natural environmental information accumulated, commercial shipping had no further interest in the passage. The Hudson's Bay Company continued to use part of the water route to its trading posts around Hudson Bay. Otto SVERDRUP confirmed that there was no sea passage through the group of islands NW of Lancaster and Viscount Melville sounds 1898-1902.

The Northwest Passage was finally traversed 1903-06 by Norwegian adventurer Roald AMUNDSEN in his tiny ship, *Gjoa*. He travelled W and S of Lancaster Sd through Peel Sd and along the western Arctic coast through Queen Maud and Coronation gulfs. His western exit from the Arctic was simply a feasible route out of the area rather than a planned attempt to traverse the Northwest Passage. The first W to E passage by the RCMP vessel ST ROCH under Henry LARSEN followed a similar route through the relatively shallow channels along the mainland coast 1940-42. Larsen left the central Arctic through Bellot Str and travelled N and E of Baffin I. During the summer of 1944 the *St Roch* became the first to traverse the passage from E to W in a single year, using a new route W of Lancaster Sd, S through Prince of Wales Str between Banks and Victoria islands, and along the northern Alaska coast. Finally, in 1954, the first ship to achieve the passage from W to E in a single year was the Canadian government icebreaker *Labrador*. In 1969 the American oil tanker *Manhattan*, with the assistance of the Canadian icebreaker *John A. Macdonald*, traversed the Northwest Passage from E to W. *See* ARCTIC EXPLORATION J. Lewis ROBINSON

Reading: L.H. Neatby, *In Quest of The North West Passage* (1958).

Northwest Territories (NWT) The name was originally applied to the territory acquired in 1870 from the HBC and Great Britain — RUPERT'S LAND and the North-Western Territory — which lay NW of central Canada. In 1880 Great Britain also transferred to Canada the arctic islands, N of the mainland, thereby adding to the territories. Large portions of NWT were subsequently removed to create the provinces of Manitoba (1870), Saskatchewan (1905) and Alberta (1905); the Yukon Territory (1898); and to add to the areas of Manitoba (1880, 1912), Ontario (1912) and Québec (1912). Even so, today's NWT constitutes the largest political subdivision within Canada (34.1% of the national area) and the northernmost landmass extending to within 800 km of the North Pole. Its enormous distances, northern location and sparce population impart distinctive characteristics.

Land and Resources

The NWT includes a mainland portion lying W of Hudson Bay-Foxe Basin and S of the BEAUFORT SEA and other arctic marine waters to the E. North of the mainland the Arctic Archipelago includes a great number of islands of varying size and complexity. The more westerly part of the mainland forms the Mackenzie Valley area, a subarctic region contrasting with the arctic mainland area that lies E and N of the TREELINE and is sometimes known as the barren lands. This vegetation division corresponds to a cultural division of the native peoples, with the Inuit occupying the Arctic and the Indians, or Dene, the Subarctic. The greater economic development and larger population of the subarctic Mackenzie Valley also set it apart from the arctic mainland.

Arctic Archipelago Although 60°N is the southern boundary of the NWT, all islands in James and Hudson bays and in HUDSON STRAIT, as well as those farther N, are included within the territories. Eighteen of the islands are larger than Canada's smallest province and the largest, BAFFIN I is more than twice the size of Great Britain. Islands lying N of the straits W from LANCASTER SOUND are known as the QUEEN ELIZABETH IS. Geologically, the islands of the Archipelago range from ancient Precambrian (Baffin I, eastern DEVON I and SE ELLESMERE I) through progressively younger formations to the NW. The eastern islands are mountainous and average 1800-2100 m, with Mt Barbeau (2616 m) in northernmost Ellesmere I the highest peak in the Archipelago. Permanent ice caps cover much of the eastern islands, and magnificent fjords occur in the coastal section. Canada's (and the world's) first arctic national park was established on eastern Baffin I in 1972 (AUYUITTUQ NATIONAL PARK). The central islands are plateaulike, while those in the NW and SW are mainly lowland plains. Severe climate and PERMAFROST result in very poor soil development. Vegetation is tundra, varying from low bush to grass, but it may be totally lacking in some sectors.

Ice covers all the surrounding seas for much of the year, and never disappears from around the northwesternmost islands, severely limiting navigation. Long, cold winters are characteristic of all the NWT. The SE sector of the Archipelago is not as cold, however, because of its proximity to the open waters of the N Atlantic, and with its higher elevation, it receives higher precipitation than elsewhere in the Arctic, which overall is among the driest areas of Canada. The Archipelago differs from the other 2 regions of the NWT in that summers remain cool, averaging only 4°C in July over most of the area because of the surrounding cold waters. The great contrast between the long days of summer and the short (even non-existent) days of winter reflects the high latitude.

Marine biotic resources (whales, seals, fish) supplemented by caribou have traditionally supported the INUIT, with trapping (white fox) in the first half of the 20th century. Commercial whaling by the whites almost exterminated the whales by *c*1910, though limited hunting by natives continues, eg, in the Mackenzie Delta. Seal skins and fox pelts still provide some income for the Inuit. The greatest postwar resource development has been in minerals, with 2 lead-zinc mines now in production in the Archipelago: Nanisivik at Strathcona Sound in N Baffin I, and Polaris on Little Cornwallis I. More widespread activity has resulted from the search for oil and natural gas in the NW Queen Elizabeth Is. Proved reserves of natural gas now are sufficient that the companies have sought permission to construct a plant on MELVILLE I to ship liquified natural gas by tanker to E Canada (Arctic Pilot Project) and ultimately to construct a pipeline to southern Canada. Exploratory drilling for oil continues, especially offshore in the Beaufort Sea. This greatly increased resource development has aroused great concern for the fragile arctic ENVIRONMENT among both the native peoples and conservationists. The Lancaster Sound area and Polar Bear Pass on BATHURST I are especially sensitive areas.


NORTHWEST TERRITORIES
Primary Road
Railway
National Park
Glacier
POPULATED PLACES
1 - 999
1 000 - 4 999
Territorial Capital
0 100 200 300 km
1 : 15 300 000
NOTE: Islands in Hudson Bay belong to the N.W.T.
ARCTIC OCEAN
Beaufort Sea
Hudson Bay
GREENLAND (KALAALLIT NUNAAT)
ALASKA USA
ARCTIC CIRCLE
BANKS ISLAND
VICTORIA ISLAND
PRINCE OF WALES
PARRY ISLANDS
SVERDRUP ISLANDS
ELLESMERE ISLAND
DEVON ISLAND
BAFFIN ISLAND
MELVILLE PENINSULA
BOOTHIA PENINSULA
SOUTHAMPTON ISLAND
MACKENZIE MOUNTAINS
YUKON
NAHANNI
WOOD BUFFALO
YELLOWKNIFE
Great Bear Lake
Great Slave Lake
Bathurst Inlet
Queen Maud Gulf
Coronation Gulf
Amundsen Gulf
Dolphin and Union Str
Franklin Str
Lancaster Sound
Barrow Str
Viscount Melville Sound
M'Clintock Channel
Peel Sound
Prince Regent Inlet
Foxe Channel
Fury and Hecla Str
Frobisher Bay
Cumberland Sound
Chesterfield Inlet
Ranklin Inlet
Baker Lake
Whale Cove
Eskimo Point
Coral Harbour
Repulse Bay
Cambridge Bay
Gjoa Haven
Resolute
Mould Bay
Tuktoyaktuk
Inuvik
Aklavik
Sachs Harbour
Holman
Cape Parry
Coppermine
Cape Dorset
Pangnirtung
Clyde River
Pond Inlet
Arctic Bay
Grise Fiord
Eureka
Alert
Fort Simpson
Fort Liard
Fort Nelson
Fort Smith
Fort Resolution
Fort Providence
Fort Norman
Fort Good Hope
Norman Wells
Fort Franklin
Rae-Edzo
Yellowknife
Snowdrift
Rae Lakes
Echo Bay
Hay River
Ross River
Watson Lake
Faro
Dawson
Mayo
Keno Hill
Elsa
Carmacks
Whitehorse
Pelly Crossing
Old Crow
Arctic Red River
Mackenzie Bay
Beaufort Sea
Barrow
Prudhoe B
Porcupine R
Mackenzie R
Liard R
Peace R
Slave R
Athabasca R
Hay R
Nelson R
Thelon R
Back River
Ellice R
Kazan R
Dubawnt L
Baker Lake
Aberdeen L
Wager Bay
Foxe Pen
Melville Pen
Boothia Pen
Somerset Island
Prince of Wales Island
Victoria Island
Banks Island
Melville Island
Bathurst Island
Devon Island
Ellesmere Island
Axel Heiberg Island
Meighen Island
Borden I.
Prince Gustaf Adolf Sea
Ellef Ringnes Island
Amund Ringnes Island
Mackenzie King I.
Prince Patrick Island
Eglinton I.
Cameron I.
Lougheed I.
Cornwall I.
Graham Island
Nansen Sound
Buchanan Bay
Smith Sound
Robeson Chan.
Hazen Strait
Ballantyne Strait
M'Clure Strait
Penny Str.
Belcher Channel
Norwegian Bay
Jones Sound
Lady Ann Str.
Coburg I.
Wellington Chan.
Prince Albert Sd
Wollaston Peninsula
Hadley Bay
Stefansson Inlet
Admiralty Inlet
Brooeur Pen.
Gifford River
Home Bay
Broughton Island
Cumberland Peninsula
Prince Charles Island
Committee Bay
Spence Bay
Hall Beach
Simpson Peninsula
Felly Bay
Wager Bay
Roes Welcome Sound
Evans Strait
Coats I.
Mansel I.
Salisbury I.
Nottingham I.
Resolution Island
Lake Harbour
Akpatok Island
Button Islands
Ungava Bay
Newfoundland
Quebec
Ottawa I.
Southampton I.
Foxe Basin
Gulf of Boothia
Franklin Bay
Cape Parry
Holman
Prince Albert Sd
Dolphin and Union Str
Coronation Gulf
Dease Strait
Queen Maud Gulf
Bathurst Inlet
Repulse Bay
Wager Bay
Roes Welcome Sound
Foxe Channel
Frobisher Bay
Cumberland Sound
Pangnirtung
Clyde River
Pond Inlet
Arctic Bay
Grise Fiord
Eureka
Alert
Dundas
Melville Bugt
Godhavn
ARCTIC CIRCLE
Mackenzie Bay
Beaufort Sea
Barrow
Prudhoe B
Porcupine R
Mackenzie R
Liard R
Peace R
Slave R
Athabasca R
Hay R
Nelson R
Thelon R
Back River
Ellice R
Kazan R
Dubawnt L
Baker Lake
Aberdeen L
Wager Bay
Foxe Pen
Melville Pen
Boothia Pen
Somerset Island
Prince of Wales Island
Victoria Island
Banks Island
Melville Island
Bathurst Island
Devon Island
Ellesmere Island
Axel Heiberg Island
Meighen Island
Borden I.
Prince Gustaf Adolf Sea
Ellef Ringnes Island
Amund Ringnes Island
Mackenzie King I.
Prince Patrick Island
Eglinton I.
Cameron I.
Lougheed I.
Cornwall I.
Graham Island
Nansen Sound
Buchanan Bay
Smith Sound
Robeson Chan.
Hazen Strait
Ballantyne Strait
M'Clure Strait
Penny Str.
Belcher Channel
Norwegian Bay
Jones Sound
Lady Ann Str.
Coburg I.
Wellington Chan.
Prince Albert Sd
Wollaston Peninsula
Hadley Bay
Stefansson Inlet
Admiralty Inlet
Brooeur Pen.
Gifford River
Home Bay
Broughton Island
Cumberland Peninsula
Prince Charles Island
Committee Bay
Spence Bay
Hall Beach
Simpson Peninsula
Felly Bay
Wager Bay
Roes Welcome Sound
Evans Strait
Coats I.
Mansel I.
Salisbury I.
Nottingham I.
Resolution Island
Lake Harbour
Akpatok Island
Button Islands
Ungava Bay
Newfoundland
Quebec
Ottawa I.
Southampton I.
Foxe Basin
Gulf of Boothia
Franklin Bay
Cape Parry
Holman
Prince Albert Sd
Dolphin and Union Str
Coronation Gulf
Dease Strait
Queen Maud Gulf
Bathurst Inlet
Repulse Bay
Wager Bay
Roes Welcome Sound
Foxe Channel
Frobisher Bay
Cumberland Sound
Pangnirtung
Clyde River
Pond Inlet
Arctic Bay
Grise Fiord
Eureka
Alert
Dundas
Melville Bugt
Godhavn
ARCTIC CIRCLE

Arctic Mainland The Canadian SHIELD makes up the arctic mainland. Pleistocene ice sheets polished its surface, stripping away surface material down to the bedrock. In places boulders and meltwater-sorted sands and gravels remain from the melting ice. Overall it is a gently undulating rocky surface of low elevation, with a bewildering maze of rivers and irregular lakes. As in the Archipelago, true soil is generally absent. Vegetation is also the tundra type, usually including considerable shrubs. In sheltered places, as along inland water courses, stunted trees may extend out from the forested lands on the S and W. Climatically as well as in location the arctic mainland lies between the Arctic Archipelago and the Mackenzie Valley, with more severe winter temperatures and higher summer temperatures than the former because of its continental location. BAKER LK. for example, W of Hudson Bay, has a mean daily temperature of −33.0°C in January and 11.0°C in July, with a mean total precipitation of 235 mm.

The greatest single natural resource of the region for the native peoples has been the migratory barren land CARIBOU, which swarmed in enormous herds to summer in this region. Some large herds remain, but the numbers have declined disastrously in this century because of overhunting, wolf kills and disease. The decline has had serious repercussions for local residents here and in the Mackenzie Valley, resulting in the disappearance of the Caribou Eskimos who formerly lived in the Barren Lands. In 1927 the Thelon Game Sanctuary was established along the THELON R W of Baker Lake to protect MUSKOXEN, which are also found near Bathurst Inlet and in the Arctic Archipelago. As in the Arctic Archipelago, marine biotic resources and trapping still provide some support for the Inuit, but most now are permanent residents in settlements and seek other sources of income. A nickel mine at RANKIN INLET, in operation from 1957 to 1962, provided some employment before closing. In 1981 an Inuit-run corporation co-operated in the opening of a new gold mine at Cullaton Lk, 1300 km N of Winnipeg. Some residents from western settlements are employed in the oil and gas search, while exploration for new minerals continues, particularly for uranium near Baker Lake. There has been some development in recent years of tourist facilities for fishermen, bird watchers and photographers. Concerns have been voiced about the impact of large-scale resource development on the local environment, on the traditional native way of life and on native LAND CLAIMS.

Mackenzie Valley Area Geologically this area ranges from the Canadian Shield on its eastern margin, through younger Palaeozoic and Mesozoic sedimentary formations in sequence to the W. GREAT BEAR LK (31 300 km²) and GREAT SLAVE LK (28 600 km²) lie along the contact line of the Shield, which here often exceeds 300 m of relief. Much of the Mackenzie Valley area consists of the narrowing northward extent of the level continental Interior Plains, with occasional level-bedded hill areas a few hundred metres above the general surface. In the W it rises abruptly into the mountainous terrain of the rugged Cordillera region with peaks of over 1500 m. The area is integrated by the MACKENZIE R and its tributaries, whose total drainage area (1.8 million km²) and system length (4241 km) are the largest and longest in Canada.

Only the northernmost part of the area falls within the continuous permafrost zone, unlike the other two regions of the NWT. Almost all falls within the discontinuous zone where permafrost is widespread if not universal. The Mackenzie Valley area lies within the subarctic boreal forest zone, where spruce, pine, birch, larch and poplar are common. Extensive areas of poor drainage occur, especially on the plains, as a result of permafrost and continental glaciation. These result in string bogs and muskeg. Temperature ranges are greater in the Mackenzie Valley than in the other 2 regions, at Fort Good Hope a maximum of 35°C has been recorded and until recently Fort Good Hope's −61.7°C was the lowest recorded temperature in Canada. In January the average mean temperature is approximately −30°C and somewhat milder temperatures can occur briefly throughout the winter. More importantly the summers are normally warmer in the Mackenzie Valley, with July's mean usually 16°C in the Mackenzie Valley. Precipitation, including snowfall, is significantly higher than for most of the Arctic.

Hunting, fishing and trapping have been traditional activities for the native Indian population, and the FUR TRADE supported the earliest white presence. Moose, caribou, bear, beaver, fox, muskrat and migratory birds continue to be important, but the major resource base since the 1930s has been minerals. Though radium and uranium production from Port Radium on Great Bear Lk has now ended, silver continues to be produced in the area. Gold is mined at YELLOWKNIFE, lead-zinc at Pine Point on the S side of Great Slave Lk, and tungsten at Tungsten near the Yukon border. Oil continues to be produced in the Mackenzie Valley at NORMAN WELLS, Canada's pioneer (1921) northern oilfield, though the focus of recent oil and gas search has now moved northwards. A commercial fishery operates at Hay River on Great Slave Lk. Limited commercial use has been made of the forests because of remoteness from major markets and slow natural growth rates.

The potential hydro power resources of the NWT have been estimated at about 15 000 MW, of which 10 200 MW are within the Mackenzie Valley area. The series of rapids on the SLAVE R near the Alberta boundary has attracted attention for possible hydroelectric power generation (up to 2000 MW), but such a project would have serious repercussions for wildlife. WOOD BUFFALO NATIONAL PARK, straddling the Alberta boundary, is Canada's largest national park (over 44 000 km²). It was established in 1922 to protect the only herd of wood bison in the wild state, and also contains several thousand plains buffalo and the summer nesting grounds of the nearly extinct whooping cranes. Concern for environmental disruption by large development projects in the Mackenzie Valley and the Arctic was demonstrated forcefully in the 1970s, when the Berger enquiry into a possible MACKENZIE VALLEY PIPELINE resulted in its delay until native land claims and environmental issues were resolved.







Northwest Territories

Capital: Yellowknife
Motto: None
Flower: Mountain avens
Largest Urban Centres: Yellowknife, Inuvik, Fort Smith, Hay River, Frobisher Bay, Fort Simpson
Population: 46 000 (1981c); rank eleventh, 0.19% of Canada; 47.9% urban; 52% rural nonfarm; 0.2% farm; 0.01 per km² density; 6.9% increase from 1976-81; Jan 1984e pop, 49 000
Languages: 63.6% English; 1.4% French; 35% Other (1981)
Entered Confederation: 15 July 1870
Government: Territorial — Commissioner, Executive Committee, Legislative Council of 24 members; federal — one senator, 2 members of the House of Commons; the Minister of Indian Affairs and Northern Development is responsible for directing the Commissioner in the administration of the territory
Area: 3 379 684 km², including 133 294 km² of inland water; 34.1% of Canada
Elevation: Highest point — Mount Sir James MacBrien (2762 m); lowest point — sea level at Arctic shore
Gross Domestic Product: $1.2 billion (Yukon and NWT) (1982e)
Value of Mineral Production: $467.2 million (1981); $503.065 million (1982); $561 million (1983 prelim total)
Electric Power Generated: 432 879 MWh (1983)
Sales Tax: None (1984)

People

A northward extension of the fur trade led to the first white presence in the NWT in the late 18th and early 19th centuries as posts were established down the Mackenzie Valley. Missions arrived in the latter part of the 19th century, and the RCMP and other representatives of the federal government in the present century. Mineral and transportation developments in the 1930s marked the beginning of a more significant white influx. In the arctic regions, the remoteness made access more difficult, and fur trade posts were not established there until the 20th century. Permanent settlements were not established in the Queen Elizabeth Is until after WWII.

Urban Centres

There are 64 communities in the Northwest Territories. The most populous of the small urban centres are located in the Mackenzie Valley area. Yellowknife is the largest city (pop 10 500). It began as a gold-mining centre and became territorial capital in 1967. Fort Smith (pop 2380) was the major administrative centre within the territories until 1967 and is still important as a regional centre. Hay River (pop 3140) is a transportation and fishing centre. Pine Point (pop 1570), a mining town based on lead and zinc production, lies just S of Great Slave Lake. Rae-Edzo (pop 1510), the largest Dene community in the NWT, is an administrative centre for the Dogrib people. Fort Simpson (pop 1040), once the center of the fur trade, is located at the



Pond Inlet on northern Baffin Island (*photo by Karl-Heinz Raach*).

confluence of the Liard and Mackenzie rivers. Inuvik (pop 3620) is the major administrative and transportation centre for the western Arctic, as is Frobisher Bay (pop 2610) for the eastern Arctic, located on Baffin I. Rankin Inlet (pop 1200) is the regional administrative centre for the Keewatin. Also in the Keewatin, Eskimo Point (pop 1110) was an Inuit summer camp until the 1900s and still relies largely on hunting and fishing. Baker Lake (pop 990) is the only inland Inuit community. Cambridge Bay (pop 860) is the only territorial regional headquarters for the Kitikmeot region. Coppermine (pop 850) residents derive employment from oil, gas and mine exploration and development. Most other settlements consist of only a few hundred.

Ethnicity

Native people represent 58% of the population, whereas white residents account for 42%. Almost all of the latter group are found in the Mackenzie Valley, mainly in the larger settlements. The 34% of the population speaking languages other than English or French is a reflection of the multiplicity of native cultures that prevails in the NWT. About two-thirds of Canada's 23 000 Inuit live in the NWT, entirely in the arctic regions where they constitute the majority of population. The numerous different Indian cultural groups of the Mackenzie Valley area, included within the Dene or Athapascan linguistic group, total about 10 525. The Métis (approximately 2600) usually have been included in the latter figure, but are stressing their own separate identity as a fourth major ethnic element in the NWT. All 3 native groups are increasingly active politically.

Growth Rate Because of the relatively small total population, external policy and economic conditions have significant impact. Population growth has been erratic since 1966, reflecting the administrative transfer from Ottawa to Yellowknife, and the fluctuating interest in mineral resource development. The birthrate remains one of the highest in Canada however (in 1980, 26.5 per 1000 population), creating pressure for employment.

Economy

Primary resource extraction always has been the foundation of the NWT economy. Furs, the original base, are now of much less importance. Commercial WHALING disappeared early in this century. From the 1930s minerals have become the most important economic base for the NWT, with all other economic activities except service, far behind.

Agriculture Agriculture is of negligible significance in the NWT. The warm summers of the Mackenzie Valley have encouraged speculation on its potential for agriculture, and there have been impressive crop tests recorded at favourably located experimentation stations. However, unpredictable frosts, summer drought and limited good soils create serious obstacles, and improved transportation service often makes it cheaper to bring in agricultural products from the S. Only a few market gardens operate in the Hay River valley.

Mining In 1983 metal mining production in the NWT was valued at $517 million: 55% from zinc, 7% from lead, 31% from gold, 6% from silver and 1% from tungsten. Though only 1% of the total value is contributed by tungsten, the NWT provides almost 100% of Canada's production of that mineral. Mining employs about 2000 people, or about 15% of the work force of the territories, and provides significant employment in related service activities, such as mining exploration. Except for the production of gold bullion, no smelting of minerals occurs in the territories, however, as concentrates are shipped elsewhere.

The only producing oilfield in the NWT continues to be that at Norman Wells, and the oil is also refined locally. Production of approximately 3000 barrels daily from 50 wells has recently increased, with an $800-million expansion, to 25 000 barrels a day, which is piped S to Alberta. A small gas field at Pointed Mountain in the SW near the NWT-Yukon-BC border pipes gas southward. The ongoing search for additional sources of oil and natural gas reflects Canada's hopes for national self-sufficiency in these fuels and for greater employment opportunities for northerners. In 1980 government revenues from all oil and gas sources in the North totalled $12 million. As of 1980 over $800 million had been invested in oil and gas exploration in the Arctic Archipelago over some 21 years of exploration activity. In addition to the 2 main arctic exploration areas (Beaufort Sea and NW Queen Elizabeth Is), the search now includes DAVIS STRAIT and NW Baffin Bay and Lancaster Sound.

Hunting and Trapping Hunting and trapping are more important in the daily lives of NWT residents than statistics might suggest. Although a large percentage of the 9158 residents holding general hunting licences are only part-time hunters and trappers, many of the people living in smaller communities earn most of their living by hunting, trapping and fishing. In addition to the fur value obtained ($2.8 million in 1982-83), the meat is a major item in the local diet. Since 1974 the territorial government has assisted those wishing to make a living off the land through the establishment of outpost camps. There are 54 permanent camps and about the same number of temporary sites at present, with a population of approximately 1200.

Fishing and Forestry The commercial fishery operates both summer and winter on Great Slave Lk. The annual limit is set at 1.7 million kgs but the catch is usually well under this. Whitefish and lake trout are the most important catch. Smaller quantities are also produced by other subarctic lakes, though Great Bear Lk is restricted to sport fishing. Arctic char supports some commercial fishery in such arctic communities as Cambridge Bay, Pelly Bay, Paulatuk and Rankin Inlet. Some 59 510 m^3 of timber was cut in the Mackenzie Valley in 1981; lumber accounted for 45 720 m^3, fuel wood 5710 m^3 and roundwood 8080 m^3.

Modern Inuit village at Lake Harbour, southern Baffin Island (*photo by Fred Breummer*).



Tourism Tourism provides increasing economic benefits to the NWT, with visitors arriving by road via the Mackenzie Highway and the Dempster Highway in the W. Fly-in sport fishing lodges and wilderness camps are served out of Yellowknife, Frobisher Bay, etc. The 3 national parks in the NWT attract visitors despite their distance from southern Canada: Auyuittuq is administered from Pangnirtung, Wood Buffalo from Ft Smith and NAHANNI from Ft Simpson. In 1979 Nahanni was declared a "world heritage site" by the United Nations.

Arts and Crafts A vigorous arts and crafts program among the native people has been developed within the past 2 decades and now generates several million dollars annually. More than one-sixth of the native population is engaged seasonally in this activity. Inuit prints and sculpture have established an international reputation and are a major source of employment in Cape Dorset, Holman Island, Baker Lake and other communities. Most are handled through local co-operatives, which now number 40 in the NWT with a membership of almost 4000. They operate a variety of services, including motels, restaurants and retail stores and are the largest employers of native people in the North.

Transportation

Transportation in the NWT must cope with enormous distances, severe climatic conditions and the small, scattered population. It is remarkable that the NWT is so well served, and the high costs can be appreciated. Commercial water transportation still operates during the summer on the Mackenzie. A modern diesel tug and barge fleet is based at Hay River, with a secondary base at the mouth of the Mackenzie at Tuktoyaktuk, the only reliably sheltered harbour on the shallow western coast. The coastal communities from Tuktoyaktuk eastwards as far as the Boothia Peninsula are served by tug and dual-purpose barge, though often the short ice-free season may restrict such service to a single call. Eastern Arctic communities are served by vessels operating out of Churchill, Montréal and Halifax, with regular annual visits as far N as RESOLUTE but including some icebreaker escorted trips to Winter Harbour on Melville Peninsula.

Since WWII a limited road network has been extended northwards into the Mackenzie Valley. Highways are mainly all-weather gravel roads and include several important river ferry links. The total length is about 2200 km. The Mackenzie and Yellowknife highways now link Hay River and Yellowknife to the road system of NW Alberta. Extensions from Hay River tie in Pine Point and Ft Smith. A northward extension down the Mackenzie Valley was stopped at Wrigley, N of Fort Simpson, because of the opposition of the local people, but the Liard Highway opened in 1984, tying Ft Simpson to the ALASKA HIGHWAY. Inuvik and other Mackenzie Delta communities are now linked to Dawson, YT, by the Dempster Highway, making it almost possible to reach the shores of the Arctic Ocean by road. "Winter roads" exist seasonally over frozen lakes to some isolated communities and mines. The Great Slave Lk Ry, a



Airport at Spence Bay, NWT. Much of the North relies on air transport for supplies (*photo by Sherman Hines/Masterfile*).

branch of the CNR, extends 696 km N from Grimshaw, Alta, to Hay River and is the only railway in the NWT. A spur eastwards serves Pine Point and permits shipment south of lead-zinc concentrates, the primary reason for its construction in 1964. The railway also led to Hay River's development as the major river transportation centre because of its trans-shipment advantages, thus displacing the earlier all-water Slave R route via Ft McMurray, Alta. Aircraft often are the only practical method of transportation in the NWT, particularly in the Arctic. There are 184 airfields in the territories (serving most NWT communities with populations over 100), 14 of which are operated by Transport Canada as licensed airports. Regularly scheduled airline service is provided from southern Canadian cities into the larger communities as far N as Resolute. The main southern airports serving the NWT are Edmonton to the Mackenzie Valley area and to Resolute, Montréal to the Eastern Arctic and to Resolute, and Winnipeg to Yellowknife, Rankin Inlet and Frobisher Bay. An east-west service links Yellowknife and Frobisher Bay by way of Rankin Inlet. Almost all communities, including the northernmost arctic settlements, now have local air service available, while nonscheduled charter aircraft bush planes operate from the larger centres to any point in the territories, even to the North Pole.

Energy

Heating is a major cost for northerners, given the long, severe winters and the transportation costs. Energy needs for most settlements are provided by fuel oil and thermal power generation. In most of the territories hydro power is nonexistent. The Northern Canada Power Commission provides over 90% of all power in Canada's northern territories. In the NWT its installed capacity is 157 MW, with 111 MW thermal and 46 MW hydro, just the reverse of the relative proportions in the YT. At the present time hydro plants operate only N and S of Great Slave Lk: along the Snare R (23 600 kW) for the Yellowknife area, and at Twin Gorges on the Taltson R (20 800 kW) for the Pine Point area.

Government and Politics

From 1905 until after WWII the government of the NWT was carried on by the appointed commissioner and council, composed entirely of senior civil servants based in Ottawa. Beginning in 1951, elected members were added gradually to the previously all-appointed council until it became a fully elected body in 1975. Until 1964 the commissioner was a part-time senior federal official with other major responsibilities. In 1964 the first full-time commissioner was appointed to a separate territorial office. In 1967 the seat of territorial government was moved to Yellowknife and the commissioner relocated there with the nucleus of what has become a territorial public service. The federal Northwest Territories Act contains the written constitution and defines the powers of the territorial government. The territorial council consists of 24 elected members, one of whom it chooses to preside as Speaker. A unique feature of the council currently is that the majority of members are native people: 8 Inuit, 5 Dene, 1 Métis and 10 non-natives.

Northwest Territories

Lieutenant-Governors	*Term*
William McDougall	1869-70
Adams George Archibald	1870-72
Francis Godschall Johnson	1872
Alexander Morris	1872-76
David Laird	1876-81
Edgar Dewdney	1881-88
Joseph Royal	1888-93
Charles Herbert Mackintosh	1893-98
Malcolm Colin Cameron	1898
Amédée Emmanuel Forget	1898-1904
	(office abolished in 1905)

Commissioners	*Term*
Part-time commissioners only, Ottawa residents	1905-63
Bent Gestur Sivertz	1963-67
Stuart Milton Hodgson (first NWT resident commissioner)	1967-79
John Havelock Parker	1979-

The chief executive officer for the territories is the commissioner, appointed by the federal government, who is required to administer the territories under instructions from the minister of Indian affairs and northern development. The commissioner and government leader serve as chairman and deputy chairman of an executive committee, of which 8 members are nominated by majority of the territorial council — true only for the Ninth Assembly which ended in 1983. The role of the commissioner is changing as elected executive members assume increasing departmental and executive functions. Each member of the executive committee is responsible for one or more territorial government departments. The NWT elects 2 members to the Canadian Parliament and also has one representative in the Senate.

Judiciary The territorial judiciary consists of a supreme court judge based in Yellowknife, 4 territorial judges (3 in Yellowknife and 1 in Hay River), 15 judicial officers located in Yellowknife and Hay River, and 102 justices of the peace (53 of native origin) living in various communities. Judges and justices of the peace are appointed by the commissioner. The judge of the supreme court of the NWT is ex officio judge in the YT, and vice versa. Court sessions are held in Yellowknife and on regular court circuits throughout the territories.

Local Government For administrative purposes the NWT is divided into 5 regions: Ft Smith Region (based on Ft Smith), Inuvik Region (Inuvik), Keewatin Region (Rankin Inlet), Kitikmeot Region (Cambridge Bay) and Baffin Region (Frobisher Bay, including all of the Queen Elizabeth Is). Decentralization and devolution recently have been increasing the importance of the regions. The fostering of development of local government to provide local decision making has been hampered by the small size of many of these communities and by

Northwest Territories

Climate	*Aklavik*	*Resolute*	*Yellowknife*	*Frobisher Bay*	*Baker Lake*
Mean Daily Temp, Jan (°C)	-28.6	-32.6	-28.6	-26.2	-33.0
Mean Daily Temp, July (°C)	13.8	4.3	16.0	7.9	11.0
Mean Daily Temp, Year (°C)	-8.9	-16.4	-5.6	-8.9	-12.2
Mean Total Precip, Year (mm)	205.5	136.4	250.0	415.2	234.6
Mean Snowfall, Year (cm)	99.1	78.7	119.4	247.2	100.0
Mean Duration of Sunshine, Year (hrs)	1909	1475		1435	
Mean Days with Fog, Year	11	49	19	20	
Thunderstorms per Year	1	1	5	1	
Mean Frost-Free Period (days)	77	9	108	59	



Inuvik, NWT, some 1086 km NW of Yellowknife, is the administrative and communications centre of the lower Mackenzie and the largest settlement N of the Arctic Circle (*photo by John Reeves/Masterfile*).

their remoteness and limited local economic resources. At present there are 36 incorporated municipalities in the NWT, of which 7 are tax-based: the city of Yellowknife; the towns of Inuvik, Hay River, Frobisher Bay, Ft Smith, Pine Point; and the village of Ft Simpson. There are 29 hamlets, 15 settlements and 12 unorganized communities.

Health Until the Northern Health Services was established by the federal government in 1954, health services in the territories were provided principally by church agencies. Since then they have been broadened to make available facilities that are similar to those elsewhere in Canada. The territorial government has been assuming more responsibility in recent years. Modern hospitals are located in Yellowknife, Hay River, Ft Smith, Ft Simpson, Inuvik and Frobisher Bay, with lesser facilities including 39 nursing stations scattered over the territories. Dental care is available in Yellowknife and Hay River, and from government-employed full-time dentists and dental therapists located throughout the NWT.

Politics Although candidates for the 2 NWT seats in the federal Parliament represent traditional political parties, this is not true for the territorial legislature. Two major issues occupy territorial residents currently: native land claims and political status. Though the Dene signed treaties with the federal government in the past, they dispute that land title was involved and, except for one at Hay River, reserves do not exist. The Dene, along with the Inuit and the Métis, are urgently seeking land claims settlement. The issue is sometimes further complicated by overlapping claims between the native groups.

The federal government quickly accepted and implemented many of the recommendations of the 1966 Carrothers Commission on the development of government in the NWT. It is on record as supporting the move towards full responsible government. At present however it retains control of territorial resource revenues and the territorial government is dependent on the federal for the bulk of its finances. Whether resource revenues in future will be transferred or shared is a controversial issue. The 1980 Drury Commission endorsed the existing government and recommended that greater authority be transferred to it and to the communities. A further political issue is whether the territories will evolve into full provinces as residents wish, or into something else because of the particular problems (including huge costs). In a 1982 plebiscite a majority voted in favour of dividing the NWT. In Feb 1985 the new Conservative government endorsed the plan to divide the NWT into 2 independent jurisdictions — "Nunavut" in the east, comprised of a primarily Inuit population, and a western territory comprised of Dene, Métis, some Inuit, and whites. Nevertheless some difficult issues remained to be resolved before the plan could be implemented by its timetabled date of 1987.

Icebreaker *Canmar Kigoriak* works the southern Beaufort Sea year-round (*courtesy Dome Petroleum Limited*).



Education

Until the end of WWII education was provided mainly by church missions, with students usually housed in nearby residences in a few larger centres. Beginning in 1959, a massive development program was initiated by the federal government and was transferred to the territorial government in 1969. Some 70 government-operated schools now exist, with over 700 teachers and 12 000 students enrolled (compared with 6000 in 1962). A complete range of modern facilities are available up to the completion of secondary schooling, and the NWT has developed its own curriculum. Vocational training in the territories is supplied by a central facility at Ft Smith and by extension services throughout the NWT. A wide variety of adult vocational training programs are available, particularly geared to the needs of the area. Special efforts are made to encourage active local native participation in education programs, through further decentralization and local input to programs, through increased use of native languages and the use of local classroom assistants.

Cultural Life

Interest in native cultures in the NWT has developed with government encouragement. In addition to assistance to arts and crafts programs, the knowledge of elderly native peoples is being tapped for the schools and being recorded for the future. Native cultural programs are active. The ARCTIC WINTER GAMES, held every 2 years since 1970, include a variety of traditional native games as well as more widely known sports, drawing competitors from the NWT, Yukon and Alaska. The Prince of Wales Northern Heritage Centre with its museum and archives is a major centre of public information and research in the NWT. Other community museums, historical societies and heritage groups operate within the territories. The Territorial Library is based in Hay River and provides circulation from 30 points over the North.

Communications

Eight weekly newspapers are published regularly in the NWT and a general publisher is located in Yellowknife. In 1958 the CBC established a Northern Service to meet the special needs of northerners, native and non-native. Radio broadcasts are made in 10 native languages and dialects, as well as in English and French, and include local community as well as network programs. Relay transmitter stations and microwave systems help offset the great distances. Satellite channels now make it possible to transmit radio and TV programs into the most remote northern communities; all of the more than 60 centres with populations over 150 receive radio and TV. A second, commercial service offering as great a variety of programs as anywhere on the continent began in 1982. Two TV stations are located in Yellowknife and one in Frobisher Bay. Telephone and telegraph services link nearly all communities and those few without service generally have HF or VHF radios for emergency use.

Historic Sites

Active archaeological surveys are providing greater knowledge about the early native peoples in the Subarctic and the Arctic. Such surveys have also provided decisive evidence re-

cently of Viking presence in the Eastern Arctic. Many historic sites are associated with the fur trade in the Subarctic, and with exploration for the NORTHWEST PASSAGE and the lost Franklin Expedition in the Arctic. These sites are now protected by law against vandalism and looting.

History

A variety of aboriginal cultures existed in the area before the arrival of the whites, based upon the nomadic hunting and fishing economies of the Inuit in the Arctic, and of the Dene in the Subarctic. Within the latter Athapaskan linguistic family, some 7 dialectical groups existed: Chipewyan, Yellowknife, Slave, Dogrib, Hare, Nahanni and Kutchin.

Exploration The first known white explorers to visit today's NWT were the Vikings, who sailed to the Eastern Arctic from their Greenland settlements (*c*1000 AD). In 1576 Martin FROBISHER was the first of a series of European explorers seeking the Northwest Passage, but by the early 16th century the severe ice conditions and the limitations of the ships checked much farther advance. In 1770-71 Samuel HEARNE of the HBC made a remarkable overland trip from Churchill through the arctic mainland to the COPPERMINE R, but though the company used the Hudson Bay route, its interests were farther inland on the continent. Alexander MACKENZIE of the NWC pushed N from Ft Chipewyan on Lk Athabasca in 1789 to discover and follow the Mackenzie R to its mouth. Fur trade posts were soon established along his route and in tributary areas, and were subsequently taken over by the HBC. Later exploration in the Arctic Archipelago focused on a renewed search for a Northwest Passage in the first part of the 19th century, and on attempts to reach the geographic North Pole in the latter part. The disappearance of Sir John FRANKLIN's 1845 expedition led to the addition of much map information by the search expeditions and included the traverse of the elusive passage in 1853 by M'Clure (though the first traverse by ship was in 1903-04 by AMUNDSEN). Later British and American expeditions proceeding up the E coast of Ellesmere I explored much of the eastern Queen Elizabeth Is. The Norwegian explorer Otto SVERDRUP discovered most of the remaining islands to the NW at the turn of the 20th century, with Vilhjalmur STEFANSSON completing the final discoveries in 1913-18.

Settlement The fur trade posts provided the only nuclei of white settlement in the NWT until relatively recently. Missions were established near the posts along the Mackenzie in the latter part of the 19th century. Federal presence was represented in these small settlements after the turn of the century by the RCMP, by Royal Canadian Corps of Signals radio stations and by other agencies. Strategic water transportation sites, such as Ft Smith and Tuktoyaktuk, provided other attractions for limited settlement. Because of its easier accessibility and more varied resources, more incomers trickled into the Mackenzie Valley than the Arctic. Beginning in the 1930s mineral exploration aided by the bush pilots and their improved aircraft resulted in a significant influx of newcomers, even into the Arctic mainland. However, actual mine development and a new economic base for settlement were again restricted to the Mackenzie Valley.

Development In recent decades major change and development in the NWT have resulted from international and national political events, widespread social change, large-scale resource demands and the availability of improved technology. As early as WWII the impact of international hostilities was felt in Mackenzie Valley settlements through the Canol Project and in the southern part of the Eastern Arctic through the North East Staging Route airports. The Cold War caused Dew Line radar stations to be built across the Arctic and contributed to the introduction of the first permanent settlements in the Queen Elizabeth Is as part of the Joint Arctic Weather Stations project. The federal government assumed increased responsibility with the creation (1953) of the Department of Northern Affairs and National Resources (now the Department of Indian Affairs and Northern Development). Major improvements were made in health services, housing, education facilities and communications to bring them more into line with those of southern Canada. More recently much of this responsibility has been delegated to the territorial government. Government services are now more numerous throughout northern settlements and occasionally provide the greatest source of local employment. As a result, most northern residents now live in permanent settlements for most of the year. The voracious world demand for minerals and fuels along with improvements in mining and transportation technology have made northern resources economically attractive, and resource development is necessary to provide employment; but there is also a responsibility to protect the environment for native people who wish to continue their traditional way of life and to protect wilderness habitats for future generations. WILLIAM C. WONDERS

Reading: T. R. Berger, *Northern Frontier, Northern Homeland* (1976); L.-E. Hamelin, *Canadian Nordicity: It's Your North, Too* (1979); D.H. Pimlott, et al, eds, *Arctic Alternatives* (1973); K.J. Rea, *The Political Economy of the Canadian North* (1968); W.C. Wonders, ed, *The North* (1972); M. Zaslow, *The Opening of the Canadian North, 1870-1914* (1971), and ed, *A Century of Canada's Arctic Islands, 1880-1980* (1981).

Norway House, Man, consists of 2 closely related communities along Little Playgreen Lk and the E channel of the Nelson R, 30 km N of Lk Winnipeg and 460 km N of Winnipeg. The Norway House Indian Reserve, pop 1812 (1981c), with Rossville as its centre, is under the jurisdiction of the federal Dept of Indian and Northern Affairs, as well as an elected band chief and council. The nonreserve community (pop 626), under the provincial Dept of Northern Affairs, has a mayor and 6 councillors.

Located at the junction of several water routes, screened by a rocky shoulder from Little Playgreen Lk, Norway House was a hub of the HUDSON'S BAY COMPANY's fur-trade and supply lines, and an administrative centre for Rupert's Land. Three HBC posts were built in the area 1801-26, the last being at the site of the present community. Named after Norwegian axemen who were hired to open land communications from YORK FACTORY, Norway House was known for its fishing, hunting and for the production of YORK BOATS. Settlers from the RED RIVER COLONY found temporary refuge here in 1815 and 1816-17 after they were attacked by forces of the rival North West Co. Rev James EVANS, a Methodist, established a mission nearby in 1840 with 2 Indian associates. The original HBC warehouse, gateway and powder magazine have been preserved, and Norway House is still an active HBC centre. Commercial fishing, services and trapping are the mainstays of the local economy.

D.M. LYON



Situated north of Lk Winnipeg, Norway House (shown 1925) quickly became the centre of the Hudson's Bay Co's transport system. The brigades from every part of the Northern Department stopped at Norway House on their way to and from York Factory. The neat wooden buildings ranged in a square are typical of 19th-century trading-post architecture (*courtesy Province of Manitoba Archives*).

Norwegians Some 500 years before Columbus landed on a Caribbean island, displaced Norsemen discovered and attempted a settlement on Canada's shores (*see* NORSE VOYAGES; ICELANDERS). Nordic sagas helped Helge Ingstad, a Norwegian explorer and writer, to discover an ancient Norse site at L'ANSE AUX MEADOWS on the northern tip of Newfoundland in the 1960s — the earliest known site of European settlement in America. Norwegians were active in Canadian waters again at the end of the 19th century, with Fridtjof Nansen as the pioneer of major Norwegian expeditions. Otto SVERDRUP charted many of the arctic islands and discovered AXEL HEIBERG, AMUND RINGNES and ELLEF RINGNES islands — all named for his Norwegian sponsors. Norwegian Roald AMUNDSEN navigated the last unsailed link in the NORTHWEST PASSAGE. It was not until 1930 that Norway recognized Canadian sovereignty in the Arctic. Henry A. LARSEN, of Norwegian birth, was the first Canadian to travel the Northwest Passage.

Permanent Norwegian migration to N America began in 1825 when the first shipload of Norwegians arrived in New York. In the next 75 years some 500 000 Norwegians landed at Québec, for this was the shortest corridor to the central American states. In spite of efforts by Canada, very few remained because of Canada's restrictive land policies at that time. Not until the turn of the century did Norwegians accept Canada as a land of the second chance.

Migration and Settlement Major settlements by Norwegians in the Canadian West occurred between 1886 and 1929, a span of time that can be roughly divided into 3 periods of 15 years each. In the first period, from 1886 to the turn of the century, the building of the CPR and the opening up of the West to homesteaders brought Norwegian settlers, and a Norwegian colony was established in Calgary in connection with the Eau Claire Lumber Mill. Second, from 1900 to 1914, there was a great influx of Norwegians from both the US and Norway (18 790 from Norway). Third, from 1914 to 1929, 21 574 Norwegians arrived from Norway. The 1931 census reported 93 243 people of Norwegian descent in Canada. Of these, 39 241 were born in Canada, 32 551 in Norway and 21 451 in the US. The GREAT DEPRESSION and WWII reduced the flow of Norwegian immigrants to 1376 from 1930 to 1945. From 1945 to 1959, 9196 arrived, but between 1960 and 1975 only 4615. Currently, the number of immigrants from Norway is very low and shows signs of decreasing.

Social and Cultural Life In Canada, Norwegians established their own ethnic and religious associations. Because Norwegian settlements in Canada began as extensions of their experiences in America, their major social organizations were generally continental institutions. This is still true of the Sons of Norway lodges, which were originally established in Minneapolis in 1895.

The ethnic paper *Norrana*, founded in 1910 in Winnipeg, is still published in Vancouver and has some 4000 subscribers. According to the 1981 census, there are now only 19 695 Canadians that claim Norwegian as their mother tongue.

In 1941, of Norwegians in Canada, 84.7% adhered to the Lutheran Church, 5.4% the United Church of Canada, 2.6% the Anglican, 1.5% the Presbyterian and 5.8% miscellaneous groups. In 1967 the Evangelical Lutheran

Church, of Norwegian background, became an autonomous Canadian synod. Those of Norwegian background are a diminishing minority because of continuing church mergers.

Because most of the early immigrants were literate and Lutheran, they placed high value on a Christian education for their children. Most Norwegian settlements not only promoted local summer parochial schools but conducted confirmation classes beyond the regular Sunday school. The Norwegian Lutherans established Camrose Lutheran College in 1911, Outlook College in 1915. Then, in co-operation with other Lutheran synods, they founded the Canadian Lutheran Bible Institute in 1932 and Luther Theological Seminary in 1939.

Maintaining Group Identity Over the years, assimilation was promoted by the numerical superiority and dominance of an Anglo-Canadian culture, the levelling influence of the public school system, the decreasing migration from Norway, the readiness of Norwegians to speak English and to marry into other groups, their readiness to accept Canadian citizenship and their above-average educational status, which opened doors to advancement in urbanized society. Nevertheless, a distinctive cultural identity is still maintained in the homes of Norwegian Canadians where traditions are centered on festivals and foods. Ethnic clubs and societies promote charter tours to Norway so that recent generations may become aware of their distinctive heritage. Norwegian ethnicity, far from dying out, has recently reasserted itself. Language classes in Norwegian are again popular, and even the third and fourth generations are discovering the distinctiveness of their roots.

Well-known Canadians of Norwegian descent include skier Anne HEGGTVIET and figure skater Karen MAGNUSSEN. GULBRAND LOKEN

Reading: Gulbrand Loken, *From Fjord to Frontier: A History of the Norwegians in Canada* (1980).

Nor'Wester, shortened version of North-Wester (variously spelled); historically, a NORTH WEST COMPANY agent, WINTERING PARTNER or servant; a trader or *engagé* who winters in the hinterland; or a veteran of these experiences. In the plural the term may refer to the NWC itself. A native or resident of the Northwest Territories, usually non-Indian, may be called a Nor'Wester, but in the literature of the FUR TRADE the term is usually associated with the NWC and its members.

JEAN MORRISON

Notary In common law provinces persons admitted to the Bar are sworn as notaries public. Other persons may be so commissioned by the LIEUTENANT-GOVERNOR upon the recommendation of the ATTORNEY GENERAL. A notary may draw and issue deeds, contracts and other commercial instruments and is a commissioner for taking affidavits. In Qué the legal profession is divided into "notaires" and "avocats." Notaires draft or receive acts and contracts that need authentication, an important aspect of Qué CIVIL LAW. They are not involved in matters where a dispute exists between the parties as to law or facts.

K.G. MCSHANE

Notley, Walter Grant, political leader (b at Didsbury, Alta 19 Jan 1939; d near High Prairie, Alta 19 Oct 1984). He was raised on a farm and shortly after graduating from U of A (1961) was hired as provincial secretary of the newly formed provincial New Democratic Party. In 1968 he was elected Alberta leader of the party, which at that time held no seats in the legislature. After 3 unsuccessful attempts to win a seat, he won the new riding of Spirit River-Fairview in 1971, holding it for the rest of his life. He was a one-man caucus for 11 years and won respect for his parliamentary skills and knowledge of the issues. He became Leader of the Official Opposition in Alberta after the NDP elected a second member in 1982. Although proud of his Alberta heritage, Notley had a broader perspective as well, serving on the national executive of his party. When the Alberta government reduced oil shipments to central Canada in protest against the National Energy Program, Notley was the only Alberta legislator to oppose the move. He participated actively in the constitutional debate of 1980-81, criticizing the extreme views of both the federal and Alberta governments. Notley died in an aircraft accident. GARTH STEVENSON

Notman, William, photographer (b at Paisley, Scot 8 Mar 1826; d at Montréal 25 Nov 1891). He immigrated to Canada in 1856 and found employment with a Montréal wholesale drygoods company. He had learned the daguerreotype process in Scotland and set up a photographic studio in Montréal. He rapidly gained prominence because of his superb portraits, the basis of attracting customers from all classes — from royalty to tradesmen. In 1858 he was commissioned by the Grand Trunk Ry to photograph the construction of Montréal's remarkable Victoria Bridge.

Notman's staff (55 in the 1870s) included apprentice photographers. He established 14 branch studios in eastern Canada and the US, all managed by his trainees. Notman won many medals for his work in exhibitions at home and abroad. To meet the demand for landscapes and other views, he sent his photographers across Canada, recording the construction of the CPR, the rise of the western cities, the life of the plains and coastal Indians, the lumber trade of the Ottawa Valley, East Coast fishing, rural activities and the bustle of the cities. Notman also became famous for the composite photographs of the snowshoe and curling clubs produced by his studio. These large creations were made up of 300 or more individual photographs, cut out and pasted onto a painted background.

Always community minded, Notman was involved in art associations, church societies, sports clubs and other Montréal organizations. He was also a backer of the Windsor Hotel and co-partner in large holdings in Longueuil, where he had a summer home. Of his 7 children, all 3 boys became photographers. William McFarlane NOTMAN, his eldest son, took over the business at his death. The Notman collection, containing over 400 000 photographs, plus office records and family correspondence, forms part of the collections of the Notman Photographic Archives housed in the McCord Museum of McGill University. STANLEY G. TRIGGS

Notman, William McFarlane, photographer (b at Montréal 1 Nov 1857; d there 1 May 1913). At age 15 he started to work for his father, photographer William NOTMAN, and was made a partner in the business at about age 25. His portraits — of rural people at daily tasks and of well-dressed urban notables — are sensitive and powerful, and his skill in portraying the Canadian landscape was outstanding. Notman made 8 trips to western Canada 1884-1909 to photograph along the CPR line, documenting the early growth of towns and capturing dramatic views of the Rockies and Selkirks. He accompanied the 1901 royal tour of the duke and duchess of York from Québec C to Victoria. Notman also photographed extensively in Murray Bay, Tadoussac, Lac St-Jean and the Eastern Townships. In 1908 he made a steamer voyage around Newfoundland, photographing the ports of call. STANLEY G. TRIGGS

Notre Dame Bay, 6000 km², is a large inlet of the Atlantic Ocean on the NE coast of Newfoundland. It contains many islands and its shores are indented by numerous coves and smaller embayments. One of Newfoundland's main rivers, the EXPLOITS, flows into the bay, carrying large quantities of timber from the interior as far as the pulp and paper mills at GRAND FALLS. The principal activity on the bay is fishing, with important commercial catches of cod, capelin and lobster. LEWISPORTE, a busy commercial port on the Bay of Exploits, is also the headquarters of the highly successful bluefin-tuna sportfishing on Notre Dame Bay. New World and FOGO are the largest islands in the bay, and FUNK I, 60 km E of Fogo, is one of Newfoundland's primary bird sanctuaries. P.C. SMITH

Notre-Dame Church, Place d'Armes, Montréal, built as a parish church, 1823-29, by the congregation of St-Sulpice, is the earliest surviving example of a Gothic revival church in Canada. This daring and innovative design on a scale then unequalled in N America was by James O'Donnell, an Irish architect who had emigrated to New York. It was carried out in the face of strong criticism from the architecturally conservative Abbé Jérôme DEMERS of Québec City, who decried the "protestantism" of its Gothic style and rectangular plan (without apse or transepts). CHRISTINA CAMERON

Notre Dame de Lourdes, Man, Village, pop 627 (1981c), inc 1963, is situated on the NE slope of the Pembina Hills, 130 km SW of Winnipeg. French Canadians homesteaded in the area 1881, followed by French and Swiss immigrants 1890-91. The main settlement began under Dom Paul Benoît of the Chanoines Réguliers de l'Immaculée-Conception who surveyed the Roman Catholic mission of Notre Dame de Lourdes 1890. He returned 1891 with settlers and fellow priests, who established a church, a monastery and schools for boys and for aspirants to the priesthood. Over the next 4 years, 5 groups of settlers and priests followed, including the Chanoinesses des Cinq Plaies du Sauveur who began a convent 1895. The clerics from Notre Dame served in surrounding parishes and the Chanoinesses developed new convents. Dom Benoît left the parish 1910 and many of his companions became secular priests. The Chanoines remained at Notre Dame until 1948. Today the village is primarily a service and commercial centre. D.M. LYON

Nottaway, Rivière, 776 km (via Rivière Bell to head of Rivière Mégiscane), rises in W-central Québec and flows N via Lacs Parent and Quévillon into Lac Matagami. Here it is joined by its chief headstream, Rivière Waswanipi, and then drains NW through Lac Soscumica. Eventually, it empties into SE JAMES BAY at Rupert Bay where a trading post was established. Its drainage basin covers 65 800 km² and it has a mean discharge of 1130 m³/s. This powerful river's name is Indian (possibly Algonquin) in origin and has been variously translated as "the enemy" or "the river of the enemy." DAVID EVANS

NOVA, AN ALBERTA CORPORATION, with head offices in Calgary, is a Canadian energy company with 1983 sales or operating revenues of $3.8 billion (ranking 18th in Canada), assets of $6.8 billion (ranking 11th) and 8600 employees. Ownership of the corporation is widely distributed with over 90% Canadian ownership. Originally known as The Alberta Gas Trunk Line Company Limited, the company was established in 1954 to build, own and operate Alberta's natural gas gathering and transmission facilities. In the early 1970s the company broadened its base, and today it is involved in natural gas transmission, resource development, petrochemicals and manufacturing. It was renamed Nova, An Alberta Corporation in 1980. The group of companies currently operating under the NOVA banner includes Husky Oil Ltd, Foothills Pipe Lines (Yukon) Ltd, and Nova-cor Chemicals Ltd. NOVA also has energy-related enterprises in the US, Italy, New Zealand and elsewhere.

Nova Scotia, 1714-84 Confirmed as British by the TREATY OF UTRECHT in 1713, the peninsula of NOVA SCOTIA was neglected until 1749 — a period of "phantom rule" and "counterfeit suzerainty." Since the only English inhabitants were the garrison and a few merchants at Annapolis, and fishermen and a handful of troops at Canso, the elective assembly prescribed by the governors' commissions was impracticable. The main body of inhabitants, the ACADIANS, had been given a year to take an unqualified oath of allegiance, but although they persistently refused, they were not forced to leave; instead they flourished, increasing from nearly 2000 in 1710 to more than 12 000 by 1750.

Determined to remove the danger posed by the presence of the French at LOUISBOURG on Île Royale (Cape Breton I), Gov William Shirley of Massachusetts and New England troops, with a British naval force, captured the fortress in 1745. Much to their chagrin, it was returned to the French by the Treaty of Aix-la-Chapelle in 1748. The British government decided, however, to establish a counterpoise to Louisbourg, and in June 1749 Edward CORNWALLIS with some 2500 settlers founded HALIFAX and made it the provincial capital. Over the next few years a considerable number of "foreign Protestants," largely German, also arrived, many of whom founded LUNENBURG in 1753.

On the eve of the SEVEN YEARS' WAR Gov Charles LAWRENCE sought to remove the danger presented by the French at FT BEAUSÉJOUR and by the French missionary, Abbé Jean-Louis Le Loutre, who was promoting anti-British sentiment among Acadians and MICMAC. Beauséjour fell to Lawrence's forces in June 1755, and within the next few months, after the Acadians had rejected a final ultimatum to take the oath, he deported 6000 on his own initiative. After the war some 2000 Acadians returned and resettled in the province, many in the new township of Clare. Cape Breton and PEI were annexed to Nova Scotia after the war, but the latter was separated permanently in 1769 and the former temporarily 1784-1820.

Because New Englanders in Halifax kept insisting on the "rights of Englishmen," Lawrence, on instructions from Britain, reluctantly summoned an elective assembly which met in Halifax on 2 Oct 1758, the first in what is now Canada. To fill the lands formerly occupied by the Acadians, he also issued proclamations inviting settlers. Between 1760 and 1763 alone no fewer than 4500 New Englanders entered the province. About the same time 500 Ulstermen arrived, mostly under the auspices of the adventurer Col Alexander McNutt; they were followed in 1772 and 1773 by some 1000 Yorkshiremen who settled on the Isthmus of Chignecto and in 1773 by nearly 200 Scots who settled at PICTOU (*see* HECTOR). But it was the New Englanders who laid the enduring foundations of Nova Scotia, making it, in a very real sense, a "new New England." A population of about 8000 in 1763 increased to more than 17 000 in 1775, well over half of them New Englanders.

Yet the New Englanders were unable to establish some of their customary modes of self-government. Instead of town meetings they were forced to accept the undemocratic English system of local government by courts of sessions and grand juries. These institutions remained until 1879 because the province was under the rule of a Halifax merchant-official oligarchy, which dominated the COUNCIL OF TWELVE and manipulated the Assembly to serve its own interests. For a dozen years prior to 1775 this group under the leadership of Joshua MAUGER, latterly a British MP, plundered the province, secured the recall of 3 governors and defeated the well-intentioned, but inept, attempts of Gov Francis Legge to disclose their abuses.

During the AMERICAN REVOLUTION many of the province's New Englanders undoubtedly sympathized with the Americans; certainly they were as willing to trade with Massachusetts as with the British forces. But outside strongly British Halifax, Nova Scotians showed no desire to become involved, and John Bartlet BREBNER's description of them as the "neutral Yankees of Nova Scotia" is exceedingly apt. If nothing else, their existence at scattered intervals along the edges of a narrow peninsula separated by rough terrain prevented concerted, united action on their part. Except for the short-lived, ineffectual "Eddy rebellion" at Ft Cumberland, Nova Scotia remained quiet. By 1782 LOYALISTS began to arrive, the first of a large influx, which affected the province markedly and led in 1784 to the creation of New Brunswick and Cape Breton as separate provinces. J. MURRAY BECK

Nova Scotia juts out into the N Atlantic, some say like a giant lobster-shaped pier; others call it the wharf of N America; its tourist literature describes it as "Canada's ocean playground." Nothing has influenced Nova Scotia and its people more than the sea. Because the province is nowhere more than 130 km wide, no part of it is far from the sea. With its fine harbours located near major sea-lanes, it has served as a military and naval bastion in many wars. Halifax, in truth, was the warden of the north.

Today the sea retains its significance, having made Nova Scotia the big fisherman of the N Atlantic, outrivalling its nearest competitors, Newfoundland and New England. Its serrated, 10 427-km shoreline embraces the rugged headlands, tranquil harbours and ocean beaches so attractive to tourists. One of its 3809 coastal islands, SABLE ISLAND — 193 km offshore and once "the Graveyard of the Atlantic" — may have rich deposits of gas and oil under the surrounding waters. Many other islands and much coastal land have been purchased by outsiders in the last decade or two. Once regarded as the boondocks, Nova Scotia is seen increasingly as a place where the good life can be lived even with a below-average per-capita income. Nova Scotians generally are beginning to insist that material development does no harm to the pleasant living they now enjoy.

Land and Resources

Main Regions The chief physical feature of Nova Scotia is the Atlantic Upland, which shows itself in 5 fragments, separated in places by extensive lowlands. Of these fragments, the largest is the Southern Upland, which occupies the southern and central part of the province. Starting at the rugged Atlantic coast, marked by many inlets, islands, coves and bays, it rises at the rate of 2.75 m/km to an altitude of 180-210 m in the interior. Its northern border constitutes the South Mountain. The second fragment is the North Mountain, a range of trap rock which runs parallel to the South Mountain for 190 km along the Bay of FUNDY from Cape Blomidon on Minas Basin to Brier Island. Between the 2 ranges lie the fertile valleys of the Annapolis and Cornwallis rivers, the celebrated apple-growing region of Nova Scotia. The third fragment consists of the flat-topped Cobequid Mountain, rising to 300 m and extending 120 km across Cumberland County; the fourth has its beginnings in the eastern highlands of Pictou County and extends in a long narrowing projection through Antigonish County to Cape George. The fifth fragment, on northern CAPE BRETON ISLAND, is a wild, wooded plateau, which at one point rises to a height of more than 520 m above sea level. It largely accounts for the highly scenic character of CAPE BRETON HIGHLANDS NATIONAL PARK, especially as viewed from the Cabot Trail, which runs through it. In contrast, the southern part of Cape Breton I is largely lowland.



Clark's Harbour on the western side of Cape Sable Island, NS. The island is connected to the southwestern tip of NS by a causeway (*photo by Janis Kraulis*).

Geology The deep drainage channels that have been cut through the uplands have exposed the roots of the mountains and laid bare rocks which are among the oldest of the Earth's crust and are representative of most of the geological time scale. Peninsular Nova Scotia consists of Paleozoic cover pierced by a granite backbone which, because it is highly resistant to change, occupies the higher elevations. The North Mountain resulted from volcanic action in Triassic times, and the Annapolis and Cornwallis valleys were carved out in the same period. Practically all the industrial minerals, including gypsum, limestone, sandstone, salt and barites, occur in rocks of the Mississippian age. The coal deposits of the province are to be found in the several groups of Pennsylvanian rocks, especially the Pictou, Stellarton and Morien groups.

Surface Only 10% (about 538 000 ha) of Nova Scotia is agricultural land. That with the greatest potential for farming is situated in the lowlands where the soils have developed on deep tills; the uplands usually have shallow, stony soils. The most extensive lowlands, and hence the best agricultural land, are to be found along the Bay of Fundy and Northumberland Str. The tremendously high tides of the Bay of Fundy have created large areas of marshland, which, by means of dikes begun in Acadian times, have been converted into valuable agricultural lands.

Originally, most of the province was covered by forest, but little of the virgin forest remains, except in the plateau of NE Cape Breton I. Because of the acid soil and the slow growing season, secondary growth has tended to be coniferous, but hardwoods continue to exist in sufficient abundance to produce a colourful display in the autumn. In swampy areas and rocky barrens, mosses, lichens, ferns, scrub heath and similar growths are common. Wild flowers grow in profusion, among which the mayflower, pitcher plant, white water lily and several varieties of violets stand out for their beauty. Widely found throughout the province are herbaceous plants such as Clintonia, cranberries, blueberries and many species of goldenrod. The European cuckooflower has become common in the Annapolis Valley, while the ragwort has spread over eastern Nova Scotia.

Water Over 3000 lakes have been impounded by the irregularly high and low terrain, especially in the Southern Upland region, and hundreds of streams and small rivers have eroded their way through it. Because of the general direction of the watersheds, the rivers cannot be long, but with moderately heavy precipitation, normally no shortage of water occurs. The province's largest lake, the 930 km^2 BRAS D'OR, was created when the sea invaded the area between the upland and lowland areas of Cape Breton; saline and tideless, it is widely used for recreation. On the peninsula the largest lake is Lk Rossignol in the SE central area, a focus of both lumbering and recreational activities. Though short, the rivers have had considerable significance historically and economically. The Sackville and Shubenacadie, used extensively by


Gulf of St Lawrence
Cape North
Cape North
CAPE BRETON HIGHLANDS
Ingonish
Ingonish Beach
Cheticamp
Newcastle
Chatham
KOUCHIBOUGUAC
Tignish
PRINCE EDWARD ISLAND
Miramichi River
Egmont Bay
Northumberland Strait
Summerside
Souris
CHARLOTTETOWN
Montague
Borden
NEW BRUNSWICK
Moncton
Baie Verte
Sackville
Margaree
Inverness
Lake Ainslie
Baddeck
North Sydney
Sydney Mines
New Waterford
Glace Bay
Sydney
Sydney River
Eskasoni
Louisbourg
Bras d'Or Lake
Cape George
St Georges Bay
CAPE BRETON ISLAND
FREDERICTON
Saint John R
Sussex
FUNDY
Chignecto Bay
Pugwash
Amherst
Oxford
Springhill
Pictou
Tatamagouche
New Glasgow
Trenton
Stellarton
Thorburn
Antigonish
Mulgrave
Port Hawkesbury
Louisdale
ISLE MADAME
Petit-de-Grat
Strait of Canso
Guysborough
Chedabucto Bay
Canso
Aspen
St Mary's R
Parrsboro
Truro
Bible Hill
Salmon River
Hilden
Cape Chignecto
Cobequid Bay
Minas Channel
Minas Basin
Saint John
Shubenacadie R
Stewiacke
Upper Musquodoboit
Shubenacadie
Waterville
Kentville
Wolfville
Berwick
Hantsport
Falmouth
Windsor
Kingston
Middleton
Bay of Fundy
Elmsdale
Enfield
Fall River
Lake Charlotte
Sheet Harbour
Beaverbank
Sackville
Timberlea
North Preston
Dartmouth
HALIFAX
Bridgetown
Annapolis Royal
Annapolis Basin
Digby
Digby Neck
St Mary's Bay
Weymouth
LONG I.
Freeport
BRIER I.
Meteghan
Lahave R
Western Shore
Chester
Lakeside
Peggys Cove
Terrence Bay
New Germany
Mahone Bay
Mahone Bay
Lunenburg
KEJIMKUJIK
Lake Rossignol
Bridgewater
Milton
Liverpool
Brooklyn
ATLANTIC OCEAN
Yarmouth
Shelburne
Lockeport
Gulf of Maine
Clark's Harbour
CAPE SABLE I.
SABLE ISLAND
NOVA SCOTIA
Trans-Canada Highway
Primary Road
Ferry
Railway
National Park
POPULATED PLACES
1 - 999
1 000 - 4 999
5 000 - 24 999
25 000 - 99 999
Provincial Capital
0 20 40 60 km
1 : 2 500 000

the Indians, were important in early transportation; some, such as the Mersey, continue to play a significant role in lumber and pulpwood production; others, such as the Margaree and St Mary's, have become celebrated as salmon streams; several have afforded the means to construct hydroelectric power plants, however small. The high tides of the Bay of Fundy are a remarkable phenomenon. The bay, 77 km at its mouth, narrows to 56 km where it divides into Minas Basin and Chignecto Bay. For about 240 km the water is forced forward to reach a height of 15-18 m above low-tide level in its narrowest extremities. The high tides facilitate the loading of gypsum, lumber and the like by freighters, which at low tide rest on mud flats.

Climate Although systems moving eastward from the interior of the continent dominate the province's weather, they are only part of a complex process which at times makes the meteorologist's task a nightmare. These systems often react with low pressure systems coming from the S and moving northeastward along the coast, and the whole is affected by the proximity of the Labrador Current and the Gulf Stream. Generally the water has a moderating influence upon the climate, particularly along the Atlantic coast where the average Jan temperature is about −4°C and the summer mean temperatures are in the high teens Celsius.

The influence of the sea is felt in other ways. Ice brought down by the Labrador Current leads to a late spring marked by cold winds, rain and mist. In summer, especially in June and July, the mingling of the warm Gulf Stream and the cold Labrador Current produces a great deal of sea fog, which often drifts over the coastal areas. Autumns are consistently fine, clear and long. The coastal areas are both milder and wetter than the rest of the province. Yarmouth has about 160 frost-free days a year compared with 100 in parts of the interior. Rain may vary from 140 cm in coastal areas to 100 cm inland. Snowfall ranges from 160 cm to 245 cm.

Resources The natural resources of Nova Scotia are somewhat limited. Today those which sustained the early settlers remain vital to the provincial economy. The FISHERY remains most important. The province is plentifully supplied with both metallurgical and thermal COAL, and recently the latter has been given prominence in the province's overall energy strategy. The potential for offshore OIL AND NATURAL GAS along the southern coast remains largely unknown, but it appeared by 1982 that the Venture gas field off Sable I was sufficiently large to warrant the consideration of bringing it into production.

Conservation Natural resources are conserved in a variety of ways. The adoption in 1977 of the 200-nautical-mile (370 km) offshore fishing zone and recognition of the federal government's right to regulate the fishery has permitted it to take the action needed to restore badly depleted fishery stocks. To preserve and promote the inland salmon and trout fisheries, the provincial government provides water control, restocking of lakes and research. At Shubenacadie it maintains a wildlife park and a bird hatchery. But its major effort is directed towards protection and renewal of the forests. Part of its protection service is provided by fire towers and an aerial patrol service aimed at early detection of fires. The Dept of Lands and Forests provides seedlings for planting on crown lands and also supplies them to individuals and companies for private reforestation. Recently it has also entered into a program with the federal government designed to improve the yield of the forests through modern management practices. But it has been powerless to prevent the ravaging of large areas of the Cape Breton Highlands by the spruce budworm, in part, perhaps, because of strong public resistance to the use of chemical sprays.







Nova Scotia

Capital: Halifax
Motto: Munit Haec et Altera Vincit ("One defends and the other conquers")
Flower: Mayflower
Largest Cities: Halifax, Dartmouth, Sydney, Glace Bay, Truro, New Glasgow, Amherst
Population: 847 000 (1981c); rank seventh, 3.48% of Canada; 54.9% urban; 42.9% rural nonfarm; 2.1% farm; 15.9 per km² density; 7.4% increase from 1971 and 2.3% from 1976; 1.4% increase 1976-81; Jan 1984e pop, 866 100
Languages: 96% English; 2.9% French; 1.1% Other
Entered Confederation: 1 July 1867
Government: Provincial — Lieutenant-Governor, Executive Council, House of Assembly of 52 members; federal — 10 senators, 12 members of the House of Commons
Area: 55 491 km², including 2650 km² of inland water; 0.06% of Canada
Elevation: Highest point — Cape Breton (532 m); lowest point — sea level
Gross Domestic Product: $8.3 billion (1982e)
Farm Cash Receipts: $233.1 million (1982)
Value of Fish Landings: $270.804 million (1983 prelim total); $259.511 million (1982 total)
Electric Power Generated: 6 167 610 MWh (1983)
Sales Tax: 10% (1984)

People

Settlement and Immigration The French who established the first successful settlement of Europeans in the province at PORT-ROYAL in 1605 named it ACADIA, from the name assigned to the coast by VERRAZZANO. Lasting British settlement did not occur until the founding of HALIFAX in 1749 by Edward CORNWALLIS. Over the next 3 years about 2500 foreign Protestants, mostly German, arrived and were largely settled at LUNENBURG. Between 1760 and 1768 up to to 8000 New Englanders, the pre-Loyalists, came as settlers, together with several hundred emigrants from northern Ireland. About 1000 Yorkshiremen who arrived between 1772 and 1774 settled at the Isthmus of Chignecto and the first Scots reached Pictou in 1773 aboard the HECTOR. The AMERICAN REVOLUTION brought about 20 000 LOYALISTS, disbanded soldiers and REFUGEES to Nova Scotia as permanent settlers. Some BLACKS came with the pre-Loyalists and Loyalists, some from Jamaica in 1796, and although many did not stay, a few hundred were left to be joined by the 2000 who arrived following the WAR OF 1812. Between 1815 and 1851 about 55 000 Scots, Irish, English and Welsh established themselves in the province, and after the expansion of the coal and steel industries — beginning in the 1890s — newcomers arrived from the British Isles and continental Europe to settle mostly in Cape Breton.

Ethnicity, Mother Tongue and Religion In 1981 the total population was 847 442, an increase of 7.4% over the previous 10 years and 2.3% over the previous 5, but a continuing decline in the percentage of the national total. About 72% of the people in 1981 were of only British and about 8% of only French descent, and a further 8% had some British or French in their background; the remainder were European, Asian, African or American Indian in origin. The mother tongue of 93.5% was English; of 4.3%, French. Most Acadians are in Digby and Yarmouth counties on the mainland, and in Inverness and Richmond counties on Cape Breton I. Nevertheless, many Acadians have moved elsewhere, especially to Halifax, and a speedy loss of their mother tongue has often occurred. Legislation enacted in 1981 provides for Acadian children to be taught in French wherever the numbers make it practicable. But most Acadian parents want their children to be fluent in English as well as French. In 1981, 36.9% of the population was Roman Catholic; among Protestants, United Church adherents constituted 20.2%, Anglicans 15.6%, Baptists 12.1%, Presbyterians 4.6% and Lutherans 1.5%.

Labour Force In 1981 the total number of males in the labour force was 210 525, a participation rate of 70.3%; 8.2% were unemployed. The participation rate of women was 38.1%; 11.1% were without work. In contrast with past experience the percentage of unemployment in recent years has usually been only slightly above the national average and occasionally a little lower. A continuing problem of Nova Scotian labour is that wages generally lag considerably behind the Canadian average.

Urban-Rural Living As in the rest of Canada, a marked shift from rural to urban living has occurred in recent decades. From 1941 to 1961 the proportion of rural dwellers declined from 54.6% to 43.4%, with a corresponding increase in urban dwellers. But in the late 1960s the process slowed down somewhat since in 1971 rural dwellers had fallen to 42.0%, and by 1976 the process had actually reversed because rural dwellers had increased to 44.2%.

In 1981 Halifax County had one-third of the provincial population, and the people in metropolitan Halifax, the largest urban centre in Atlantic Canada, numbered 277 727: 114 594 in the city of Halifax, 62 277 in the city of Dartmouth and 100 856 in the growing suburbs. The second-largest urban centre, SYDNEY and the 6 surrounding towns, GLACE BAY, New Waterford, SYDNEY MINES, Dominion, North Sydney and LOUISBOURG, had a population of about 78 000 in 1981. That centre's future is unclear because of uncertainties surrounding the Sydney steel plant and the heavy-water plant at Glace Bay. The third urban area, encompassing the Pictou County towns of NEW GLASGOW, Stellarton, Trenton, WESTVILLE and PICTOU, has a population of



Sydney, NS, noted since 1900 for its huge steel mill, the largest and most modern in Canada at the time of its construction (*photo by John deVisser*).

about 50 000 if the surrounding suburban and rural area is included. Although it no longer has the benefits of a coal-mining industry, it has been assisted materially by a relatively new paper plant and a tire-manufacturing factory.

Economy

The per capita income of Nova Scotians has seldom risen much above 80% of the national average. Limited natural resources and the great distance from central Canada are partly responsible, but greater blame has been attached to national transportation policies and, more especially, to the protective tariff or NATIONAL POLICY. The few provincial industries fostered by the NP have recently deteriorated and many of the early secondary industries have disappeared, unable to compete with central Canadian rivals. Nova Scotia has therefore had to rely mainly upon primary industries.

Agriculture Although the Micmac relied on hunting for their food, fishing captains in the early 16th century are believed to have cultivated vegetable gardens to feed their crews. At the same time the French were growing grain at Port-Royal and in 1609 they erected the first water-powered gristmill in N America. To secure salt for curing fish, they also built dikes along tidal marshes and later used them to begin a dikeland agriculture. The Marshlands Reclamation Commission in recent times has preserved and extended this system of dikes.

About 538 000 ha, 10% of the land, is agricultural. The largest cultivated areas are found in the Annapolis Valley and in some parts of northern Nova Scotia. But subsistence living on family farms has been common throughout wide areas of the province. Near the coast farming and fishing are often combined, as are farming and lumbering inland. Recent years have shown a trend towards larger, fewer farms, with a smaller total area, and a decrease in farm population.

The total value of agriculture to the provincial economy is estimated at about $219 million (1981), and the annual gross farm income runs in the area of $132 million derived from 16 specialized commodities. The largest single sector is DAIRYING, which supplies fluid milk for home use as well as for dairy-product manufacturing. The production of eggs, chickens and turkeys has also thrived in recent years; indeed, dairy and poultry products bring a greater return than do the fruits, vegetables and greenhouse products for which the province is better known. Beef and hog production, another expanding sector, yields about $25 million annually. The county fair is an important institution, and the one at Windsor, established in 1765, is the oldest of its type in N America.

Industry In the late 1970s Nova Scotia had over 700 manufacturing plants employing about 43 000 people (14.6% of the labour force). Most of the plants are relatively small, and the great majority of them are based on primary products such as pulpwood, fruit and vegetables. Over 60 of the industries have been established since the 1960s, largely as a result of incentives provided by the provincial and federal governments. At least half the manufactured products are destined for export, 70% to the US. Many newer industries involve investment from the US, Britain and Germany, and a few make no use of the province's natural resources. Of these, the 2 heavy-water plants at Glace Bay and the Str of Canso have uncertain futures, but Michelin of Canada successfully operates tire-producing plants at Granton, Bridgewater and Waterville, making extensive use of Nova Scotian labour.

As a province abounding in recreational and cultural opportunities and possessing more historic sites than any province except Québec, Nova Scotia has become a favourite of tourists in the June-Oct season. The number of tourists and the gross value of the industry have grown more than 30% in each of the past 2 decades. In 1981 the money expended by tourists exceeded $500 million for the first time; the total number of visitors was over 1.7 million; and about 27 000 people were employed in the tourist industry.

Although several major Canadian banks had their origin in Halifax, their head offices are now located in central Canada; only the BANK OF NOVA SCOTIA still holds its annual meetings in Halifax. Many large Canadian corporations do, however, locate their regional offices in Halifax. That more Nova Scotians work in business, trade, finance and transportation than in resource and manufacturing industries is sometimes attributed to the continuation of a historical pattern among people whose ancestors were sea traders. Office buildings, hotels and stores are more prominent than factories and over 70% of the province's employed work in the service industries.

Mining The value of mineral commodities has increased steadily and reached about $240 million in 1981. Coal, SALT, GYPSUM and other construction materials are the principal products in an industry employing about 5000 people. By far the most important mineral is coal; in 1981 the reserves were estimated at 3 billion t, half of it estimated to be recoverable, and 925 million t being within 64 m of the surface. Nova Scotia coal has had a chequered history. The rapid increase in production following the establishment of the Whitney Syndicate and the development of the steel industry were primarily responsible for the province's prosperity in the early 20th century. After WWI conditions in the coal areas were often troubled, and in the late 1950s the market contracted greatly in the face of competition from petroleum and natural gas. Production declined from about 6.6 million t in 1950 to about 2 million in 1971. But coal has made a striking comeback; following large increases in petroleum prices by the OPEC cartel, the province has determined to reduce the dependency on foreign oil by replacing it with thermal coal. The province is also producing a considerable amount of metallurgical coal, over 1 million t in 1977. The near exhaustion of earlier mines in Cumberland, Pictou and Inverness counties means that practically all the coal is now mined in Cape Breton County.

Gypsum and salt, found largely in Hants and Cumberland counties, are the most valuable minerals after coal. Gypsum, quarried more extensively here than in any other province, is sent to the US for processing. Nova Scotia also has the largest barite deposits in Canada as well as large deposits of sand, gravel and other construction materials. Production difficulties during 1982 brought about the closure of a small lead-zinc mine which had recently been opened at Gay's River.

The quest for energy sources has led to offshore exploration for gas and oil, especially on the Scotian Shelf in the neighbourhood of Sable I where substantial quantities of gas have been discovered. In March 1982 Prem John BUCHANAN signed a 42-year agreement with the federal government giving Nova Scotia the same benefits from its offshore resources that Alberta receives from its land-based oil and gas.

Forestry Lumbering has always been important in Nova Scotia's economy (*see* TIMBER TRADE HISTORY). In the 19th century much of the prosperity came from wooden ships and from the planking, deals and other lumber they carried overseas. Today more than 4.3 million ha, about 78.5% of the total area, is still forested, and over 74% of that is in the hands of small woodlot owners. The PULP AND PAPER INDUSTRY has now far outstripped the sawn-lumber industry in importance and value. Of approximately 1.3 million cords of pulpwood harvested annually, only a small proportion (64 298 cords in 1981) are exported. The most common softwood, balsam fir, is used not only for pulpwood, but also as the basis of a second industry — the export of Christmas trees. Lumber production annually ranges up to 200 million board feet; in 1981 it was 170.9 million board feet. The most important commercial hardwoods are yellow birch, red maple and sugar maple; the last also forms the basis of an industry for woodlot owners, especially in the N, through the production of maple syrup and allied products.

Fisheries Nova Scotia is second to BC in the value of its fishery, which first attracted Europeans to its shores. Salt and dried fish for export to Latin America was once the staple of the market, but quick-frozen and filleted fish altogether dominate the modern market. Since WWII, schooners with dories have given way to draggers that fish the entire year. In 1980 more than 11 000 fishermen and about 5000 shore-based workers were participating in the industry; about 6200 fishing craft, large and small, were supplying 81 processing plants throughout the province.

In a highly diversified industry, inshore fishermen account for about 70% of the total. No less valuable than groundfish such as haddock and cod are molluscs and crustaceans such as scallops and lobsters. The groundfish are caught both by offshore trawlers and draggers and by inshore boats including long-liners. Lobsters are

taken largely inshore by Cape Island boats; scallops by both offshore and inshore draggers; herring by seiners. In 1971 the swordfish industry ceased because of fear of MERCURY contamination.

With the agreement of other fishing nations Canada declared a 200-mile fishing limit in 1977, assuming the right to regulate most fishing banks on its continental shelf with the aim of letting the fish stocks recover from depletion by large, foreign factory ships. Although fish landings rose to a historic high value of about $250 million in 1981, the industry was beset by problems. The offshore industry had long complained that the inshore fishermen, through a powerful lobby and a sympathetic minister, had been favoured at its expense. All the fishermen objected to overregulation by the federal authority, especially to a recent sector management plan, which discouraged flexibility. The new 200-mile limit had attracted hundreds of newcomers with deleterious results. Forced to operate under a quota system, large fish plants and draggers with heavy overheads found it costly to operate at less than full capacity. Processors experienced difficulties because of sales by inshore fishermen to foreign trawlers. An additional problem was that of having to sell a high-cost product of sometimes poor quality during a recession.

A long-standing dispute between Canada and the US over the ownership of Georges Bank, one of the world's richest fishing areas, was settled by the World Court in 1984. Although Canada received only one-sixth of the disputed territory, it was the most valuable portion and Nova Scotia fishermen suffered much less serious harm than the New Englanders.

Transportation In early Nova Scotia the sea was the only highway, but in the late 1760s road building began. Today, about 26 000 km of highways extend to every community in the province. Politics in the latter 19th century was largely railway politics; practically all the province's 1900 km of railway were built between 1854 and 1914, partly as government works and partly privately. In the last 3 decades, however, a steady decline in railway services has occurred. In 1983 the only passenger trains in operation were provided by VIA from Halifax through the Annapolis Valley to Yarmouth, from Halifax to Amherst and on to Montréal, and from Halifax to Sydney. Freight services provided by the railways diminish year by year as permission is granted to discontinue operations on little-used trackage. Public transportation by road is provided by Acadian Lines and smaller bus companies, while a large part of the freight is moved by truck.

The attempt to build up a deep-water, bulk-cargo superport in the Strait of Canso has failed for the moment, but Halifax, a full day closer to Europe than any other American mainland port, continues to maintain pre-eminence in cargo handling. In the late 1960s a large container terminal was built on a 24 ha site in S Halifax and in the early 1980s a second was built at Fairview Cove in Bedford Basin at the north end of Halifax Harbour. Halifax is competing with Saint John and Montréal to have the container firms use its services, and time will tell if its facilities have been overdeveloped.

Seagoing car ferries connect southwestern Nova Scotia with New Brunswick (via Digby and Saint John) and with New England (via Yarmouth and Bar Harbor, Maine; and perhaps only temporarily via Yarmouth and Portland, Maine). In addition, car ferries run to Newfoundland (from North Sydney) and to PEI (from Caribou, near Pictou). Air Canada provides passenger and air-cargo services to major Canadian and international centres through Halifax International Airport; it also uses regional airports at Yarmouth and Sydney. Eastern Provincial Airways (EPA) acts as a regional carrier and also flies directly from Halifax to Toronto; Canadian Pacific Airways (CPA) flies directly from Halifax to Montréal.

Energy Before 1973 the generation of electric energy was in the hands of the Nova Scotia Power Commission, a government agency established in 1919, and the Nova Scotia Light and Power Company, a private utility. In 1973 they were united in a crown corporation, the Nova Scotia Power Corp. Per capita energy consumption in 1980 was about 87% of the national average, the smaller usage attributable in part to the relatively underdeveloped industrial base. In 1950 about 70% of the province's energy needs were met by hydroelectric power and indigenous coal. Convinced that cheap oil would continue to be available and that nuclear energy would be less expensive than that derived from coal, governments allowed a situation to develop in which, by 1978, over 70% of the electricity was produced from oil. Because of major increases in oil costs, Nova Scotia had the most expensive energy in Canada, excepting PEI.

In 1979 the Energy Planning Board was established under the new Dept of Mines and Energy to devise an energy strategy. This strategy aimed at the development of the few remaining hydroelectric opportunities; the opening of new coal mines and the expansion of existing ones so as to permit oil-fired generating plants to be phased out; and the completion on the Annapolis R in 1984 of the first tidal plant in N America, using the largest turbine ever built for hydroelectric development.

But the government's main concern remains with offshore gas and oil development. The government has authorized NS Resources Ltd, a provincial crown corporation, to take an equity position in energy projects. The substantial drilling programs projected following the federal-provincial agreement of 2 Mar 1982 seem to indicate that the focus of energy activity on the Atlantic coast has shifted to Nova Scotia from Newfoundland, which by 1984 had no agreement with Ottawa.

Government and Politics

Basic Structure Although some of the Nova Scotia constitution still rests on the prerogative, especially on the commissions and instructions of the pre-Confederation governor, in practice this does not differentiate it from other provinces. Legally, provincial executive power is vested in the LIEUTENANT-GOVERNOR, practically it is exercised by the Executive Council, which has increased in size from an 18th-century COUNCIL OF TWELVE to 23 members (1983). Beginning in 1838 the legislative power was vested in a general assembly consisting of a lieutenant-governor, legislative council and legislative assembly. In 1928, however, Nova Scotia abolished its council and left Québec as the only province with a bicameral legislature. The Fifty-Second General Assembly elected in 1981 was unique in that for the first time all of its 52 members were chosen by single-member constituencies. Universal suffrage for males and females over 21 came into effect in 1920; the voting age was reduced to 19 in 1970 and to 18 in 1973.

The senior court, the Supreme Court of Nova Scotia, is a provincially constituted court whose judges are appointed by the provincial Cabinet. In the early 1960s it was divided into trial and appellate divisions; in 1982 the latter consisted of the chief justice of Nova Scotia and 4 other judges; the former of the chief justice of the Trial



Nova Scotian fishing village of Prospect (*photo by Jim Merrithew*).

Lieutenant-Governors of Nova Scotia 1867-1984

	Term
Charles Hastings Doyle	1867-73
Joseph Howe	1873
Adams George Archibald	1873-83
Matthew Henry Richey	1883-88
Archibald Woodbury McLelan	1888-90
Malachy Bowes Daly	1890-1900
Alfred Gilpin Jones	1900-06
Duncan Cameron Fraser	1906-10
James Drummond McGregor	1910-15
David MacKeen	1915-16
MacCallum Grant	1916-25
James Robson Douglas	1925
James Cranswick Tory	1925-30
Frank Stanfield	1930-31
Walter Harold Covert	1931-37
Robert Irwin	1937-40
Frederick Francis Mathers	1940-42
Henry Ernest Kendall	1942-47
John Alexander Douglas McCurdy	1947-52
Alistair Fraser	1952-58
Edward Chester Plow	1958-63
Henry Poole MacKeen	1963-68
Victor deBedia Oland	1968-73
Clarence L. Gosse	1973-78
John Elvin Schaffner	1978-84
Alan Rockwell Abraham	1984-

Division and 7 other judges. In 1982 the County Court, constituted and appointed in the same way, had 8 judges, but legislation not proclaimed provides for the appointment of 2 additional judges and the naming of a chief county court judge to exercise general supervisory power. Because much of the criminal business, although not the trial of the most serious offences, is dealt with in the Provincial Magistrates' Court (a completely provincial court), the number of its judges has increased substantially in recent years; since 1980 one of them has exercised some supervisory powers as chief judge.

Municipal Government Local government is carried on in 3 cities, 39 towns and 24 rural municipalities. Although the last generally conform to the county boundaries, 6 counties have 2 rural municipalities each. Despite several attempts made to amalgamate or alter these units, they have remained practically untouched since 1879. The only substantive changes in the status of the units since 1923 have been the incorporation of Dartmouth as a city in 1961 and Bedford as a town in 1980; and the reversion to their rural municipalities of the towns of Port Hood, Wedgeport, Joggins and Inverness. Smaller communities may organize themselves under the Village Service Act to secure services not provided by their rural municipality. Over the past 3 or 4 decades many responsibilities of the municipalities have been shifted to the provincial government, but the latter is well aware that it lays rough hands on the municipal government only at great peril to itself.

Federal Representation As was constitutionally provided in 1867, Nova Scotia's membership in the Senate is 10, but its representation in the House of Commons has fallen from 21 in the 1870s to 11 in 1984, with a corresponding decrease in clout in federal politics. It has been suggested that the voters' propensity to support the old-line parties through thick and thin has harmed the province's bargaining position. It has also been argued, but no less strongly denied, that Nova Scotia's leverage would be substantially greater in a union of MARITIME PROVINCES.

Public Finance Until Confederation most government revenues came through import duties (*see* CUSTOMS AND EXCISE), which could readily be adjusted as circumstances warranted. After 1867 payments from Ottawa became by far the largest source. Not until the turn of the century did the province have its first million-dollar budget and coal royalties rank ahead of the federal subsidy as the chief producer of revenue. Principally because of the expanding coal and steel industry, the decade before WWI was the only period in which the provincial exchequer has been in a genuinely healthy condition since Confederation. Since 1918 the province has almost always been strapped for money and, in common with the other have-not provinces, has had to make all sorts of demands upon the milch cow at Ottawa. In the 1960s Nova Scotia was a leader in pressing upon the federal authorities the principle of full equalization.

By 1976 the province had its first billion-dollar budget. In the year ending 31 Mar 1982 expenditures had risen to $2.12 billion and revenues to $1.89 billion. Of the expenditures, 25.4% went to health, 25.9% to education, 11.4% to servicing the public debt, 9.4% to social welfare and 6.5% to municipal affairs. Of the revenues, 47.8% came in various forms from Ottawa, 21.8% from personal and corporation taxes, 18.0% from sales taxes, 3.5% from liquor sales and 1.5% from motor-vehicle revenue. Because of financial difficulties, the sales tax was increased from 8 to 10% in 1982, the corporate tax by 2 points to 15% and the personal income tax by 4 points to 56.5% of the federal tax.

Health The Dept of Public Health administers an extensive program with its divisions of dental health, nursing service, public-health engineering, nutrition, tuberculosis, hospitals and nursing homes, child and maternal health, communicable disease control, industrial health and emergency health services. In 1959 the province entered the national hospital insurance plan and in 1968 the medical-care insurance plan. To ensure greater administrative efficiency these two plans were merged under the Health Services and Insurance Commission in 1973. To the free services already provided, dental care for children up to 7 was introduced in 1974 and shortly afterwards prescription drugs for those 65 and over. The province's share of the cost is obtained in large measure from a sales tax levied under the Health Services Tax. Medical research is carried on primarily by the Faculty of Medicine at DALHOUSIE UNIVERSITY, which, because of a shortage of funding from national agencies, has established the Research and Development FOUNDATION.

Politics The first genuine political parties appeared in the election of 1836 when Tories (Conservatives) battled Reformers (Liberals), who had come into existence almost overnight under the guidance of Joseph HOWE. Until 1867 the parties contended fairly equally, but the Confederation issue upset the rough balance in favour of the anti-Confederates (Liberals). Until 1956 the Conservatives won only 3 elections and were in office only 12 of the 89 years. Since WWII, however, a lessening in traditional voting, combined with divisions within the Liberal Party and the influence of John DIEFENBAKER and Robert STANFIELD, have combined to narrow differences in electoral strength and to make the parties genuinely competitive. It has been very difficult to supplant established Nova Scotian premiers, and W.S. FIELDING, George Murray, Angus L. MACDONALD and Stanfield maintained their political ascendency over lengthy periods. But to describe Conservative Stanfield as less liberal or more conservative than Liberals Fielding, Murray and Macdonald would be a deception, since the old-line parties pragmatically base their programs and platforms on electoral needs, not on ideological considerations.

The traditionalism of the political culture has complicated the difficulties of third parties. In 1920 factors arising largely out of WWI permitted the Farmer-Labour group to make the best third-party showing ever — 11 members and 32.3% of the popular vote, compared to the Conservatives' 3 members and 23.3%. Since 1941 the CCF-NDP has at times elected one federal member and up to 4 provincial assemblymen. In 1945, when the Conservatives failed to elect anyone, the 2 CCF members constituted the official opposition in the Assembly. Before 1981 all the CCF-NDP victories were in the urban part of Cape Breton County, but that year the NDP leader won a seat in metropolitan Halifax, where the total party vote almost equalled that of the Liberals. That year its province-wide vote was 18.1%, the highest on record. In 1984 Prem John Buchanan won his third and most decisive victory when the Conservatives won 42 seats, the Liberals 6, the NDP 3 and the Cape Breton Labour Party 1.

Premiers of Nova Scotia 1867-1984

	Party	*Term*
Hiram Blanchard	Liberal	1867
William Annand	Anti-Confederation	1867-75
Philip Carteret Hill	Liberal	1875-78
Simon Hugh Holmes	Conservative	1878-82
John Sparrow David Thompson	Conservative	1882
William Thomas Pipes	Liberal	1882-84
William Stevens Fielding	Liberal	1884-96
George Henry Murray	Liberal	1896-1923
Ernest Howard Armstrong	Liberal	1923-25
Edgar Nelson Rhodes	Conservative	1925-30
Gordon Sidney Harrington	Conservative	1930-33
Angus Lewis Macdonald	Liberal	1933-40
Alexander Stirling MacMillan	Liberal	1940-45
Angus Lewis Macdonald	Liberal	1945-54
Harold Joseph Connolly	Liberal	1954
Henry Davies Hicks	Liberal	1954-56
Robert Lorne Stanfield	Conservative	1956-67
George Isaac Smith	Conservative	1967-70
Gerald A. Regan	Liberal	1970-78
John MacLennan Buchanan	Conservative	1978-

Education

Administration Provincial aid to education was first provided by the "forgotten school act" of 1808, but because of the fear of direct taxation, it was not until the 1865 Act, which provided for compulsory assessment, that a free, universally operative system of common-school education came into being. Although the legislature has always refused to give legal recognition to separate schools, even before Confederation the Catholic schools in Halifax were treated as part of the public system if they followed that system's course of study and observed its regulations. Later the same recognition was granted to Catholic schools in the larger towns of Cape Breton and eastern Nova Scotia. Recently, with the enlargement of Halifax's boundaries and the consolidation of schools resulting from declining enrolments, the separate system has been substantially eroded in Halifax. From 1864 to 1950 the policymaking function was vested in a council of public instruction, which was basically the provincial Cabinet; in 1950 the province got its first minister of education.

In addition to school consolidation, 2 other basic changes have been made in the public system since WWII. Following the Pottier Report, an Act of 1946 established a foundation program providing for a basic level of educational services financed partly by the provincial government and partly by municipal taxes equalized across the province. Based upon the Walker Report on Public Education Finance, an Act of 1982 provided for the reduction of the existing 74 school boards to 21, on the ground that the change would create an administrative situation in which sufficient students, funds, professional staff and specialist expertise would permit a far wider and more enriched program. Although it was left to the municipal units to enter into this arrangement voluntarily, all but the town of Hantsport acquiesced.

Institutions The religious denominations gave an early impetus to higher education and at one time in the 19th century Dalhousie alone of the 7 colleges was nondenominational. It has been contended that the province suffers from a surfeit of universities, but strong religious sentiment, if nothing else, has prevented consolidation. The exception has been that Pine Hill Divinity Hall, formerly a Presbyterian and later a United Church institution, became the Atlantic School of Theology in 1971, the country's first ecumenical college, in which the Roman Catholic, Anglican and United churches participate. Institutions providing regular university programs in Halifax are Dalhousie, SAINT MARY'S, MOUNT SAINT VINCENT and the UNIVERSITY OF KING'S COLLEGE; outside Halifax are ACADIA in Wolfville, SAINT FRANCIS XAVIER in Antigonish and UNIVERSITY COLLEGE OF CAPE BRETON at Sydney. UNIVERSITÉ SAINTE-ANNE at Church Point is the only francophone college in the province. Institutions providing specialized training in Halifax are the TECHNICAL UNIVERSITY OF NOVA SCOTIA and the NOVA SCOTIA COLLEGE OF ART AND DESIGN; in Truro are the NOVA SCOTIA AGRICULTURAL COLLEGE and the Nova Scotia Teachers' College. The Atlantic Institute of Education in Halifax was eliminated in 1982 for financial reasons. Training in the new high technology of fishing is

offered at the Nova Scotia Fisheries Training Centre; technical education for mariners is provided by the Nova Scotia Nautical Institute and by the CANADIAN COAST GUARD College at Sydney. A program of post-secondary education for candidates for business and industry is offered by 14 regional vocational schools, 3 modern institutes of technology similar to community colleges, and the apprenticeship program of the provincial Dept of Labour.

Cultural Life

Until the last few decades Nova Scotia's geographical position had kept it removed from some of the main currents of national life. But improvements in travel and the strong impact of nationwide COMMUNICATIONS have eroded some features of the traditional life-style and introduced greater modernity.

Arts In recent years especially, the Nova Scotian government has taken steps both to preserve the province's heritage and to support artistic and cultural forms and activities. In 1975 it established the Art Gallery of Nova Scotia as an agency of the province for the acquisition, preservation and exhibition of works of art, but financial considerations have so far prevented the construction of a suitable building for exhibition purposes. The next year it provided that a building reflecting the cultural, social, economic, political or architectural history of the province might be designated a Registered Historic Property. In 1978, a third Act established the Cultural Foundation to accept, raise and administer funds for the promotion and encouragement of cultural affairs.

All 3 levels of government have supported Halifax's NEPTUNE THEATRE, which has established a national reputation although it performs in inadequate quarters. Despite assistance from the CANADA COUNCIL and the province, the Atlantic Symphony Orchestra, based in Halifax but performing throughout the Atlantic provinces, collapsed for financial reasons in 1982. Since that time it has been revived on a smaller scale as Symphony Nova Scotia. Scottish culture is particularly vigorous in eastern Nova Scotia; Saint Francis Xavier offers courses in Celtic studies, while the Gaelic College at St Ann's, Cape Breton, fosters piping, singing, dancing and handicrafts, and annually hosts the Gaelic Mod, a festival of Highland folk arts. Recently, art galleries and craft shops have proliferated, run by both natives and newcomers, with estimated sales approximating $20 million annually.

Communications The newspaper circulating widely throughout the province is the morning Halifax *Chronicle-Herald;* its afternoon edition, the *Mail-Star,* is largely limited to the Halifax area. These papers have sometimes been criticized for their blandness and the Davey Committee (1970) accused them of "lazy, uncaring journalism." The daily serving Cape Breton in particular is the Sydney *Post-Record,* and county weeklies abound. Radio service is provided by CBC and a large number of private stations; television, by CBC and the stations of the Atlantic Television network (ATV) affiliated with CTV. Considerable production for radio and television emanates from the Halifax program unit of the CBC. CABLE-TELEVISION stations transmit mainly the signal from the American networks, which is received via Bangor, Maine (*see* NEWSPAPERS; BROADCASTING).

Preservation of the Past Through the efforts of the federal and provincial governments, the Royal Nova Scotia Historical Society, and a plethora of local heritage and historical societies, the province's storied past is exhibited to the public in various ways. Standing out among the national historic parks are a restored LOUISBOURG; a replica of Champlain's Habitation Port-Royal; and the HALIFAX CITADEL (in the process of rehabilitation). The provincial government has restored numerous old houses that are representative of earlier eras, including Uniacke House, home of Richard John UNIACKE, near Halifax; Perkins's House, home of Simeon PERKINS, at Liverpool; and "Clifton," home of Thomas Chandler HALIBURTON, at Windsor. Scores of HISTORIC SITES have been marked with plaques on the advice of the Historic Sites and Monuments Board of Canada, the Nova Scotia Historic Sites and Advisory Council, and the Royal Nova Scotia Historical Society. The Nova Scotia Museum provides displays on provincial history. The Public Archives of Nova Scotia building, opened in 1980, is unexcelled in any province and is a veritable treasure house of paintings, documents and manuscripts.

History

Discovery and Early Settlement The early inhabitants of Nova Scotia were the MICMAC, a branch of the Algonquian language group. Some evidence of their numbers and their migrations with the hunt can be gauged from shell heaps discovered in various parts of the province. With the coming of Europeans they almost invariably established better relations with the French than with the English. In recent years they have presented LAND CLAIMS similar to those of Indians in other provinces, but their bargaining power is weak because they constitute only 0.6% of the population.

Long before John CABOT made a landfall in 1497 (probably on Cape Breton I), NORSE adventurers may have reached Nova Scotia; scores of other explorers and fishermen plied its coasts before de MONTS and CHAMPLAIN established Port-Royal in 1605, the first agricultural settlement by Europeans on land which is now Canadian, and the beginnings of Acadia. King James I of England granted New Scotland (called Nova Scotia in its Latin charter) to Sir William Alexander in 1621, and endowed the province with an Order of Baronets and a coat of arms in 1626. Two settlements were set up by Scots 3 years later, but both were unsuccessful.

Three times in the 17th century — by Samuel Argall in 1613, Robert Sedgewick in 1654 and Sir William Phips in 1690 — the French settlements were captured by the English, each time to be returned. The small group of French settlers that were left after the conquest of 1613, together with 300 sent by the Company of New France in 1632 and 60 brought out by Grandfontaine in 1671, constitute the ancestors of the Acadian people today. The fourth capture of Port-Royal (renamed Annapolis Royal) by Francis Nicholson in 1710 was to be the last, since in 1713, by the TREATY OF UTRECHT, Acadia, but not Île Royale (Cape Breton I) or Île Saint-Jean (PEI) passed to British hands. Until 1749, however, it was little more than a "counterfeit suzerainty" (*see* NOVA SCOTIA, 1714-84). The founding of Halifax that year, followed by the arrival of the pre-Loyalists and later by about 20 000 Loyalists (including some 3000 blacks) and disbanded troops, marked the beginnings of British Nova Scotia. An immediate result (1784) was the formation of the new colonies of New Brunswick and Cape Breton from territory that had been part of Nova Scotia, the latter since the TREATY OF PARIS, 1763.



House near Wolfville, NS, a quiet university town that has many descendants of the original New England settlers (*photo by Sherman Hines/Masterfile*).

The 19th Century Many Loyalists had been men of wealth and influence who, because of their sacrifices, expected privileged treatment. Although not unsympathetic at the outset, Gov John PARR eventually had a cooling off with them because of their unending demands for office and their frequent clashes with the pre-Loyalists. But time was on their side, for Parr's successor, Loyalist John Wentworth, used his 16 years as governor (1792-1808) to establish a Loyalist ascendancy in the higher levels of government. As a result, the Loyalists no longer needed to press their claims vigorously and, partly through intermarriage, distinct Loyalist influence disappeared within a relatively short time.

Always a strong defender of the prerogative, Wentworth became increasingly so and in the early 1800s he became embroiled with a so-called "country party," an undisciplined grouping led by William Cottnam Tonge. Eventually, Wentworth got the better of Tonge by rejecting his election as Speaker of the Assembly and dismissing him from his position as naval officer of Halifax. But despite his best efforts the Assembly gained substantial control over the disposition of road moneys, something most country assemblymen regarded as their principal *raison d'être.* Since the military governors who followed chose not to disturb these arrangements, relative political calm prevailed until the mid-1830s, in marked contrast with the situation in the Canadas.

The Napoleonic Wars brought prosperity to Nova Scotia, especially to the lumbering and SHIPBUILDING industries. The War of 1812 also added to the province's well-being; indeed, more than one Halifax fortune was accumulated through PRIVATEERING in these years. But peace, accompanied by poor harvests several years in a row, brought recession in its wake, and recovery did not begin until the mid-1820s, partly promoted by William Huskisson's trade Acts of 1825. Nevertheless, a new wave of IMMIGRATION followed the war and by mid-century the newcomers totalled about 55 000. Some 2000 blacks arrived shortly after the war and in 1818-19 about 200 WELSH. But the bulk were Irish or Scottish, the former largely remaining in Halifax and the latter going to Cape Breton I and the northeastern part of the peninsula. From the early part of the century a slow but steady intellectual awakening had been making itself felt, first in trade, next in literary activity, and finally reaching its zenith in politics in the 1830s. One manifestation was the celebrated Brandy Dispute of 1830 in which almost the entire province turned upon the Council of Twelve for daring to assert a power relating to money bills which had long lain in abeyance.

The movement for RESPONSIBLE GOVERNMENT got under way in earnest in 1836 when, mainly through the efforts of Joseph Howe and his *Novascotian,* a majority of reforming assemblymen was elected to the legislature. Their struggle was against an interrelated merchant-



Lunenburg, NS, dockyards with town in background (*photo by Ted Grant / Masterfile*).

official oligarchy, largely from Halifax, which through the Council of Twelve dominated the business, political and ecclesiastical life of the province in its own interest. The Halifax group, even more than its Upper Canadian counterpart, was a FAMILY COMPACT. Howe was a conservative reformer, and his followers could later echo his words, that they had achieved their ends without a blow struck or a pane of glass broken. Howe's moderation is shown in his willingness to enter into an ill-starred coalition with the Tories, 1840-43, in the hope of attaining his objectives gradually. The Reformers finally achieved success when, in the election of 1847, they won 29 seats to their opponents' 22. On 2 Feb 1848 James B. Uniacke became premier and formed the first ministry operating under responsible government in the British Empire overseas.

Two positive accomplishments marked the next 17 years. Under the leadership of Howe, Nova Scotia entered the railway era and by 1858 the government-owned Nova Scotia Railway was operating lines from Halifax to Windsor and Truro. Charles TUPPER took the lead in the enactment of the school Acts of 1864 and 1865, which required the opening of schools elsewhere without payment of fees and introduced the disliked compulsory assessment which would make free schools possible. Otherwise, these were years of issueless, bitterly partisan politics. Following a bitter clash between Howe and the Irish, the Catholics deserted the Liberals and sectarian politics prevailed for a short period after 1857, the only instance of its kind in Nova Scotia history.

Starting in 1865 the CONFEDERATION question left a mark on the province. Contrary to general belief, Howe did not initiate the movement against the Quebec Resolutions. Rather it began in western Nova Scotia and among the Halifax merchants on economic grounds; people relying on seaborne traffic eastward and southward did not relish setting up new links with a remote, unknown interior. To Howe it seemed obvious that colonial union should at least wait until railway communication had been established with the PROVINCE OF CANADA and monstrous that it should be effected on the basis of a resolution adopted by a 3-year-old assembly that had been elected when union was not an issue. A delegation under him could not prevent the BRITISH NORTH AMERICA ACT from being enacted, but in Sept 1867 Nova Scotia's voters returned 18 anti-Confederates out of 19 to the House of Commons and 36 out of 38 to the provincial House of Assembly (*see* REPEAL MOVEMENT). Finally, convinced that repeal was impossible, Howe accepted "better terms" and entered the federal Cabinet in Jan 1869. Until his death in 1873 he devoted himself to preventing the "slumbering volcano" of Nova Scotia from erupting. Not until the federal election of 1874 and the entrance of 2 Nova Scotian Liberals into Alexander MACKENZIE's Cabinet did the anti-Confederates finally "accept the situation"; the stage had been set for them to become the provincial wing of a national party. But bitterness did not die easily and as late as 1927 some Nova Scotians still flew flags at half-mast on July 1.

Obviously, Tupper had set Nova Scotia's financial needs too low in the Confederation bargain, for even with Howe's better terms the province found it difficult to maintain existing services, much less to continue the expansion of the railway system. By 1867 the branch from Truro to Pictou had been built as a government undertaking, and by 1869 the Dominion government had completed the INTERCOLONIAL RAILWAY as part of the Confederation bargain. After an increase in the province's debt allowance in 1873 the provincial government provided subsidies for building the Western Counties Railway from Annapolis to Yarmouth, the Nictaux and Atlantic from Middleton to Lunenburg, the Eastern Extension from New Glasgow to the Str of Canso, and several lines on Cape Breton I. But because of the province's straitened financial circumstances, none of them would be completed either easily or quickly. Numerous pleas for aid having been rejected or unanswered by Ottawa, Prem W.S. Fielding campaigned on the repeal of Confederation in the election of 1886 and took 29 of 38 seats. But it all came to naught when the Conservatives won 14 of Nova Scotia's 21 federal seats the following year.

The 20th Century Nonetheless, Fielding, a cautious financier, quickly established his preeminence in provincial politics. By 1893 he had persuaded Henry M. Whitney of Boston to embark on coal mining in Cape Breton County and soon the Whitney Syndicate had laid the foundation of a substantial coal and steel industry. George Murray succeeded Fielding in 1896 in circumstances so auspicious that he held on to the premiership for an unequalled 26 years. Greatly expanded coal royalties and an increased federal subsidy in 1907 overcame Nova Scotia's financial difficulties for the first time since Confederation and enabled Murray to complete with ease the province's last major railway, the Halifax and Southwestern from Halifax to Yarmouth, and to make the first cautious advance into the social-service state. The economy of Nova Scotia was stimulated by an increased demand for iron, steel, fish and lumber during WWI. But war's end brought recession which lasted long after recovery had begun outside the Maritimes. That Farmer-Labourites could win 11 seats in politically conservative Nova Scotia in the provincial election of 1920 indicates the depth of the malaise.

Hitherto the major demands on Ottawa had been to relieve the provincial government of its financial burden. But in the early 1920s came the realization that it was the deleterious effects of national economic policies relating to transportation and the tariff which were preventing Nova Scotia from sharing fully in the benefits of Confederation. A MARITIME RIGHTS movement which began in 1922 was quickly taken over by the Conservatives and used to overthrow a 43-year-old Liberal government in 1925. A federal royal commission headed by Sir Andrew Rae Duncan recommended more favourable freight rates and increased federal grants for the Maritimes, but failed to consider the greatest grievance, the protective tariff. Liberal Angus L. Macdonald appointed the Jones Commission to rectify the omission on his becoming premier in 1933.

Macdonald, the third of Nova Scotia's outstanding political leaders after Confederation, headed what was probably the strongest of all Nova Scotian Cabinets and conducted a highly progressive government before he entered the federal Cabinet in 1940. Again Nova Scotia enjoyed good times during WWII and Halifax became the major port for shipping munitions and other supplies to Western Europe. The Macdonald who returned to Halifax from Ottawa adopted a much more conservative stance than in prewar days. Following his death, Nova Scotia's voters conducted a mild political revolution in 1956 by returning the Conservatives for the first time since Confederation under noncrisis conditions: Robert Stanfield then became the fourth premier to establish political dominance over the province.

Since the mid-1950s economic development has been the primary concern of provincial politicians. Industrial Estates Limited (IEL), est 1957, was the chosen instrument of the Stanfield government, and its early successes led to a belief in the early 1960s that Nova Scotia might be coming into its own. But the serious losses incurred by Clairtone (*see* ELECTRONICS INDUSTRY) and Deuterium of Canada (*see* NUCLEAR ENERGY) injected a note of pessimism. The same period was marked by serious difficulties in the coal and steel industries, almost the only ones of substance to be developed in the province as a result of the protective tariff. The apparently permanent collapse of the coal market led in 1967 to the establishment of the Cape Breton Development Corporation (Devco), a federal CROWN CORPORATION with provincial involvement, aimed at developing alternatives for miners as the coal industry was phased out. In 1967, to prevent the closing of Dosco's steel plant at Sydney, the Nova Scotia government took it over and operated it as a crown corporation, the Sydney Steel Corporation (Sysco); to date it has added massively to the provincial debt and its future is far from certain. In contrast, coal has made a comeback as a substitute for oil in energy production.

Recently, there have been 2 philosophies concerning provincial development. Ought it to be confined to industries making use of the province's natural resources? Or, despite past failures, should continued efforts be made to establish

secondary industries which may be altogether unrelated to those resources? Whatever the answer, Nova Scotians are insisting more and more that their pleasant way of life should not be sacrificed to material considerations.

J. MURRAY BECK

Reading: J. Murray Beck, *The Government* of Nova Scotia (1957) and *The Evolution of Municipal Government in Nova Scotia, 1749-1973* (1973); J.B. Brebner, *New England's Outpost* (1927) and *The Neutral Yankees of Nova Scotia* (1937); D. Campbell and R.A. MacLean, *Beyond the Atlantic Roar* (1974); G.G. Campbell, *The History of Nova Scotia* (1949); R.E. George, *A Leader and a Laggard* (1970); J.F. Graham, *Fiscal Adjustment and Economic Development: A Case Study of Nova Scotia* (1963); J. Leefe and P. McCreath, *History of Early Nova Scotia* (1982); W.S. MacNutt, *The Atlantic Province* (1965); B. Moody, *The Acadians* (1981); B. Murdoch, *A History of Nova Scotia or Acadie,* 3 vols (1865, 1866, 1867); T.H. Raddall, *Halifax: Warden of the North* (1948).

Nova Scotia Agricultural College, Truro, NS, opened in 1905 to provide agricultural education and training for the Atlantic provinces. It amalgamated the School of Agriculture (fd Truro, 1885) with the School of Horticulture (fd Wolfville, 1893). The college offers technical and vocational courses, pre-professional studies in agricultural engineering and veterinary medicine, and an agricultural science degree. The college approaches agricultural studies from various directions and emphasizes direct involvement with the organized industry. Graduates have occupied prominent positions in agricultural services both in Canada and abroad.

LOIS KERNAGHAN

Enrolment: Nova Scotia Agricultural College, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
472	—	17	—

Nova Scotia College of Art and Design, Halifax, was established 1887. It offers instruction in fine art, crafts, art education, communication design and environmental planning. It achieved university status in 1969, and is the only degree-granting art school in Canada. Four-year programs lead to the bachelor of fine arts degree (in fine art or art education), bachelor of design (in communication design or environmental planning) or bachelor of arts (in art education). Master's degrees are offered in fine arts and art education. The college also offers diplomas in fine art and graphic design. The college is noted for its publishing ventures on source material in contemporary art. In 1978 it completed an innovative move to a campus within Halifax's restored waterfront. LOIS KERNAGHAN

Enrolment: Nova Scotia College of Art and Design, 1982-83
(Source: Statistics Canada)

Full-time Undergrad	*Full-time Graduate*	*Part-time Undergrad*	*Part-time Graduate*
469	12	91	1

Nova Scotia Research Foundation Corporation (NSRFC), research organization established as a CROWN CORPORATION in 1946 in response to H.M. TORY's recommendation that a provincial board be established to co-operate with universities and the NATIONAL RESEARCH COUNCIL in seeking solutions to problems of economic development and rehabilitation. NSRFC's advisory role to industry resulted in incorporation in 1975. In 1981 a proposal was made to extend the corporation's role to other parts of the Maritimes, in collaboration with the NEW BRUNSWICK RESEARCH AND PRODUCTIVITY COUNCIL The corporation supports economic development in NS and elsewhere by means of technical advice and through research conducted in 7 divisions at a laboratory in Dartmouth. NSRFC has established a world reputation for research in OCEAN technology. More recent expertise involves BIOTECHNOLOGY and COAL desulphurization. Developments of NSRFC's Engineering Physics Division and Centre for Ocean Technology include underwater data-acquisition systems, rare-earth magnetic couplers and multi-pass fluid rotary unions. With DALHOUSIE UNIVERSITY and TECHNICAL UNIVERSITY OF NOVA SCOTIA the council has established the Applied Microelectronics Institute to develop microelectronic marine products. A wholly owned council subsidiary, Nova Magnetics Ltd, will be sold to the private sector, when development of magnetically coupled blower technology becomes economically viable. NSRFC is governed by a board of scientists and industrialists, the chairman serving as president of the corporation. Total staff is about 128 people. Two-thirds of funding comes from sales and contracts to industrial and government clients; the remainder from grants. *See* OCEAN INDUSTRY. MARTIN K. MCNICHOLL

Novel in English In its first phase, from the earliest fiction writing in Canada to WWI, the novel acquired a truly Canadian voice. But the pre-Confederation period was a time far more of development than of achievement. Novels were written and published, but few had literary merit and few could be called distinctively Canadian in their subject matter or point of view. This was to be expected. The country itself was taking shape, and with it a society and a culture for the novelist to represent, analyse and judge. Colonial uncertainty is reflected in the derivativeness and poor quality of fiction in this period; yet some novels did contribute to the establishment of a tradition, and a few achieved lasting significance.

Frances BROOKE's *History of Emily Montague* (1769) is usually described, somewhat misleadingly, as the first Canadian novel. The author lived only briefly in the colony of Québec, and much of her novel is sentimental romance of the kind common in England. Brooke does, however, give some serious attention to French-English relations, the colony's future relations with Britain and the potential threat posed by the American colonies, issues that were to be prominent in later Canadian novels. Her interest in the landscape also anticipates the continuing use of Canada as an exotic setting for fiction by British novelists (eg, Frederick Marryat and R.M. Ballantyne) and by Canadians themselves.

Of more importance to the Canadian quality of Canadian fiction was the publication, in newspapers and magazines, of sketches (sometimes loosely linked as a series) and serialized novels (*see* SHORT FICTION; LITERARY MAGAZINES); some of the early work of Susanna MOODIE and Rosanna LEPROHON appeared in these forms. Many writers continued merely to imitate British models, but there were 2 notable exceptions: Thomas MCCULLOCH and Thomas Chandler HALIBURTON. McCulloch's "Letters of Mephibosheth Stepsure" (in the *Acadian Recorder,* 1821-23), a satirically comic depiction of his Pictou, NS, neighbours, can still delight modern readers (*see* HUMOROUS WRITING). McCulloch's work undoubtedly influenced Haliburton, the first Canadian fiction writer to achieve an international reputation. Haliburton's "Clockmaker" sketches of 1835-36 appeared in book form as *The Clockmaker; or The Sayings and Doings of Samuel Slick, of Slickville* (1836), which was instantly popular in N America and Britain. Sam Slick remains one of the great creations of the comic imagination, and served Haliburton well as a vehicle for serious investigation of his own Nova Scotia and of the growing crudity and materialism of the US. *The Old Judge* (1849) is the best of Haliburton's many other works of fiction. Haliburton for a time rivalled Charles Dickens in popularity, and he was the one major writer of fiction to appear in the pre-Confederation period; he remains important in the Canadian literary tradition.

Two other novelists of this period retain an interest for later readers. Rosanna Leprohon's "The Manor House of De Villerai" (1859-60) and *Antoinette de Mirecourt* (1864) do not avoid sentimentality and melodrama, yet in their presentation of Québec society after the British conquest they reveal a skill and a sensitivity still not fully appreciated; and although John RICHARDSON tried his hand without success at the novel of manners, when he made use of Canadian history in *Wacousta* (1832) and its sequel *The Canadian Brothers* (1840) the results revealed a powerful (if undisciplined) imagination. Both novels are marred by sentiment and melodrama, and exhibit the pervasive influence of Sir Walter Scott on writers of historical novels (with some influence as well from the American writer James Fenimore Cooper). Despite these detractions, Richardson's ability to present violent action, and his attempt to define the developing Canadian character, ensure him at least a minor place in the history of the Canadian novel.

The nationalistic and optimistic spirit following CONFEDERATION is reflected in the increasing variety and quality of Canadian novels. Several writers achieved international popularity, if not lasting literary merit; among them were May Agnes Fleming, Basil King and Margaret Marshall Saunders, whose *Beautiful Joe* (1894), a sentimental story of a dog, is reported to have sold more than one million copies in 14 languages. James DE MILLE was also a popular writer, but in *A Strange Manuscript Found in a Copper Cylinder* (1888) he produced an unusual, disturbing and still-fascinating novel. Popular novelists of this sort may seldom have written good novels; nevertheless, they demonstrate that Canadian writers were gaining an increasing confidence that they could write for audiences outside Canada.

Historical novels were also popular and often skillfully written. Charles G.D. ROBERTS produced several, as did Gilbert PARKER, but these and other novelists were seldom able to present more than the surface of the historical periods they dealt with. William KIRBY's *The Golden Dog* (1877) does penetrate the surface in its attempt to recreate and analyse the society of NEW FRANCE before its fall. Kirby may be guilty of transforming this society to produce a unifying national myth of French-English harmony, yet his knowledge and sympathy make his novel, despite its length and frequent clumsiness, live in a way that others do not.

An increased interest in representing the regions of Canada is also characteristic of the post-Confederation novel; for example, *Anne of Green Gables* (1908) and its successors by L.M. MONTGOMERY are set in Prince Edward Island; *Duncan Polite* (1905) and others by Marian Keith (Mary Esther MacGregor) in Scottish communities in southern Ontario; *The Way of the Sea* (1903) and *Doctor Luke of the Labrador* (1904) by Norman DUNCAN and *The Harbour Master* (1913) by Theodore Goodridge Roberts are set in Newfoundland and Labrador.

The opening up of Canada's West and North was also a frequent subject. Sometimes the treatments were mainly superficial and popular, as in novels by Gilbert Parker, Agnes Laut and Robert SERVICE. More valuable work was done by Ralph Connor (C.W. GORDON) in *The Sky Pilot* (1899) and *The Foreigner* (1909), and by Nellie MCCLUNG in *Sowing Seeds in Danny* (1908). While their portraits of the developing West are not free of sentimentality and obtrusive didacticism, they do show some movement towards the realistic presentation of a sense of place, a movement even more pronounced in Martin

Allerdale Grainger's *Woodsmen of the West* (1908), a good novel set in BC.

Didacticism and a moralizing tone were prominent in many novels. Two writers who made serious and important attempts to combine entertainment with intellectual substance, Agnes Maule Machar (social justice, Christianity) and Lily Dougall (religious themes), had limited artistic success for this reason. The major novels of the post-Confederation period largely overcame this difficulty, achieving moral seriousness without preaching to the reader. To various degrees and in various ways they also integrated historical, regional, social, intellectual and international concerns.

Francis William Grey's one novel, *The Curé of St. Philippe* (1899), is both a subtly comic novel and a shrewd analysis of education, religion, politics and French-English relations in a small Québec town of the period. Robert Barr wrote many works, including an important collection of detective fiction, *The Triumphs of Eugène Valmont* (1906), but his most successful Canadian novel, *The Measure of the Rule* (1907), is a satiric criticism of teacher training and educational theorizing, with some attention paid to the shortcomings of Toronto society at the turn of the century.

By the beginning of the 20th century the Canadian novel had moved beyond its formative period, as is evident in the best works of that period's major novelists, Sara Jeannette DUNCAN and Stephen LEACOCK. Duncan's novels, written after her successful career as a journalist, are the product of an informed and sensitive intelligence with a wide range of serious interests. *A Daughter of Today* (1894) is, until its awkward conclusion, a compelling study of the "new Woman" and the artistic temperament. *An American Girl in London* (1891), one of her "international" novels, is a comedy dealing with the differences between American and British social customs. *Cousin Cinderella* (1908), a less lively comedy, returns to this theme and adds to it by introducing the question of where Canadians stand in this relationship. *The Imperialist* (1904) is set in southern Ontario, yet international themes are again prominent, presented as they impinge upon the consciousness of a Canadian town, whose society Duncan depicts and analyses with wit and skill. Duncan resided in India for almost 30 years after 1890, and her novels set there become increasingly dark in tone, from *The Simple Adventures of a Memsahib* (1893) to later works such as *His Honour, and a Lady* (1896) and *Set in Authority* (1906), which are critical of the British establishment in India and increasingly sympathetic towards the native population and its aspirations. Duncan continued to write until the 1920s, but the quality of her work after 1910 is uneven.

Leacock began his literary career by parodying, with exuberance and an underlying note of surrealistic violence, the various forms, styles and aberrations of conventional fiction. *Literary Lapses* (1910), *Nonsense Novels* (1911) and later *Frenzied Fiction* (1918) give Leacock a well-deserved international reputation as one of the great humorists in the English language. He was to write much more in this vein, often successfully, but never again did he reach the consistently high quality of this early work. Leacock's major achievements are *Sunshine Sketches of a Little Town* (1912) and *Arcadian Adventures with the Idle Rich* (1914). In the first we find a humorous presentation of the foibles and follies of the residents of a small Ontario community, with understated satire and criticism directed at social pretension, materialism, urbanization and politics. The second book is overtly satiric, as its title suggests, much less filled with sunshine. The idle rich and their hangers-on have no redeeming qualities, and Leacock offers no consolation to his readers poised on the brink of a world war that was to have far-reaching consequences for Canada.

DAVID JACKEL

Novel in English, WWI-1959

At the end of WWI, the self-confidence engendered by Canada's role in the war brought an upsurge of NATIONALISM which included a renewed interest in a national literature. Between 1920 and 1940, 700 works of fiction were published by Canadians. While the popular genres of mystery, adventure and romance continued to flourish, Canadian writers showed themselves to be aware of the progress made in fiction by such writers as Dreiser, Joyce and Woolf. The first important development in Canada after the war was the advent of realism, heralded in Prairie fiction. Novels recorded the life of the homesteader with increasing fidelity to experience; writers tended less and less to romanticize or idealize either landscape or life. The prolific Arthur STRINGER bridges the earlier and later periods of the Prairie novel, stylistically as well as chronologically, with his Alberta trilogy *The Prairie Wife* (1915), *The Prairie Mother* (1920) and *The Prairie Child* (1922). Robert Stead's *Neighbours* (1922) and *The Smoking Flax* (1924) most obviously demonstrate the move toward realism, although plot lines and occasional melodramatic incidents continue the romantic trend.

With Stead's *Grain* (1926), and with the publication in 1925 of the first novels of Martha Ostenso and Frederick Philip GROVE, realism in Prairie fiction was firmly established. Ostenso's *Wild Geese* vividly depicts the harshness of life in a homesteading community, but its central figure is the romantic villain Caleb Gare, whose lust to possess the land causes him to enslave his family and eventually destroys him. Grove followed his first novel, *Settlers of the Marsh*, with 3 more Prairie novels: *Our Daily Bread* (1928), *The Yoke of Life* (1930) and *Fruits of the Earth* (1933). Although his patriarchal heroes often succeed in their struggle against nature, they are inevitably brought to see that their success is ephemeral.

The strong regional consciousness of these authors characterized much Canadian fiction, as writers portrayed the impact of environment on character and on human relationships (*see* REGIONALISM IN LITERATURE). While realism was developing, the popular romantic tradition continued in Prairie fiction, presenting a more optimistic view of pioneer life, as in Laura Goodman Salverson's *The Viking Heart* (1923), a novel about Icelandic settlers. Frederick Niven, after writing several successful novels about his native Scotland, traced the historical development of the Prairies in an accurate and entertaining trilogy: *The Flying Years* (1935), *Mine Inheritance* (1940) and *The Transplanted* (1944). The romantic tradition continued with W.O. MITCHELL's *Who Has Seen the Wind* (1947), the story of a child growing up on the Prairies. The wind provides the central, unifying symbol of the boy's attempt to comprehend the spiritual world.

Thomas RADDALL's historical novels of Nova Scotia are among the best popular fiction. *His Majesty's Yankees* (1942) and *The Nymph and the Lamp* (1950) are lively, exciting and historically accurate. But the outstanding popular success of the period was Mazo DE LA ROCHE's *Jalna* series (1927-60). Set in rural Ontario, the series continued through 16 sentimental novels characterized by lively dialogue, dramatic incidents and memorable characters. The Jalna books continue to be read throughout the world.

Meanwhile, other Ontario writers were, like their Prairie contemporaries, producing realistic fiction. Raymond Knister, author of some of the best and most experimental short stories of the 1920s and some of Canada's earliest modernist poetry, wrote what is possibly the first realistic novel of rural Ontario, *White Narcissus* (1929). Knister used elements of the landscape as symbols reflecting the emotions of his protagonist, whose journey from city back to farm becomes a journey of self-discovery.

With the novels of Morley CALLAGHAN, urban realism became firmly established. Callaghan's early novels, *Strange Fugitive* (1928), *It's Never Over* (1930) and *A Broken Journey* (1932), incorporate deterministic elements: characters often appear to be victims of forces beyond their control. Callaghan writes in a deceptively simple, economical style which changed very little when he turned to a more Christian outlook in his next 3 novels: *Such is My Beloved* (1934), portraying a priest's loving attempt to save 2 prostitutes; *They Shall Inherit the Earth* (1935), a father-son conflict set against the backdrop of the Great Depression; and *More Joy in Heaven* (1937), the story of a reformed bank robber misunderstood by society. In these novels the saint figure stands in opposition to society, as it does in the later *The Loved and the Lost* (1951), in which Callaghan's style softens and he effectively uses myth and symbol.

The optimism following WWI disappeared with the onset of the GREAT DEPRESSION. Fewer novels were published and fewer read. Some novelists attempted to record the disillusionment of the time and the best fictional record of social protest is West Coast journalist Irene Baird's *Waste Heritage* (1939), a documentary novel of Vancouver and Victoria in 1938. The desperation of the time in the urban areas of eastern Canada is reflected in Callaghan's early novels and stories. Hugh GARNER's *Cabbagetown* (1950) is a later account of growing up in a Depression slum in Toronto. Sinclair ROSS's first novel, *As For Me and My House* (1941), and some of his earlier short stories give the best fictional record of the Prairies of the Depression years.

With *As For Me and My House*, the atmosphere of a particular time and place and its influence on the human spirit received a newly sophisticated and imaginative treatment. In this novel of a minister and his wife trapped in a puritanical Prairie town, Ross exploits the setting and its impact on the psyche to voice such modern concerns as alienation, the failure of communication, the problem of the imagination and the search for meaning in an incomprehensible universe. The outer world mirrors the inner state. In the next decade, Ernest BUCKLER wrote *The Mountain and the Valley* (1952), set in the Annapolis Valley of Nova Scotia. Buckler's complex symbolism and sensuous, richly textured language create a pastoral world through which he voices his themes of isolation and the problem of the imagination.

Hugh MACLENNAN, the best-known Canadian novelist of the 1940s and 1950s, began writing as a post-Depression surge of nationalism swept Canada. In 1941, with the publication of *Barometer Rising*, MacLennan began chronicling the Canadian psyche. Set in 1917, with its focal point the HALIFAX EXPLOSION, this novel explores Canada's developing national spirit. MacLennan's second novel, *Two Solitudes* (1945), deals with the English-French relations in Canada through 2 generations, from WWI to the beginning of WWII. When *The Precipice* (1948), less overtly Canadian, was less successful, MacLennan returned to his role as spokesman for the national spirit. *Each Man's Son* (1951), set in a Nova Scotia mining town, dramatizes the Calvinistic puritanism which is seen to pervade much of Canadian life. *The Watch that Ends the Night* (1959), which has received the most critical acclaim, is more expansive. The age-old love triangle is acted out in a Canadian milieu, involving an introspective man, a spiritually strong artistic woman and a larger-than-life man of action. In this work, as in his earlier novels, MacLennan excels in description and narration, while his weaknesses are lengthy explanations and stilted dialogue.

WWII became the subject for a number of novels. Among the best are Hugh Garner's *Storm Below* (1949), a story of 6 days on a Canadian corvette; Earle BIRNEY's *Turvey* (1949), a humorous look at army life; Colin McDougall's *Execution* (1958), an appallingly realistic account of Canadian combatants on the Italian front; and David Walker's *The Pillar* (1952), based on his experiences as a prisoner of war. Walker, who immigrated to Canada after the war, produced a variety of successful novels, many of which, including the broadly humorous *Geordie* (1950), are set in his native Scotland. His first novel with a Canadian setting, *Where the High Winds Blow* (1960), is a well-written romance and adventure story of the opening up of the North, with an entrepreneurial hero who is equally at home in northern wilderness and southern civilization.

The immigrant experience continued to be a major theme. Joining Walker, Grove, Salverson and Niven was Henry KREISEL, the Jewish-Austrian author of *The Rich Man* (1948), the story of an immigrant to Toronto who pretends to be wealthy when he visits his family in Vienna; and the more complex *Betrayal* (1964). John Marlyn's *Under the Ribs of Death* (1957) describes the struggle for material success of a Hungarian immigrant's son. Brian MOORE, who spent 14 years in Canada before moving to the US, wrote a moving, intense novel of a Belfast spinster, *The Lonely Passion of Judith Hearne* (1956), and a perceptive and entertaining novel of an Irish immigrant in Montréal, *The Luck of Ginger Coffey* (1960). Malcolm LOWRY, the most celebrated of our temporary residents, completed *Under the Volcano* (1947) and wrote *October Ferry to Gabriola* (1970) in Canada. *Under the Volcano* is brilliant, a complex novel which uses cinematic techniques, cabalistic and theosophical symbolism, myth and unusual metaphors to tell of the last 12 hours in the life of an alcoholic.

The Jewish immigrant experience was told by a number of voices. Mordecai RICHLER's *Son of a Smaller Hero* (1955) and *The Apprenticeship of Duddy Kravitz* (1959) portray the third generation of a family of Jewish immigrants in Montréal. Kravitz is a picaresque hero whose story is told in an exuberantly written social satire employing broadly humorous dialogue. Adele WISEMAN's *The Sacrifice* (1956) is the tragic story of a Jewish-Ukrainian immigrant's attempt to cope with a new world and yet to live according to his own tradition. His own tragedy is mitigated by the hope of a good future for his grandson.

While realism and regionalism became increasingly sophisticated, several fine experimental writers moved further from the traditional use of the elements of the novel to produce symbolic, lyrical, fragmented narrative. Howard O'HAGAN's *Tay John* (1939) is based on an Indian legend of a golden-haired child who emerges from the grave of a pregnant woman and is last seen disappearing into the earth. The novel begins with the legend and blends mythical with realistic narrative in an episodic structure. In the 1940s F.P. Grove turned from realism to more innovative techniques. *Master of the Mill* (1944) is a futuristic novel dealing with the complexities of industrial society and the problems of automation. The narrative method is complex, involving flashbacks of the protagonist, a manuscript written by another character and the recollections of others. In *Consider Her Ways* (1947), Grove based his story of the ant world on scientific fact and used his ant characters to satirize humanity.

Elizabeth SMART's remarkable lyrical novel, *By Grand Central Station I Sat Down and Wept* (1945), was first published in England and received scant attention in Canada until a N American edition appeared in 1975. The novel explores the dualities of experience, especially the pain and pleasure of love, through paradoxical structures. The plot is minimal; the setting takes on the texture of imagery and becomes an adjunct to emotional expression. Sheila WATSON's *The Double Hook* (1959) also explores the dualities of experience. Watson describes her characters as "figures in a ground from which they could not be separated." The novel is a mythical and allegorical exploration of the interconnections between good and evil, and of the redemption of a community to love. Poet A.M. KLEIN turned to fiction to tell the story of the return of the Jews to the Promised Land. In *The Second Scroll* (1951), he presents a pattern of Jewish exile and return parallel to that in the First Scroll (the Torah) to recount the Jews' return to Israel after WWII. Like the Torah, *The Second Scroll* includes glosses, which take the form of poetry, drama, a prayer and an excerpt from a letter. The novel's central religious theme demonstrates man losing and finding God, and grapples with the problem of the existence of evil.

Ethel Wilson's 4 novels and 2 novelettes, published in less than 10 years, are among the best crafted and most subtly expressed of Canadian fictional works. Wilson's strong sense of place links her to realistic writers. Her style is marked by clarity, economy, deceptive simplicity, unobtrusive imagery and the acute observation of people. Her complex world view includes an awareness of life's ironies, of the interplay of chance and Providence. John Donne's "No man is an Iland," the epigraph to her first novel, *Hetty Dorval* (1947), is central to Wilson's view of life. *Swamp Angel* (1954), possibly Wilson's best novel, presents in Maggie Lloyd a convincing character who leaves an impossible marriage to forge a new life for herself.

Among the novelists of note whose careers in fiction began in the 1950s and continued through the 1980s is Robertson DAVIES, who first made his mark as a dramatist and journalist. The satire central to his Samuel Marchbank essays characterizes his Salteron trilogy, *Tempest-Tost* (1951), *Leaven of Malice* (1954) and *A Mixture of Frailties* (1958), in which snobbishness, materialism and hypocrisy are satirized.

The hero took on various guises through the 40 years of fiction writing following WWI. In accord with the shift in action from the external to the internal world, the strong, confident, at times patriarchal or even epic hero of some early novels of the period (eg, Abe Spalding of Grove's *Fruits of the Earth*) soon gave way to the more introspective, less confident protagonist (eg, Philip Bentley, the uncertain, guilt-ridden minister of Ross's *As For Me and My House*; David Canaan, the frustrated artist of Buckler's *The Mountain and the Valley*; and the intellectual George Stewart of MacLennan's *The Watch that Ends the Night*). The antihero who ruthlessly manipulates others makes an occasional appearance, as in Richler's Duddy Kravitz. Yet a further shift in the concept of the hero can be noted in Wilson's Maggie Lloyd. Self-reliant and courageous, but sensitive and loving, Maggie is the forerunner of the strong female characters created by the outstanding women writers of the 1960s and 1970s.

Some of the literary trends and techniques which began in the 1940s and 1950s came to fruition only in the 1960s and 1970s, and many of the writers continue to write some of the best-known and most highly regarded novels. Canadian novelists who began their careers in the 1960s and 1970s looked back to such writers as Ross, Grove and Wilson for examples of the possibilities for artistic response to their own particular place and time. Post-modernists have their forerunners in Watson, Smart and Lowry.

LORRAINE MCMULLEN

Novel in English, 1959-1980s

The years following 1959 marked the flowering of the novel in Canada, for in these years, as writers began to explore more fully the formal possibilities of the genre, they at last won public recognition both inside and outside Canada. Canadian novels became Book of the Month Club selections in the US; major American and British magazines published Canadian fiction; the size of press runs often increased tenfold; and translations abounded of novels by Leonard COHEN, Margaret ATWOOD, Robertson Davies and many others. At home, Canada also managed to generate commercially viable popular fiction. Much of this intensified activity was the result of the long campaign to create a literary community in Canada, a campaign that grew out of the economic and cultural nationalism of the period. Government support of the arts (*see* CANADA COUNCIL) played major roles in the financial and psychological development of a cultural climate that made Canadian literature blossom. New SMALL PRESSES proliferated, often established to champion experimental or noncommercial novels that would otherwise perhaps be unpublishable.

Since the novel form is usually closely tied to the social background of its time and place of production, the changes occurring during the 25 years after 1960 in Canada played their part in the changes appearing in the fiction of the period. The 1960s were years of relative plenty that seemed to free young people from worry about immediate need and allowed them to turn their attention to broader social concerns. These were the years of confrontational politics and of the challenging of accepted norms. The retrenchment in later years of conservative middle-class values in the face of economic recession was likely a predictable response to the anti-establishment, iconoclastic counterculture of the 1960s. Many of the writers of the 1970s and 1980s, however, were "formed," intellectually and ideologically, by those earlier years. Many, such as Atwood, Timothy FINDLEY and Rudy WIEBE, saw their role as that of a conscience or even a voice for the oppressed. In 1981 Canadian writers actively participated in Amnesty International's "Writer and Human Rights" Congress in Toronto. But the oppressed to whom novelists gave a voice were not necessarily victims of external political tyranny; they often suffered more local oppression, by what could be called bourgeois values. For many Canadian novelists, like John METCALF (*General Ludd*, 1980) and Michael Charters, metaphors of madness acted as the focus for attacks on the social and psychological labels which serve to control misfits who transgress the often unacknowledged norms of middle-class behaviour.

These themes were not, of course, unique to Canadian writers. Novels from Canada shared with those of other Western nations a concern for those staples of the novelistic tradition, social analysis and psychological investigation, along with a new emphasis on the role and status of women. *Bildungsroman* (stories of growing up) continued to be written, by novelists such as Clark BLAISE (*Lunar Attractions*, 1979), Keith Maillard, Alice MUNRO (*Lives of Girls and Women*, 1971) and Alden NOWLAN (*Various Persons Named Kevin O'Brien*, 1973) among others. Canadian fiction increasingly showed signs of breaking away from the conventions of realism. Reflexivity (the concern within a work to speak of the creative process itself) became prominent. This may have been a result of the increasing desire of writers — many of them academics — to deal openly with the technical aspects of their art; or it may have arisen from an increasing engagement with structuralism in linguistics, anthropology and theories of communication, including those of Harold INNIS and Marshall MCLUHAN.

While taking part in the international literary trends, the Canadian novel also revealed a continuity with its own past, with its regional roots

and its tradition of treating minority groups as more than just local colour — obvious reflections of the geographic and ethnic diversity of the country. Writers who had established their reputations earlier continued to publish (eg, Hugh MacLennan, *Voices in Time*, 1980; Morley Callaghan, *A Time for Judas*, 1983). However, most important during these years was the emergence of a number of significant new voices. This phenomenon was remarkable in both its quantity and its quality.

Regional writing in Canada had never been provincial, although it had tended to balance the natural novelistic attraction toward the exotic. After 1959 many Canadian writers — among them Margaret LAURENCE, David Knight, Audrey THOMAS and David GODFREY — used as settings Africa and Europe, but they did so either as analogues that enabled them to comment implicitly upon their own culture, or as the source of new perspectives that allowed them to see Canada more clearly. Writers who anchored their works in a specifically Canadian geography followed the tradition, established and continued by Prairie writers, of making the landscape both real and symbolic, both local and universal. Canadian fiction in general was spatially oriented around 2 opposing *topoi:* the city and the country. Urban novels by Juan Butler (*Cabbagetown Diary*, 1970), John Buell (*The Pyx*, 1959), Hugh Garner and others were frequently both realistic accounts of the corroding violence and alienation of the modern city and symbolic representations of the infernal "Unreal City" of T.S. Eliot's "The Waste Land."

At the other extreme were the idyllic or nostalgic descriptions of small towns and their rural environs. More often, however, these small communities became symbolic microcosms, this time of a limited and limiting society: Alice Munro's Jubilee, Robertson Davies's Deptford, Matt COHEN's Salem, Margaret Laurence's Manawaka. The land — in the form of the family farm — continued to be regarded ambivalently, as both man's essential roots and his major burden. Frequently the land was connected more to a temporal than to a spatial dimension: it was here that characters either searched for their collective or individual past or rejected its haunting authority. The Canadian wilderness also became the subject, as well as the setting, of fiction in modes ranging from the metaphoric to the ecological.

There was a similar double interpretive pull (toward the symbolic and toward the documentary) in the portrayal of minority groups in Canadian fiction. During these years, there was a greater interest in native Indian and Inuit literature, particularly in memoirs and collections of myths and folktales. Middle-class white Canadian novelists such as W.O. Mitchell, Wayland Drew and James HOUSTON evinced an increased respect for native culture and a desire to learn from it. Many immigrant groups became the foci of attention of Canadian novelists: Jewish (Adele Wiseman, Jack Ludwig, Mordecai Richler), Japanese (Joy KOGAWA), Mennonite (Rudy Wiebe), West Indian (Austin CLARKE, Harold Sonny Ladoo), and so on. These novels often consisted of commentaries on social problems experienced by immigrants to Canada, frequently mixed with suggestions that the newcomers could also be seen as symbolic of the alien and the separate in each individual.

Both of these interpretations were also to be found in the gay literature of Jane RULE (*The Young in One Another's Arms*, 1977) and Scott Symons. Leonard Cohen's *Beautiful Losers* (1966) was perhaps the archetype of the challenge to sexual mores of the 1960s, and with that challenge came the questioning of sexual roles in general. Although men such as Ian McLachlan and David Helwig also wrote of these issues, feminism as an ideology tended to be the domain of female writers. Canadian writing by women about women partook of the general radicalization of the time, of the desire to right the balance, as feminist literature everywhere was attempting to do. In English Canada there was little of the more abstract Québecois interest in defining a new female discourse. Instead, an awareness of feminist issues became part of the overt themes of fiction whose aim ranged from objective documentation of the condition of women to virulent attack on the causes of repression. While remaining engaged or committed, the feminist novels of writers like Constance BERESFORD-HOWE (*The Book of Eve*, 1973), Marian ENGEL (*Joanne*, 1975), Carol Shields (*Small Ceremonies*, 1976) and Doris Anderson (*Two Women*, 1975) allowed for a variety of tones and styles, from the thoughtful and worried through to the angry and strident.

Given the didactic stance behind many of these novels, it is not surprising to find certain formal, as well as thematic, constants. In an attempt to redress the balance of characterization in a traditionally male literary form, feminist novelists tended either to idealize women characters or to present them as pure victims of masculine domination. Male characters, as a result, were often caricatured or else had their roles reduced to the skeletal ones usually reserved for women in novels that have men as heroes. The major themes of these novels centered on the experience of women, especially in relation to power structures (on all levels). There was an intense awareness of the relationship between bonding and bondage, ie, between a woman's need for connection with others and her equally strong need for freedom and independence, a theme that made feminist novels political in the broadest sense.

However, the concern with power and victimization was not restricted to this one context. Following the lead of Québec writers of the 1960s, English Canadian novelists too became more politicized. Some focused on specific events (the OCTOBER CRISIS of 1970) or situations (federalism versus separatism). Others — David Lewis Stein, Margaret Atwood and many more — investigated the tension between social or political structures and the individual psyche. Again the stylistic and tonal range was great — from the irony of Richard Wright to the bitter satire of Leo Simpson to the sometimes ponderous earnestness of Peter Such — as *homo canadensis* confronted the forces of corporate, consumer, industrial and technological society. Ian McLachlan and Timothy Findley included in this kind of investigation a study of the role of art in such a society and the ideological implications of its involvement or its alienation.

Many novels in Canada — those by Robert Harlow, Graeme GIBSON, Helen Weinzweig, David Adams Richards and Ray Smith — could be seen as part of the general literary movement that has been labeled "postmodernism," for they too exhibited an increased self-consciousness about the creative processes. This immanent concern for their reception and interpretation prevented them from being merely introverted and precious. Their self-representation in form became a means of investigating the politics of how and why we read, as well as a way of focusing on the literary materials themselves: language and narrative. This increased interest in form may be due to the number of poets who turned to writing fiction during these years: Cohen, Atwood, Gwendolyn MACEWEN and Michael ONDAATJE among others. Another possibility suggests itself in the role of the university in Canadian letters during these years: many of the novelists were either professors (Graham Petrie, Anthony Brennan, Tom Marshall, Robert KROETSCH, etc) or writers-in-residence. Besides increasing formal awareness and experimentation, this institutionalization also produced many academic novels, ranging from satiric cuts at the intellectual community to rather boring *romans à clef*.

Postmodernist, reflexive fiction in Canada appeared to organize itself around 2 new formal traditions: the written chronicle and the oral tale. On the one hand, there was almost an obsession with the written product of history as something fixed and fixing. Munro, Ondaatje, Kroetsch, Findley and others frequently used photographic images to signal this thematic pole. On the other hand, they looked to metaphors of music, film and tape recording to express the opposite pole, that of the storytelling process. Often other oral traditions were called upon: African (David Godfrey, in *The New Ancestors*, 1970), Indian (Rudy Wiebe, in *The Temptations of Big Bear*, 1973), and Irish (Jack HODGINS, in *The Resurrection of Joseph Bourne*, 1979). Perhaps these 2 poles reflected the legacy of Marshall McLuhan, for whom oral cultures were collective, simultaneous, auditory and oriented toward the present, while written cultures were individual, signed, linear, visual and under the control of the past. Yet even those novels positively stressing an oral tradition themselves only existed as written, individual, signed works. It was this consciousness of the oral-written tension that marked the peculiarly Canadian brand of literary post modernism, which had as a by-product a reawakening of interest in myth and fantasy.

Contemporaneous with these self-conscious experimental novels was a more generally accessible body of popular fiction. Publishers such as MCCLELLAND AND STEWART retained their commitment to "serious" fiction, but the economic situation demanded as well that local mass-market sales (traditionally American) be somehow diverted to Canada. Just as Canadians came to realize that good comic novels and fine children's books were being produced right at home, they became aware too of the local popular fiction.

POPULAR LITERATURE is generally regarded as light entertainment and therefore as literature which confirms rather than challenges the reader's beliefs, usually by relying on more or less preformulated verbal and narrative structures. Often, following (or hoping to entice) television and movie scripts, popular novels provided information about a sector of contemporary society (from the drug dealing of William Deverell's novels to the pig farming of Aritha Van Herk's). Frequently, this format was combined with the conventions of the thriller. Canadian novelists, however, also produced other forms of popular literature, from the detective story to historical fiction to soft-core pornographic melodrama, and the quality of the writing varied considerably. Forms of popular fiction were also incorporated into more serious post modernist novels. This could be seen either as a cultural democratization of the high/low art split, or just as a source of parodic satire. Some novels used the gothic romance (Atwood's *Lady Oracle*, 1976) or the western (Kroetsch's *The Studhorse Man*, 1969), while others turned to comic books or Hollywood movies (*Beautiful Losers*).

Since 1959 Canada has been able not only to enjoy the consolidation of the renown of successful writers of earlier decades, but to continue with ease the process of forming an ever-growing literary canon. In the 1960s were firmly established the reputations of Margaret Laurence, Robertson Davies and Mordecai Richler; in the 1970s those of Alice Munro, Rudy Wiebe, Jack Hodgins, Timothy Findley and Margaret Atwood. The fact that such a short list as this is embarrassingly insufficient is ample testimony to the variety, richness and high quality of recent Canadian fiction.

LINDA HUTCHEON

Reading: M. Atwood, *Survival* (1972); F. Davey, *From There to Here* (1974); M. Fee and R. Cawker, *Canadian Fiction* (1976); N. Frye, *The Bush Garden* (1971); W.H. New, *Articulating West* (1972) and, ed, *Fiction in the Seventies* (Special Issue of *Canadian Literature* 92, spring 1982); G. Woodcock, ed, *The Sixties* (1969) and, ed, *The Canadian Novel in the Twentieth Century* (1975).

Novel in French Although the Québec novel was born in the turbulent days preceding the REBELLIONS OF 1837, it bore no trace of those events. Instead, it fictionalized real-life incidents (François-Réal Angers, *Les Révélations du crime ou Cambray et ses complices*, July 1837; tr *The Canadian Brigand*, 1867) or claimed kinship with Victor Hugo while borrowing heavily from the heritage of anecdotes, tales and legends (Philippe AUBERT DE GASPÉ, Jr, *L'Influence d'un livre*, 1837). With *Les Fiancés de 1812* (1844) by Joseph DOUTRE, the novel became resolutely Canadien and adventure oriented. The first part of *Une de perdue, deux de trouvées* (1849-51) by Georges Boucher de Boucherville was along these lines and led the way for the serialized novel which was developed by Henri-Emile Chevalier ("La Jolie Fille du faubourg Québec," 1854). The French authors of such serials (Alexandre Dumas, père, Eugène Sue, Frédéric Soulié) continued to be read, but the adventure story gave way to the rustic novel. *La Terre paternelle* (1846) by Patrice Lacombe had the shape of a long short story and a clear message: one must not give up the family land or leave it for the city. Pierre-Joseph-Olivier CHAUVEAU (*Charles Guérin*) fell first under the influence of Honoré de Balzac (1846) and then turned to the theme of settling the land. Antoine GÉRIN-LAJOIE developed this theme in *Jean Rivard, le défricheur* (1862; tr *Jean Rivard*, 1977) and *Jean Rivard, économiste* (1864), in which his hero, who had left college in order to homestead, established a new parish in just a few years. Rivard became a role model whose example was preached, off and on, until the middle of the 20th century. The historical novel emphasized the moral grandeur of the vanquished of 1760 (Philippe AUBERT DE GASPÉ, Sr, *Les Anciens Canadiens*, 1863; tr *Canadians of Old*, 1890), who, having fallen heroically before their opponents, nonetheless preserved their French soul, language and traditions. In *Jacques et Marie* (1865-66), Napoléon BOURASSA paid homage to the courage of the deportees of 1755 from ACADIA (lovers lose track of each other and then, after long periods of wandering, are reunited).

The best novels of the late 19th century (1866-95) are historical. Though Québecois read a great deal of Walter Scott and James Fenimore Cooper, authors such as Joseph Marmette (*François de Bienville*, 1870) and Laure Conan (the pseudonym of Félicité ANGERS) were more strongly influenced by François-Xavier GARNEAU, whose *Histoire du Canada* (tr *History of Canada*, 1860) began to appear in 1845, and by puritanical, conservative literary critic Henri-Raymond CASGRAIN. Marmette knew the historical material well but constructed his novels awkwardly, whereas Conan, the first female Québec novelist, knew better than previous writers how to develop complex characterizations (*A L'Oeuvre et à l'épreuve*, 1891, tr *The Master Motive*, 1909; *L'Oublié*, 1900). She undoubtedly owed her success to the experience she gained with *Angéline de Montbrun* (1881-82; tr 1975), considered to have been the first psychological novel written in Québec. Jules-Paul TARDIVEL moved forward in history rather than back: his nationalistic *Pour la patrie* (1895; tr 1975) was set in 1945, at a moment when French Canadians, after difficult political struggles, were finally about to win their own French and Catholic state.

At the turn of the century, rustic novels were revived, at first in rather weary form by Ernest Choquette (*Claude Paysan*, 1899; *La Terre*, 1916) but then more confidently by Damase Potvin (*Restons chez nous*, 1908). However, it was a Frenchman, Louis HÉMON, who brought the genre to full flower. Readers were deeply moved by his MARIA CHAPDELAINE (tr 1973), which appeared in a French newspaper in 1914 and then in book form in Québec in 1916. In 1921, in France, this novel began its long international career: today, it is still the best known of all Québec works. Though it is criticized for its myopic view of Québec as a land of tillers of the soil where nothing has changed or should ever change, the impressionistic realism of *Maria Chapdelaine* nonetheless forced writers to modernize their style and to observe their fellow citizens with more care. At about the same time (1918), *La Scouine* appeared discreetly — only 60 copies, privately printed. Albert Laberge divided his stark, unrelievedly sombre tale of a Québec farmer into 33 remarkably concise tableaus, all written in a style reminiscent of Emile Zola. This novel was rediscovered in 1958 and was translated as *Bitter Bread* in 1977. The rustic novel reached its culmination in 1938 with *Trente Arpents* (tr *Thirty Acres*, 1940) by Ringuet (pseudonym of Philippe PANNETON). Here the land, which in the 19th century had been viewed as society's salvation, no longer supported its master: these were the days of economic crisis, INDUSTRIALIZATION was occurring and rural people were being drawn to the city. Novels celebrating the cult of the soil were no longer written in Québec, except for the excellent *Le Survenant* (1945; tr *The Outlander*, 1950) by Germaine GUÈVREMONT, a kind of poetic revival of the genre.

The historical novel knew a similar kind of evolution into the 20th century. Robert Laroque de Roquebrune published *Les Habits rouges* (1923), a tale of the early revolutionary events of 1837, and *D'un océan à l'autre* (1924), a history of Canada's expansion westward in the days of Louis RIEL (1869-85). Alain Grandbois produced a book with a unique style, *Né à Québec...* (1933; tr *Born in Quebec*, 1964), a poetic prose account of the life of explorer Louis JOLLIET that displayed the gifts of this future poet to their best advantage. Léo-Paul DESROSIERS somewhat more prosaically recounted the early 19th-century FUR TRADE battles; his *Les Engagés du grand portage* (tr *The Making of Nicholas Montour*, 1978) was the most beautifully realized of all Québec historical novels. Even so, although Desrosiers was praised for his technique, reservations were expressed about the too neat, antithetical opposition of his characters, Nicolas Montour, totally unscrupulous adventurer, and Louison Turenne, the flawlessly honest voyageur. This was the last of the tradition; the few historical novels that occasionally appeared thereafter were decidedly mediocre.

The historical novel had been the favoured art form of literary nationalism. Almost invariably, authors stressed the moral virtue of French Canadian and Acadian characters and the treacherous nature of Anglo-Saxon ones. Sometimes a few of the latter had redeeming qualities, or were even thoroughly good, but they rarely, if ever, triumphed over their Canadien counterparts. The rustic novels offered a more subtle version of the same approach. This accounts for the survival, well into the 20th century, of the Tardivel-style nationalistic novel. It takes a more refined form in *L'Appel de la race* (1922) by Lionel GROULX, a more poetic form in *Menaud, maître-draveur* (1937; tr *Master of the River*, 1976) of Félix-Antoine SAVARD. *L'Appel de la race* is set against the background of the Franco-Ontarians' struggle for the right to French-language education: the race that thought itself superior was pitted against the race that *was* superior, both in the public drama and within the family, for the father had had the misfortune to marry an Anglophone. The original version of *Menaud, maître-draveur* was a highly coloured epic in the Claudelian manner. Strangers come to the land of Maria Chapdelaine intending to seize its riches for themselves; Menaud, an old raftsman, undertakes the defence of his people, but the combat is illusory for the strangers remain invisible, a kind of gangrenous presence silently devouring an entire people. Menaud goes mad and his madness is a warning: death is on its way. And so it was, but it was only the death of a certain kind of nationalism.

The psychological novel slowly developed as characters began to escape the usual stereotypes. Its progress can be traced from *Angéline de Montbrun* to *Un Homme et son péché* (1933) by Claude-Henri GRIGNON. A great reader of Balzac, Grignon drew, in all simplicity, the portrait of an avaricious peasant. Radio and then television turned Séraphin Poudrier into a new stereotype and he became the best-known fictional character in Québec. Rex Desmarchais, who read Maurice Barrès and Paul Bourget, pushed character analysis a step further (*L'Initiatrice*, 1932; *Le Feu intérieur*, 1933), but his novels were weak and it was only when the work of French writer François Mauriac began influencing authors in the 1940s that good psychological novels began to appear. Even so, Desmarchais helped break ground that encouraged his successors to be more daring. They were able to free themselves from the narrow morality which had so hindered the development of the Québec novel and demand that their works be judged purely on aesthetic grounds. The novel of social criticism had great difficulty establishing itself, and for the same reason: only morality tales won the approval of the religious-literary institution, only conformist novels won that of the ecclesiastical-political establishment. In 1934, for example, a bishop condemned Jean-Charles HARVEY's *Les Demi-Civilisés* (tr *Sackcloth for Banner*, 1938). The novel was poorly structured and badly written, but it had the luck to criticize hypocrisy at an opportune moment and it sold well. The great works in this field did not appear for another decade.

In 1938 the Québec novel was 100 years old. It was the expression of a people who had maintained their rural mentality despite the urbanization of the past 20 years and it had just produced its greatest examples of the 3 genres that its authors and readers collectively endorsed: the rustic novel (*Trente Arpents*, 1938), the historical novel (*Les Engagés du grand portage*, 1938) and the nationalist novel (*Menaud, maître-draveur*, 1937). WWII would stimulate the move to the cities and exposure to the outside world; the individual would escape somewhat from the supervision of the authorities; and writers from the traditional ideologies, especially nationalism, freer than in earlier days, would move farther away from the traditional ideologies. The novel changed its orientation, and came to know the city and the individual. RENÉ DIONNE

Novel in French, 1940-60

Some 300 narrative works (novels, personal accounts, collections of stories) were published in Québec between 1940 and 1960 — a total equal to the production of the entire preceding century and large enough to contain a respectable number of enduring works. In fiction, this 20-year period saw significant diversification of subject matter, notable improvement in technique and much greater psychological depth. The long tradition of the novel of the soil came to a beautiful end with the publication of Germaine Guèvremont's *Le Survenant* and *Marie-Didace* (1945, 1947; tr together as *Monk's Reach*, 1950). These books presented the day-to-day life of the people of Chenal du Moine at the turn of the century in a serene and realistic way, free of moralizing overtones. Yet they are more properly classified with the 1930s, kindred spirits to Ringuet's *Trente Arpents* (1938), whereas Ringuet

himself, after the *Héritage* stories (1946), turned his attention to city dwellers with *Fausse Monnaie* (1947) and *Le Poids du jour* (1949).

The WWII years, which followed the GREAT DEPRESSION and increasing industrialization, changed the country's social and demographic realities to produce an urban world soon reflected in the mirror of fiction. Roger Lemelin pioneered with his vivid, satirical account of life in a working-class Québec City neighbourhood, *Au pied de la pente douce* (1944; tr *The Town Below*, 1948). His very similar *Les Plouffe* (1948; tr *The Plouffe Family*, 1950) was followed by the uneven *Fantaisies sur les pêchés capitaux* (1949) and then, in an abrupt change of pace, by the extravagant adventures of *Pierre le magnifique* (1952; tr *In Quest of Splendour*, 1955).

International acclaim greeted Gabrielle ROY's great novel of urban life, *Bonheur d'occasion* (1945; tr *The Tin Flute*, 1947) in which the moving story of Florentine and her poverty-stricken family was deftly set against the backdrop of Montréal's Saint-Henri district in early 1940 and a world at war. Roy excelled in her presentation of physical and social space but she was most interested in the psychological development of the individual and her grasp of it was deep and sure. Her subsequent works displayed her talents to the full — in the semiautobiographical *La Petite Poule d'eau* (1950; tr *Where Nests the Water Hen*, 1951), *Rue Deschambault* (1955; tr *Street of Riches*, 1957), and *Alexandre Chenevert* (1954; tr *The Cashier*, 1955), her touching story of a Montréal bank clerk tortured by metaphysical anguish and physical illness, who nonetheless arrives at a certain kind of personal peace and happiness.

The novel of psychological introspection first appeared during this period. In *Ils posséderont la terre* (1941), Robert CHARBONNEAU tried to maintain the autonomy of his adolescent characters even as he wrote about their lives and destinies, thereby respecting the principle he later developed in his essay *Connaissance du personnage* (1944), one of the era's few published theories on the art of the novel. The austerity and discipline of his first novel were admirable, but its excessive detachment was not — a defect even more pronounced in his next novel, *Fontile* (1945), and not fully corrected in *Les Désirs et les jours* (1948), the last in the trilogy.

The author of the psychological novel commonly uses every technique at his command to explore the nuances of his characters. André Giroux, in *Au-delà des visages* (1948), ingeniously examined one incident from a variety of viewpoints, which allowed him to develop every facet of his protagonist's deepest spiritual being. Some writers try to compensate for limited imagination with efficiency of narrative technique but, as Giroux's second novel, *Le Gouffre a toujours soif* (1953) and his collection of short stories, *Malgré tout la joie* (1959), both show, what really matters is to touch the core of the human condition.

A similar balance between technique and depth of comprehension exists in the works of some authors who wrote well but little and enjoyed only brief celebrity in the 1950s. In Robert Elie's *La Fin des songes* (1950; tr *Farewell My Dreams*, 1955) and *Il Suffit d'un jour* (1957), the basic elements of the human drama are obsession with the meaning of life, inevitable solitude and the lack of communication between people. In Jean Filiatrault's *Terres stériles* (1953), *Chaînes* (1955) and *Le Refuge impossible* (1957), love is just a mask for hatred in the troubled family relationships (filial, maternal, conjugal, fraternal, etc) of complex-ridden individuals. In *Les Témoins* (1954) and *Les Inutiles* (1956) by Eugène Cloutier, on the other hand, apparently gratuitous (but perhaps simply critical) fantasy replaces the agonized expression of the great problems of mankind, humanity's social maladjustment and fundamental absurdity.

Other novelists, more moralizing and deliberately abstract, had begun to write satirical tales that often verged on being essays instead. The characters in François Hertel's trilogy, *Mondes chimériques* (1940), *Anatole Laplante, curieux homme* (1944) and *Journal d'Anatole Laplante* (1947), mirror their author: free, cynical, without illusions, and garrulous, they study the trivia and important events of life with equal parts perception and irreverence. Pierre Baillargeon puts a great deal of himself, including his crisp and lively style, into the biting arguments of *Les Mêdisances de Claude Perrin* (1945) and *Commerce* (1947), and into the introverted but incisive protagonist of *La Neige et le feu* (1948). Jean Simard draws on his own life for the ironic sketches of *Félix, livre d'enfant pour adultes* (1947) and *Hôtel de la reine* (1949). His *Mon fils pourtant heureux* (1956) was a more introspective work, its satire darker. In *Les Sentiers de la nuit* (1959), Simard seemed more objective but in fact, under cover of a well-executed caricature of Anglo-Saxon puritanism, he symbolically attacked French Canadian JANSENISM as well, handling the most serious of subjects — God, religion, suffering and death — in a touchingly humorous way.

The most important psychological novelist is unquestionably André LANGEVIN. He led the way in incorporating the universal themes of existentialism made famous in France by Sartre, Camus and others. His trilogy of novels on the theme of man's essential solitude argues that the only possible relationship between human beings leads inevitably to despair: it consists of the evil they inflict or themselves suffer, no matter how they try to avoid it. His characters, stripped of all transcendence, grapple with meaningless suffering in a strictly contingent universe. The randomness of their lives drives them to choose between extremes: either they seek the escape of suicide, like Jean Cherteffe in *Évadé de la nuit* (1951) or, however feeble or illusory their weapons, they try to fight their fate, like Alain Dubois in *Poussière sur la ville* (1953; tr *Dust over the City*, 1955) or Pierre Dupas in *Le Temps des hommes* (1956). In the first of these novels, Langevin failed to integrate his rigid metaphysical doctrine with the flesh-and-blood story of his protagonist. The other 2 works, however, each drawing in its own way on rich resources of time and space, achieve a high degree of aesthetic success.

These books seemed to drain Langevin, for he withdrew into silence until the publication of *L'Élan d'Amérique* (1972), which was followed in 1974 by *Une Chaîne dans le parc*. Yves THÉRIAULT, on the other hand, has become more productive over the years. The novel is only part of this author's infinite variety: he has also written hundreds of scripts for radio and television and numerous popular stories and novels for adolescents. Although 6 years elapsed between his highly original stories, *Contes pour un homme seul* (1944), and his first novel, *La Fille laide* (1950), his output thereafter was abundant — and, at times, of uneven quality. Among his best works during the 1940-60 period are *Le Dompteur d'ours* (1951), *Aaron* (1954) and *Agaguk* (1958; tr 1963). Thériault has used his works to promote a wide variety of causes. The graphic presentation of man's unbridled instincts has inherent shock value: it preaches the authenticity of vigorous primitivism. The acts of sex and violent death in particular are of great value, both for the way they bring out the individuality of each character and for the role they play in the emancipation of the oppressed: all kinds of "little people" (Indians, Inuit, Jews), fighting the established structures, moral, religious, social and ethnic, that prevent their full growth as human beings. One must complement the discussion of these outstanding writers with at least a mention of some of the others who have also made their contribution to the postwar Québec novel: Jean-Jules Richard, *Neuf jours de haine* (1948); Françoise Loranger, *Mathieu* (1949); Louis Dantin, *Les Enfances de Fanny* (1951); Roger Viau, *Au milieu, la montagne* (1951); Jean Vaillancourt, *Les Canadiens errants* (1954); René Ouvrard, *La Veuve* (1955); Maurice Gagnon, *L'Échéance* (1956); and Claire France, *Les Enfants qui s'aiment* (1956; tr *Children in Love*, 1959). Pierre Gélinas wrote *Les Vivants, les morts et les autres* (1959), one of very few novels depicting the labour movement. Several novelists first appeared in this period but did not come into their own until the 1960s. Anne HÉBERT is one, notable for her *Les Chambres du bois* (1958; tr *The Silent Rooms*, 1974), a dream-novel that perhaps crosses the line into poetry, and especially for *Le Torrent* (1950; tr *The Torrent*, 1973), a collection of stories of many levels that reflects the whole spiritual adventure of the French Canadian people. Claire Martin polished her skills in a collection of elegantly biting short stories, *Avec ou sans amour* (1958), before tackling the novel with *Doux-amer* (1960), while Marie-Claire BLAIS found her voice in *La Belle Bête* (1959; tr *Mad Shadows*, 1971) and *Tête blanche* (1960; tr 1974), 2 stories of adolescent revolt played out in a dream state. Gérard BESSETTE published *La Bagarre* (1958; tr *The Brawl*, 1976), a novel of social events, and *Le Libraire* (1960; tr *Not for Every Eye*, 1963), which appeared at the perfect moment to contribute to the QUIET REVOLUTION, the "ideological exorcism" of Québec. RÉJEAN ROBIDOUX

Novel in French, 1960-82

During the 1960s and 1970s new developments in the Québec novel coincided with important social changes. Although it did not provide a direct reflection of reality, the novel nevertheless interacted with other current forms of discourse and in this way responded to its social environment. The arrival of a new generation of writers during the Quiet Revolution helped turn these changes into something of an event — a dramatic period of contestation and rebellion, from which the Québec novel emerged transformed.

Several writers advocated the use of popular levels of language (JOUAL) in order to portray more accurately the long-ignored realities of the working class. Initially these writers were connected with the magazine PARTI PRIS. Jacques RENAUD (*Le Cassé*, 1964) and André MAJOR (*Le Cabochon*, 1964, and *La Chair de poule*, 1965) contributed to bringing about this transformation, using popular forms of language to reflect and symbolize the degrading effects of self-contempt, colonization and social deprivation. Apart from the political implications of writing in *joual*, this new approach rapidly led to the formulation of a new kind of literary style exemplified by Jacques GODBOUT in *Salut Galarneau!* (1967), and Victor-Lévy BEAULIEU in *Race de monde* (1969) and *La Nuitte de Malcolmm Hudd* (1969). For all these writers the juxtaposition of different levels of language was a way of establishing a new linguistic identity and of setting out a new conception of Québec reality.

The same period brought the appearance of extremist characters who personified or expressed revolt, radicalism and intransigence, such as the revolutionaries in Hubert AQUIN's *Prochain épisode* (1965) and *Trou de mémoire* (1968), and Claude Jasmin's *Ethel et le terroriste* (1964). Réjean DUCHARME's character Bérénice in *L'Avalée des avalés* (1966) is a clear example of this dynamic negativism whose goal is to sweep away all existing social and cultural values. Bérénice provides the foremost expression of an impulse to deny reality, which to varying degrees motivates the characters in many of the novels of this decade. As in Ducharme's works, this rejection is personified by children and adolescents in the writing of Marie-Claire Blais (*Une saison dans la vie d'Emmanuel*, 1965, *l'Insoumise*, 1966, *Les*

Manuscrits de Pauline Archange, 1968, and *David Sterne*, 1967). The values of childhood and art are often presented as a refuge from the degraded world of adults.

In many cases subversion or repudiation is expressed in parody. The novels reinterpret history and ridicule older forms of writing and obsolete values in order both to laugh at them and to advocate their opposites. In *La Guerre, yes sir!* (1968) Roch CARRIER presents a carnival-like version of the CONSCRIPTION crisis by showing farmers in the process of gleefully reversing the "civilized" values of the army and the church. In *Le Ciel de Québec* (1969) Jacques FERRON presents an absurd mock epic dealing with Québec history and French Canadian messianism, and at the same time settles his accounts with writers of the previous generation (such as Saint-Denys Garneau and Jean Lemoyne). Irony also provides an important dimension to Blais's *Une Saison. . .* and *Les Manuscrits. . .*, in which she parodies certain kinds of "uplifting" literature, and the writing of Ducharme, who mocks and inverts many different styles in *La Fille de Christophe Colomb* (1969) and *L'Hiver de force* (1973).

These stories not only undermine history and contest it; they also propose a new version of it. This reinterpretation and reconstruction of history connects with the use of *joual* in that it brings the oral tradition (*see* ORAL LITERATURE) back into literature. In this way the historical novel and the novel of the land are reinterpreted in the light of a new form of awareness: the awareness of being dominated. This can be seen in the work of Antonine MAILLET and Victor-Lévy Beaulieu, among others. It is the voice of the people that is heard when Maillet recalls the Acadians' historical misfortunes and the delights of their language in a series of novels culminating in *Les Cordes de bois* (1977), *Pélagie-la-charrette* (Prix Goncourt, 1979) and *Cent ans dans les bois* (1981, republished 1982 in France as *La gribouille*). For his part, Beaulieu tells the "true saga of the Beauchemins," a grandiose and preposterous story of a working-class family transplanted from the Gaspé coast to the sleepy suburb of Montréal-Nord (or, as he writes it, Moréal-Mort). By 1984, 5 titles in the series had been published: *Race de monde* (1969), *Jos Connaissant* (1970), *Les Grands-pères* (1971), *Don Quichotte de la démanche* (1974) and *Satan Belhumeur* (1981).

In a similar vein to these extended series, a number of other novels were involved in transforming or contesting the novel's basic conventions. Previously Gérard Bessette, in *L'Incubation* (1965) and *Le Cycle* (1971), and André Langevin, in *L'Élan d'Amérique* (1972), had introduced new ways of telling a story along the lines of the "nouveau roman" in France. In the writing of Aquin and Beaulieu the ambiguities of the narration create some uncertainty in the story, since the plot does not evolve in the usual chronological order. For these writers, however, the ambiguities stem from the social and political alienation they are intended to reflect. For others such as Jean-Marie Poupart, in *Angoisse play* (1968), *Chère Touffe, c'est plein plein de fautes dans ta lettre d'amour* (1973) and *C'est pas donné à tout le monde d'avoir une belle mort* (1974), and Jacques BENOÎT, in *Patience et Firlipon* (1970), the interrogation and disintegration of the traditional narrative structure are more gratuitous and playful, with the narrator thinking aloud about his telling of the story. More than the theme of the writer as hero, the act of writing itself has now become a determining factor in the process of narration.

Even an early novel such as Bessette's *Le Libraire* (1960) contains statements that undermine the story's realism: it is the narrator himself who invites us to undertake a second reading by describing the room in which he is writing his diary as having dimensions (8½′ x 11′) that are analagous to those of the sheet of paper on which he is writing (8½″ x 11″). To Bessette, in this example, and especially to Aquin and Beaulieu, historical references often become a metaphor for the process of writing. At its most extreme, as critic Jean Ricardou has pointed out, the writing of adventure is paralleled by the adventure of writing. In *Prochain épisode* and *Don Quichotte de la démanche* the reader witnesses a sort of short circuit between the levels of the story, or, an interference between the storyteller and the story told. The autobiographical form, which is most prevalent in the Québec novel, favours this interchange between the story being narrated and the circumstance in which it is narrated. This game of cross-references, even as it destroys the traditional impression of verisimilitude, creates a new effect: that of a writer writing his story within the context of a history that is beyond his control but in which he is necessarily involved.

In an even more radical fashion, a few writers, such as Nicole BROSSARD in *Un livre* (1970), *Sold Out* (1973) and *French Kiss* (1974), have advocated "completely getting rid of the plot" and dispensing with all logic in the narrative. Here the traditional narration is replaced by a series of fragmented, often autobiographical texts arranged in symbolic order; both because of their expressive qualities and their layout, such texts tend to resemble poetic discourse more than traditional prose. This new "textuality," a blend of theory and fiction, was taken up with particular enthusiasm by the feminist writers who used it both as a trademark and as an area in which they could wage war on "patriarchal" language. Since the publication of *L'Euguélionne* (1976) by Louky Bersianik, the new women's writing has made constant gains in strength and importance. By liberating the novel from its conventional structures, this feminist contribution has brought about a new brand of writing and a new way of expressing the feminine, as is apparent, for example, in *La Mère des herbes* (1980) by Jovette Marchessault, *Lueur* (1979) by Madeleine Gagnon and *La Vie en prose* (1980) by Yolande Villemaire. Several women writers express a desire for a new language that can be reconciled with women's "otherness." In *Nous parlerons comme on écrit* (1982), France Théoret clearly shows the determination to "denaturalize" language and culture through the exercise of writing. Such an undertaking is based on a demanding literary ethic that emphasizes the modernist precept of transforming our relationship to language as a means of thoroughly transforming reality itself.

Among the older, more traditional writers, Gabrielle Roy, Anne Hébert and Yves Thériault, all of whom began their writing careers during WWII, continued publishing in the 1960s and 1970s. With *La Route d'Altamont* (1966) and *Ces enfants de ma vie* (1977), Roy presents highly personal stories that are evocative of her life in Manitoba, whereas Hébert continues her exploration of the tormented, extreme world of guilt and passion in 3 novels with historical settings, *Kamouraska* (1970), *Les Enfants du sabbat* (1975) and *Les Fous de bassan* (1982), as well as a supernatural short story entitled *Eloïse* (1980). Thériault, meanwhile, followed his existing series of Inuit and Amerindian stories with *Ashini* (1960), *Tayaout, fils d'Agaguk* (1969), *Agoak, l'héritage d'Agaguk* (1975) and *La Quête de l'ourse* (1980).

During the 1970s writers such as Claude Jasmin and André Major moved away from novels of protest to delve more deeply into introspection. Major produced a trilogy, *L'Epouvantail* (1974), *L'Epidémie* (1975) and *Les Rescapés* (1976), in which the characters observe themselves and their lives in the little world of Saint Emmanuel. The main events in the story are almost always told retrospectively, with the remoteness of hindsight, and the distance between past and present seems to condemn the characters to perpetual remembrance. The displacement between the hero's life and his acute awareness of it not only coincides with the narrative process but also confines the character to solitary dreaming. Excluded from direct action, the character is left with no immediate grasp of reality. Rather than acting, he is acted upon; rather than being shown in acting, he is shown dreaming about the things he has done. Similarly impotent characters, imprisoned in their past, appear in Hébert's *Kamouraska*, Langevin's *L'Élan d'Amérique* and Beaulieu's *Un Rêve québécois* (1972). The narrative juxtaposes a series of retrospections representing the discontinuous flow of memory in an alienated individual who has stopped evolving. Rebellion has given way to dumbfounded amazement in a character dazed by the trauma of unavoidable events. (This kind of stunned reaction is not unrelated to the moral depression affecting many writers after the imposition of the WAR MEASURES ACT in 1970.) For Jasmin too, the "cycle of violence" gave way to what the author himself called the "cycle of memories," in which he recalls the happy childhood and adolescence he spent in his family surroundings: *La Petite Patrie* (1972), *Pointe-Calumet Boogie-Woogie* (1973), *Sainte-Adèle-la-vaisselle* (1974) and *La Sablière* (1979).

Early in the 1980s it was possible to discern various tendencies indicating something of a return to established traditions in the novel. The historical novel reappeared in the series "Les Fils de la liberté" by Louis Carion: *Le Canard de bois* (1981) and *La Corne de brume* (1982). And the social chronicle was making a comeback in the form of the first volumes of the "Chroniques du Plateau Mont-Royal" by Michel TREMBLAY: *La Grosse Femme d'à côté est enceinte* (1978), *Thérèse et Pierrette à l'école des Saintes-Anges* (1980) and *La Duchesse et le roturier* (1982). JACQUES MICHON

Reading: A. Belleau, *Le Romancier fictif* (1979); M. Lemire, ed, *Dictionnaire des oeuvres littéraire du Québec* (4 vols to date, 1980-84); G. Marcotte, *Le Roman à l'imparfait* (1976); B.Z. Shek, *Social Realism in the French-Canadian Novel* (1977); G. Tougas, *History of French Canadian Literature* (1966).

Nowlan, Alden, poet (b at Windsor, NS 25 Jan 1933; d at Fredericton, NB 27 June 1983). Largely self-educated, Nowlan was a former newspaperman whose many collections of poetry grew steadily in their power and intensity. Primary among them are *Bread, Wine and Salt* (1967, Gov Gen's Award), *Playing the Jesus Game* (1970) and *Between Tears and Laughter* (1971), all of them rich in regional sensibility and in affection for ordinary people but connected by Nowlan's intelligence, temperament and reading to a literary world far beyond folk culture. He was also a playwright, a story writer and, with *Various Persons Named Kevin O'Brien* (1973), a novelist; several other Nowlan books appeared posthumously. He was often at the centre of the literary community in Fredericton and Atlantic Canada generally, through the vivid example of his craftsmanship, his work at UNB, where he became writer-in-residence in 1969, and his individualistic personality. DOUG FETHERLING

Nowlan, George Clyde, lawyer, poltician (b at Havelock, NS 14 Aug 1898; d at Ottawa 31 May 1965). A gunner in WWI, educated at Acadia and Dalhousie, he was elected an MLA for Kings County, NS, in the MARITIME RIGHTS election of 1925. Defeated in 1933, he continued to be active in the demoralized Conservative Party and captured the federal riding of Digby-Annapolis-Kings in a series of spectacular elections (1948-50). President of the PC Party (1950-54) and vigorous spokesman for Atlantic Canada, Nowlan served as minister of national revenue (1957-62) and finance (1962-63) in the DIEFENBAKER government. Never comfortable

with Diefenbaker, who suspected him of treachery on the leadership question, Nowlan remained loyal to the Conservative Party until his death. MARGARET CONRAD

Nuclear Energy is ENERGY from the nucleus of an atom. In stars such as the SUN, pairs of light atoms (mostly hydrogen) fuse together and release the radiation received on earth as SOLAR ENERGY. This NUCLEAR FUSION, the joining of the nuclei of atoms, is one form of nuclear energy. Another form is the splitting (fission) of heavy atoms such as URANIUM. Each atom of naturally occurring uranium has a very small probability of undergoing spontaneous fission at any given moment. When this happens, a pair of lighter atoms (known as fission products) are formed and 2 or 3 neutrons (subatomic particles from the original nucleus) are released. Nuclear reactions are fundamentally different from other common energy reactions. When a conventional fuel burns or when water flows through a hydroelectric generator, the atoms themselves are unaffected, although in the case of fuels they recombine chemically. Hence, the amount of matter remains the same. In nuclear reactions, the atoms themselves are altered and a tiny amount of matter is converted into energy.

To understand how the opposite processes, fusion and fission, can both release energy requires some knowledge of the "curve of binding energy" and Einstein's equation $E = mc^2$. The nuclei of all atoms consist of nucleons. A nucleon is either a proton, a subatomic particle with positive electric charge, or a neutron with a neutral charge. The mass of any nucleus is slightly less than the sum of the masses of its constituent nucleons. This difference, or "mass defect," represents the binding energy holding the nucleons together. According to Einstein's equation relating energy (E) to mass (m) through the square of the velocity of light (c), even tiny masses represent large energies: a mass of 100 kg completely converted to energy would supply all Canadian needs for one year. If the binding energy per nucleon is plotted against the number of nucleons in the nucleus, the hump-backed "curve of binding energy" is obtained. Starting at hydrogen (1 nucleon), the curve rises rapidly to oxygen (16 nucleons), then more slowly to arsenic (75 nucleons), before dropping slowly to uranium (238 nucleons). Thus, fusing 2 light nuclei into a heavier one releases some nuclear-binding energy; fissioning a very heavy nucleus into 2 intermediate ones releases a smaller amount of energy per nucleon but involves many more nucleons. Either way, large amounts of energy are released.

Radioactivity

Nuclear energy is also released as radioactivity, which is associated with naturally occurring radioactive minerals (eg, RADIUM ores) and with man-made radioisotopes used in medicine and industry. Most fission-product nuclei are radioactive. All radioactive nuclei are unstable and, sooner or later, will decay through the emission of subatomic particles accompanied by gamma radiation (similar to X radiation). The particle released may be an alpha particle, a particularly stable combination of 2 neutrons and 2 protons, or a beta particle (also known as an electron), which is a negatively charged subatomic particle formed when a neutron transforms into a proton. After emission the nucleus may remain radioactive, or may be stable. Just when any given radioactive nucleus will decay is unpredictable. However, in a large number of nuclei of the same kind, half will decay in a period characteristic of that kind of nucleus, its "half-life." Half the remainder will decay in a second half-life period, and so on. Consequently, only about 1/1000 of the original amount of any radioactive material will remain after 10 half-lives. GEOTHERMAL ENERGY, the heat flowing to Earth's surface from its core, results from the radioactive decay of heavy nuclei such as uranium and is therefore another form of nuclear energy.

Radioisotopes are extremely reliable sources of heat for certain applications. An isotope of plutonium (plutonium-238) formed as a by-product in nuclear fission reactors is used to power heart pacemakers and space satellites. Cobalt-60 can be used to power navigation buoys. If the radioisotope emits gamma radiation, equipment using it must incorporate shielding to protect anyone nearby. A fundamental limitation is inherent in radioactive sources: the more intense the radioactivity (hence, the greater the heat produced), the shorter the source's half-life. For instance, cobalt-60 has a half-life of 5.27 years; therefore after 5.27 years it will produce half as much heat and radiation as it did initially.

Nuclear Fission

A vital contribution to the understanding of radioactivity was made by Ernest RUTHERFORD and Frederick Soddy working at McGill University in Montréal early in this century. It was they who first suggested the manner in which a nucleus of one element became a nucleus of another element, ie, by radioactive emissions. In 1904 Rutherford conjectured "that an enormous store of latent energy is resident in the atoms of the radio-elements" and that this energy could be tapped if the rate of radioactive disintegration could be controlled. While it has not been possible to control that rate, human control of nuclear fission has proved practicable. This fact, first demonstrated by Enrico Fermi in a squash court at University of Chicago in 1942, has made this particular nuclear reaction so important.

Control of the fission process depends on the existence of a chain reaction. Naturally occurring uranium consists of 99.28% of the uranium-238 isotope, 0.71% of uranium-235 and very small amounts of other isotopes. When hit by a neutron, the nucleus of a uranium-235 atom has a high probability of fissioning; if the atom is uranium-238 the probability is very low. This induced fission process was first discovered in 1938 by the Germans Otto Hahn and Fritz Strassmann. When a uranium-235 atom fissions, it emits 2 or 3 neutrons. If one of these neutrons hits and thus causes fission in another uranium-235 atom, more neutrons are emitted, one of which could possibly cause a further fission, and so on in a chain reaction. Thus, once started, the fission process can be self-sustaining. If, on the average, exactly one neutron from each fission results in one other fission, the process is in equilibrium and a steady level of heat is produced. The other neutrons escape from the mass of uranium or are absorbed by materials other than uranium-235 within the mass. This is the situation in a nuclear reactor operating at steady power. To increase the power, some of the competitive absorbers of neutrons are removed, allowing the chain reaction to diverge until the desired power level is attained. The equilibrium production of neutrons is then restored to stabilize the power. To decrease the power or shut down the reactor, more absorbers are introduced.

However much natural uranium is heaped up, no significant fission will result, because there are not enough fissile uranium-235 atoms present to sustain a chain reaction. The few neutrons produced are absorbed by the much more abundant uranium-238 atoms and so are unavailable to cause further fission. One solution is to increase the proportion of uranium-235 atoms artificially; this is done in uranium enrichment plants which exploit the small differences in physical properties between the 2 uranium isotopes. A more subtle solution is to divide up the uranium into small packets, each surrounded by a "moderator" which slows down the neutrons emitted from one packet of uranium before they hit the next packet. Slow neutrons cause fission in uranium-235 much more readily than faster ones. Generally, elements with light atoms are good moderators: ordinary water is not good enough to sustain a chain reaction with natural uranium; very pure graphite (carbon) is better; heavy water, a compound of deuterium and oxygen is best. Deuterium, the heavy isotope of hydrogen, is present in all naturally occurring hydrogen (about one part in 7000). Heavy water is produced by enriching the deuterium content of natural water in heavy-water plants.

A neutron absorbed by a uranium-238 atom is not lost, merely stored. The resulting compound nucleus subsequently transforms spontaneously by radioactive decay into an isotope of another element, plutonium-239. Although uranium-238 is not fissile, plutonium-239 is. Thus, uranium-238 is said to be fertile. Plutonium-239 can be used to sustain a nuclear fission reaction in the same way as uranium-235. Thorium, another naturally occurring nuclear fuel that is somewhat like uranium, consists almost entirely of the fertile isotope thorium-232, which can yield the fissile uranium-233 by absorbing a neutron. These alternative nuclear fuels and moderators can be combined to produce heat and electricity in NUCLEAR POWER PLANTS.

History

Natural nuclear reactors predated the man-made variety by about 2 billion years. At that time, nuclear chain reactions generating considerable heat occurred in several rich uranium deposits at Oklo, Gabon, W Africa. This prehistoric event, which has been deduced recently from chemical analysis of the remaining uranium, illustrates basic principles of radioactivity and fission. Since uranium-235 is radioactive, with a half-life of 0.7 billion years, natural uranium then would have contained over 5% uranium-235, a sufficiently high fissile concentration to sustain a chain reaction with ordinary water as a moderator. The nuclear reaction presumably started when groundwater seeped into the deposits. When the chain reaction and the associated fission heat built up to a sufficient level to boil the water and expel it, the resulting lack of a moderator would have caused the reaction to shut down automatically. This cycle must have repeated itself many times, like a gigantic coffee pot percolating away over hundreds of thousands of years. Analysis shows that, despite the absence of any deliberate means of retention, the plutonium produced in these natural reactors remained trapped in the uranium deposits until it had decayed away by its own radioactivity.

Since the early work of Rutherford and Soddy, Canada has contributed significantly to the science and application of nuclear energy. In 1933 Gilbert LABINE brought into production Canada's first radium mine at Port Radium, NWT, on Great Bear Lk. Uranium, always found in association with radium, was then considered a waste product. In 1940 George Laurence started experiments in the National Research Council's Ottawa laboratories with uranium and a graphite moderator. Had his materials been purer, he might have achieved a chain reaction before Fermi. The Port Radium mine of Eldorado Gold Mines Ltd was reopened in 1942 to produce uranium.

In 1943, as part of the Allied war effort, a joint Canadian-UK team, with important French participation, was established at Montréal to pursue the concept of nuclear reactors with heavy water. In the same year heavy water was first produced in Canada at the synthetic ammonia fertilizer plant of the Consolidated Mining and Smelting Corp at Trail, BC, using a

Norwegian process. In 1944, C.J. Mackenzie, who was then in charge of the Canadian program, wrote with great foresight to C.D. HOWE, who was the minister responsible for it: "In my opinion Canada has a unique opportunity to become involved in a project which is not only of the greatest immediate military importance but which may revolutionize the future world in the same degree as did the invention of the steam engine and the discovery of electricity." The Chalk River, Ont, laboratories were established in 1944, and in 1945 the Zero Energy Experimental Pile (ZEEP), the first reactor outside the US, started up at Chalk River. In 1946 Bennett LEWIS, who subsequently was primarily responsible for the technical development of the Canadian CANDU reactor system, became technical director at Chalk River, replacing John Cockcroft who went on to lead the United Kingdom's program. The first radioisotopes produced in the NRX reactor at Chalk River were marketed in 1949. In 1951 the world's first cobalt radiotherapy units for the treatment of cancer, using radioactive COBALT produced in the NRX reactor, were developed by Harold Johns and others. These units were installed in the Victoria Hospital in London, Ont, and in the University Hospital in Saskatoon, Sask. Since then Canada has exported more than 1300 units, and the associated cobalt, to more than 80 countries. These units are credited with saving 13 million person-years of life for the patients involved. In 1962 Canada's first nuclear power plant, the Nuclear Power Demonstration plant, was opened at Rolphton, Ont. This plant demonstrated all-important principles for the CANDU design of reactor.

Future

Although it has not yet been possible to control fusion, the required conditions are reasonably well established. It is known that fusing atoms of ordinary hydrogen (the reaction that occurs in the sun) would be extremely difficult. Instead the hydrogen isotopes deuterium and tritium are used in fusion experiments. The deuterium-tritium combination is believed to offer fusion more easily than the deuterium-deuterium. First, the atoms of deuterium and triterium must be at a very high temperature, about 100 million °C; then the atoms must be together long enough for fusion to occur. The time needed is least for densely packed atoms and increases as the density decreases. The minimum requirement commonly quoted for the product of density and time for fusion of deuterium and tritium is 10^{14} atom seconds/cm^3.

Since no structural materials can operate at the high temperatures required for the fusion reaction, other means of confining the reacting atoms had to be found. At these temperatures the atoms are ionized, ie, electrically charged, and subject to forces when they move in a magnetic field. Hence, magnetic fields can be designed to keep the hot atoms "bottled up" through magnetic confinement. In inertial confinement a small pellet of solid deuterium-tritium would be bombarded from all sides by high-energy beams of LASER light or charged particles. The intense beams would heat the pellet and, by causing shock waves, compress it to about 1/1000 of its original volume. The increased density means that a shorter period of confinement is necessary.

Until controlled fusion has been demonstrated and a practical fusion reactor designed, it would be premature to estimate costs. Like solar energy and nuclear fission, the fuel is abundant and cheap, but the cost of the equipment needed to provide the energy in usable form will be appreciable. Long before fusion becomes an alternative to fission as an energy source, the 2 may complement each other in a hybrid system. In addition to releasing energy, the fusion reaction provides high-energy neutrons which could, through other nuclear reactions, be multiplied into many neutrons of lower energy. These, in turn, could be absorbed by fertile materials, such as uranium-238 or thorium, to produce fissile materials to fuel conventional fission reactors. For this purpose another nuclear reaction, spallation, must be regarded as an alternative to fusion. In spallation, heavy atoms (eg, lead) bombarded by light particles (eg, hydrogen nuclei) emit high-energy neutrons which can be be used in the same way to provide fuel. Unlike fusion, spallation has already been demonstrated in the laboratory.

Nuclear energy offers a new energy source just when the limits of the chemical fuels — oil, natural gas and coal — are being realized. If recycled, the world's nuclear fuels are virtually inexhaustable. However, the radiation from the nuclear energy, like the fire of chemical energy, has its hazards as well as its benefits.

Like fire, radiation should be respected but not feared. All life has evolved in a sea of radiation that existed from the start of time. To ensure the safety of the public and of workers, and to protect the environment, the federal government regulates the ELECTRICAL UTILITIES, hospitals, universities and others using nuclear energy and radioisotopes. The regulations are based on internationally agreed standards; in Canada the regulatory body is the Atomic Energy Control Board. In addition, more than 10 public inquiries have been held in Canada, dealing with various aspects of the nuclear industry, from uranium PROSPECTING and MINING, through reactor safety to the disposal of nuclear HAZARDOUS WASTES. The overwhelming conclusion of these examinations has been that it is in the public interest to continue with the exploitation of nuclear energy, subject to proper regulation. *See* NUCLEAR SAFETY.

J.A.L. ROBERTSON

Nuclear Fusion is the combination of the nuclei of 2 light atoms to form a heavier one. The resulting atom has a smaller mass than the original ones; therefore, nuclear fusion is a method of transforming mass into ENERGY. This reaction produces the energy of stars such as the SUN. By weight, the fusion process yields 8 times more energy than the fission of uranium (*see* NUCLEAR ENERGY), and over a million times more than the burning of fossil fuels. Fusion is a very attractive energy source not only because of its high-energy yield but also because of the almost limitless abundance of its fuels and the fact that its principal by-product, helium, is inert, unlike the radioactive by-products of conventional fission reactors. Supplies of one major fuel, deuterium, a hydrogen isotope found in ordinary seawater, are virtually inexhaustible. The other major fuel, tritium, could be produced from lithium found in land deposits and seawater, which contain supplies for thousands of years. The amount of fuel in the reactor at any time is very small, so there is no hazard of uncontrolled energy release or runaway reactions. Problems of radioactivity, fuel handling, contamination and waste disposal are small compared to those associated with fission reactors in NUCLEAR POWER PLANTS. The first man-made fusion reaction was the US thermonuclear hydrogen bomb tested in 1952. Unfortunately, the reaction has proved very difficult to contain and harness for peaceful purposes. Controlled experiments have barely reached the point where the energy released is greater than the energy put in, but if research and development proceed successfully, fusion could be an important commercial energy source early in the 21st century.

The important fusion reactions are those involving the isotopes of HYDROGEN: hydrogen (H), consisting of 1 proton and 1 electron; deuterium (D), 1 proton, 1 neutron and 1 electron; and tritium (T), 1 proton, 2 neutrons and 1 electron. The products of such reactions are helium (^{4}He), also known as an alpha particle, and energetic neutrons (n) or protons (p). Fusion reactions are difficult to achieve because the interacting nuclei each has a positive electrical charge and, therefore, strongly repel one another. Fusion can occur only if the nuclei approach each other at very high velocities, sufficient to overcome their electrostatic repulsive forces. To release energy at a practical level, using gaseous deuterium-tritium as a fuel, requires the heating of the mixture to a temperature of 100 million °C or more. Even at lower temperatures, the gas becomes ionized as the electrons become detached from the atoms. In this state, called a plasma, the separated negatively charged electrons and positively charged nuclei move freely, giving the mixture properties different from those of a normal gas. To release more energy than was supplied, it is necessary to confine the plasma to permit a sufficient number of fusion reactions to take place. In the sun the gravitational field heats and confines the hydrogen fuel, resulting in the formation of helium and other heavier elements. On Earth there are 2 classes of approach to containing and heating the plasma: magnetic confinement and inertial confinement.

Since a plasma is a very good conductor of electricity, it can be influenced by magnetic fields. In a magnetic field, the plasma particles are forced to follow spiral paths about the field line; hence, magnetic fields can confine the charged particles of the high-temperature plasma and prevent them from striking the walls of the containing vessel. Many magnetic containment schemes have been suggested and experimentally investigated. One very successful approach has been the tokamak, a closed magnetic-field device with a hollow, doughnut-shaped vessel through which magnetic fields twist to confine the plasma. The fields are produced by external magnetic-field coils and by electrical currents made to flow through the plasma. Initial heating is often achieved by passing a current through the plasma or by rapidly changing the confining magnetic field, but the required temperatures cannot be reached by such methods. Hence, auxiliary heating techniques are used, eg, neutral beam injection, whereby high-energy neutral atoms are introduced into the hot plasma where they are immediately ionized and trapped by the magnetic field, and radio-frequency heating, which uses high-frequency electromagnetic waves generated by external oscillators and introduced into the plasma where the energy is transferred to the charged particles.

In the inertial-confinement approach to fusion, a small spherical pellet containing the fuel is compressed to extremely high density. This process heats the pellet to the required temperature and causes the fuel to ignite before the compressed mass can disassemble. The interaction occurs so rapidly that the compressed pellet remains together by its own inertia. High-power, short-pulsed LASERS and ion-particle beams are the principal candidates for delivering the intense pulses of energy required to heat the outer layers of the fuel pellet rapidly. The ensuing blow off of vaporized material creates an implosion of the fuel. For ignition of D-T fuel to occur, compression of the order of 20 times the density of lead is necessary. The hydrogen bomb uses this approach.

Intensive research is being conducted on controlled fusion energy in many countries, particularly the US, the USSR, Japan and the European Economic Community. Annual spending on fusion research worldwide was over $2 billion in 1980. In Varennes, Qué, Canada has a national research facility based on a tokamak machine. The $40-million project is being financed by the NRC and HYDRO-QUÉBEC.

M.P. BACHYNSKI

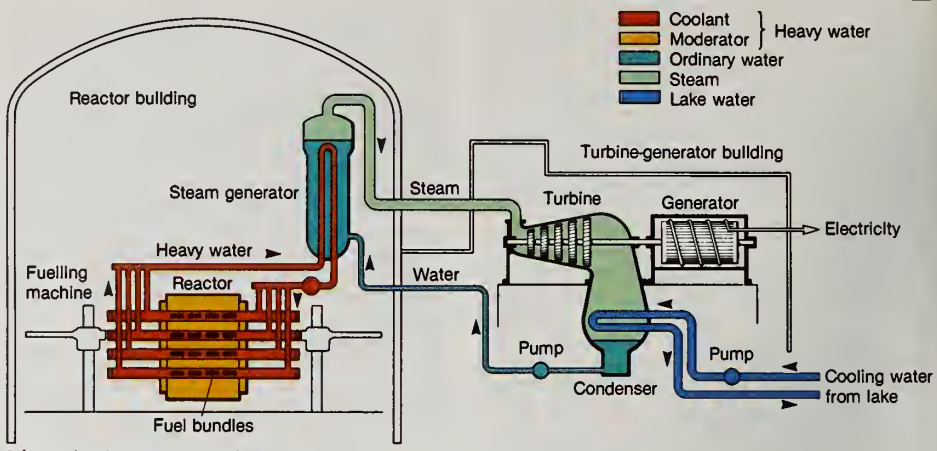
Nuclear Power Plants generate electricity from NUCLEAR ENERGY. As in all thermal-electric generating stations (*see* ELECTRIC-POWER GENERATION), heat is used to boil water into steam, which turns a turbine and drives a generator, producing electricity. A conventional thermal generating station obtains heat by burning coal or other fuels; a nuclear power plant obtains heat from the fission of nuclear fuel in a nuclear reactor. There are many ways of applying the basic principles of fission to the design of actual reactors. In Canada, a unique design known as the Canada Deuterium-Uranium (CANDU) is used. Other countries employ various other designs. A number of auxiliary plants also are needed for nuclear-power generation. All current power reactors use URANIUM as fuel. Uranium is relatively abundant, being present in most rocks and soils and in the oceans. Currently ores that contain about 0.1% uranium by weight, or greater, are economic to mine. After mining and milling, the uranium is a yellow powder (yellowcake); after further chemical treatment, it becomes a black powder (uranium dioxide).

CANDU Reactors To make fuel pellets for a CANDU reactor, the uranium dioxide is compressed, then baked at high temperatures to yield hard, insoluble, ceramic cylinders about 14 mm in diameter by 20 mm long. To make one fuel element, a 500 mm long stack of pellets is loaded into a metal tube (made of the zirconium alloy, Zircaloy), which is sealed at each end by welding. For present CANDU reactors 37 elements are assembled by further welding to form a fuel bundle, with individual elements held apart from each other. This fuel bundle is the first basic building block for the reactor. Uranium is a very concentrated energy source. A fuel bundle 500 mm long, 100 mm in diameter and weighing 22 kg could be carried in an overnight bag. When put in a CANDU reactor, it can produce as much ENERGY as burning about 400 t of coal or 2000 barrels of oil.

In the reactor, 12 bundles are placed end-to-end in a tube through which water coolant is pumped. Since the water is at nearly 300°C, it develops a pressure of about 100 atmospheres; the tubes are therefore known as pressure tubes. Each pressure tube, with its contained fuel and coolant and with end fittings to get the coolant in and out, constitutes a fuel channel, the next larger building block for a CANDU reactor. The reactor core consists of several hundred fuel channels positioned in a carefully calculated grid and passing horizontally through a tank, or calandria, containing heavy water as a moderator. Heavy water is a compound of hydrogen and oxygen, having a higher proportion of the heavy hydrogen isotope deuterium than does natural water. The presence of the heavy water and the particular arrangement of channels are essential for fission to occur in the uranium. This arrangement contributes to the safety of the reactor: if the reactor were to be seriously damaged one or both of these conditions would probably be affected and the fission process would stop automatically. This is an example of what is known as a fail-safe feature.

The coolant from the fuel channels is piped to steam generators, where the heat from the fuel is used to boil water in a secondary circuit. The resulting steam drives the turbine and turns the generator to produce electricity. The reactor coolant, now at a lower temperature, circulates back to the reactor in the closed primary circuit.

When a fuel bundle has to be replaced (after about a year and a half in the reactor), remotely controlled fuelling machines are clamped to each end of its fuel channel. Fresh fuel is pushed in from one end and the used fuel is deposited in the machine at the other end. A used fuel bundle, which looks much the same as a fresh one, retains all its wastes sealed within it. Used bundles are stored in a water-filled tank, like an extra-deep swimming pool, in a building adjacent to the reactor. The water cools the bundles and absorbs the radiation they emit. The ability to change fuel without having to shut down the reactor makes the CANDU design unique among current commercial reactors, and contributes to their exceptionally high capacity factors, ie, the electricity actually generated during some period, expressed as a percentage of what is theoretically possible.



Schematic of a CANDU nuclear power system. A fuel bundle 500 mm × 100 mm, weighing 22 kg, can produce as much energy as burning 2000 barrels of oil *(courtesy Atomic Energy of Canada)*.

To control the power level of the reactor, control rods are moved into or out of the reactor core. They are contained in tubes which penetrate the top of the calandria and pass between fuel channels. A reactor control system is used much as is an accelerator in controlling the speed of a car. However, unlike the car's accelerator, the control rods in the reactor can also bring things to a stop, ie, shut down the chain reaction. In addition to control rods there are 2 independent systems, each capable of shutting down the reactor quickly. These can be compared to 2 independent braking systems in a car, although the shutdown systems, unlike brakes, are neither needed nor used in normal operation. They are called upon only if some other system fails. One type consists of rods similar to control rods but capable of being inserted into the reactor core more rapidly; the other consists of perforated horizontal tubes in the calandria through which a liquid can be squirted into the heavy-water moderator. Control rods and shutdown systems both work by introducing into the reactor materials (eg, cadmium or gadolinium) that absorb neutrons strongly. Adding absorbers slows down, then stops the fission chain reaction; withdrawing them allows the reaction to start up again.

The fuel in an operating reactor (and even when discharged) is highly radioactive, ie, it emits gamma radiation similar to medical X rays. To protect the station operators, the reactor core is surrounded by heavy shielding, typically of reinforced concrete about 1 m thick. To protect the public against the possibility of radioactive releases which might occur in the event of an accident, the whole reactor and its primary coolant circuit are located within a sealed containment building, a massive concrete structure. No dwellings are allowed within a radius of about 1 km; thus any escaping radioactive material would be diluted and dispersed before reaching the public (*see* NUCLEAR SAFETY).

Other Commercial Reactors CANDU reactors are moderated and cooled by heavy water; the moderator and coolant are in separate circuits. Another general type of power reactor, known as a light-water reactor, uses ordinary or "light" water for moderator and coolant, without any separation. All the fuel is immersed in water under pressure, contained in a single large pressure vessel. Since light water is not a good enough moderator to sustain a fission chain reaction in natural uranium, the uranium fuel for light-water reactors has to be artificially enriched in uranium-235. The light-water reactor, first developed in the US, has 2 subtypes: the pressurized-water reactor and the boiling-water reactor. In the first, the cooling water in the pressure vessel is maintained at a high enough pressure to prevent boiling. Thus, just as in the CANDU design, steam for the turbines is produced in a secondary circuit with heat being transferred from the primary to the secondary circuit in steam generators. In the boiling-water reactor the coolant is under less pressure, so that boiling occurs. After separation from entrained water, the steam passes directly to the turbine. This procedure has the benefit of eliminating the cost and temperature drop associated with the steam generator, but the presence of radioactive coolant in the turbine makes maintenance more difficult.

Another type of power reactor, originally developed in the UK and France, uses graphite as moderator and a gas as coolant, hence the term gas-graphite reactor. The earliest of these used uranium metal contained in magnesium-alloy cans as fuel and carbon dioxide as coolant. The UK's design is called the Magnox Reactor after the particular magnesium alloy developed for the fuel cans. Graphite, being intermediate between light and heavy water as a moderator, enables natural, unenriched uranium to be used. This type is no longer competitive. In the UK it has been superseded by the advanced gas-cooled reactor which uses graphite and carbon dioxide but, by changing the fuel to uranium dioxide in stainless-steel cans, is able to take the coolant to higher temperatures. This system gives a higher thermal efficiency, ie, more electricity can be obtained from the same amount of heat. There is insufficient operating experience with advanced gas-cooled reactors to assess how well they will compete with established water-cooled reactors.

Several countries are investigating a high-temperature gas-cooled reactor that promises even higher temperatures. Here the carbon-dioxide coolant is replaced by noncorrosive gaseous helium, and the fuel consists of myriads of tiny particles of uranium carbide individually coated with graphite and embedded in a graphite block or sphere. The concept is technically attractive but, in the absence of any full-size commercial plants, the economics are largely unknown.

The USSR has developed 2 types of reactor for use in central power stations: the VVER (pressure-vessel-type water-water reactor) and the RBMK (channel-type water-graphite boiling reactor). The VVER is very similar to the US design of pressurized-water reactor; the RBMK

is a unique design. It has a graphite moderator through which run hundreds of fuel channels, generally similar to those in the CANDU.

Fuel Recycling All currently commercial nuclear-power reactors consume only about 1% of the uranium fed to them. As long as uranium is relatively abundant and cheap, the present procedure, the "once through" fuel cycle, which involves storing the used fuel discharged from the reactor, is the simplest and most economic. Used in this way, the world's known resources of economically recoverable uranium have an energy content comparable to the world's recoverable resources of conventional oil. When the richer uranium ores have been exploited and leaner ores have to be mined, it may make economic sense to recycle the used fuel to obtain more of the energy potentially available. Recycling would involve dissolving the used fuel, removing the true wastes (about 1% of the total fuel weight) and fabricating the residues into fresh fuel for reactors. Fuel recycling is an essential component of any proposal to extract appreciably more energy from our nuclear-fuel resources.

The best-known application for fuel recycling is in the liquid-metal fast breeder reactor, a radically different design that is not yet available commercially. "Liquid-metal" refers to the coolant, usually a molten alloy of sodium and potassium. "Fast" refers to the speed of the neutrons in the reactor core. Since fast reactors do not incorporate a moderator, the neutrons are not slowed down much from their speed at birth in the fission process. "Breeder" refers to the fact that more fissile material is bred from fertile material than is consumed by fission. Often, and misleadingly, this type of reactor is said to produce more fuel than it consumes. However, the essential characteristic of this reactor type is that it consumes much less nuclear fuel (normally uranium) than current reactors. Thus the cost of the electricity produced is largely independent of the cost of the uranium.

Fuel recycling would greatly extend the world's nuclear fuel resources for 2 reasons. Since ELECTRIC UTILITIES could afford to pay a higher price for uranium, mining leaner ores would become feasible and much more uranium could be economically recovered. For any particular amount of uranium mined, a larger fraction would be consumed and converted to energy. Together, these factors mean that nuclear-fission energy, with fuel recycling, becomes a nearly inexhaustible energy source. In Canada, the same principle of largely decoupling electricity costs from fuel costs is possible in the existing and commercially proven design of CANDU reactors, by exploiting fuel recycling and switching from uranium to thorium (another naturally occurring nuclear fuel) as feed. Thus, Canada could be assured of the same indefinite supply of energy without having to introduce a new reactor type.

J.A.L. ROBERTSON

Nuclear Research Establishments The research company of ATOMIC ENERGY OF CANADA LTD (AECL) operates 2 major NUCLEAR ENERGY research centres in Canada: Chalk River Nuclear Laboratories (CRNL), established during World War II on the Ottawa R some 60 km upstream from Pembroke, Ont; and Whiteshell Nuclear Research Establishment (WNRE) opened in 1962 beside WHITESHELL PROVINCIAL PARK, 105 km NE of Winnipeg, Man. Both conduct research and development on a wide variety of energy-related projects on behalf of AECL and under contract to outside companies and government bodies.

Chalk River was the site of Canada's first large research reactor, NRX, a 10 megawatt (MW) facility which used natural uranium fuel and a deuterium moderator. Originally operated as a project of the NATIONAL RESEARCH COUNCIL, CRNL became the main laboratory of AECL, the crown corporation established in 1952 to develop peaceful uses of nuclear energy. The Allies designed NRX to be an efficient producer of plutonium-239 for nuclear weapons; however, after WWII CRNL turned its attention to research in other fields. NRX proved to be a uniquely powerful research tool and attracted worldwide attention to Chalk River in the postwar era. A complete technology evolved around the use of NRX and its later, more powerful companion, NRU. Designers of the Canadian nuclear power system, CANDU, relied heavily upon the experience at Chalk River, not least as a training ground for engineers and technologists from private-sector companies which would become suppliers of CANDU fuel and components (*see* NUCLEAR POWER PLANTS). W. Bennett LEWIS, CRNL's technical director 1946-76, left a lasting imprint on CRNL and on CANDU. Under his direction, the laboratories expanded from a wartime project of 200-300 professional and support staff to a world-class science centre, making important contributions to PHYSICS, CHEMISTRY, BIOLOGY, nuclear technology and ENGINEERING. Research in GENETICS illuminated the processes of repair in damaged living cells and shed new light on the genetic basis of susceptibility to cancer. Former Chalk River scientists and engineers are found in universities, industry and government services across Canada and the US. Devices and techniques developed at Chalk River, such as those for cancer therapy, neutron-activation analysis and radiation measurement, are in use around the world. CRNL serviced contracts totalling $27 million during 1981-82, roughly 25% of its annual budget.

The Whiteshell research centre is a sizable establishment, employing just under 1000 scientists, engineers and support staff. The centrepiece of WNRE is WR-1, a 40 MW research reactor, moderated with heavy water but cooled with a special, noncorrosive organic liquid (OS-84) which can achieve temperatures of 400°C without boiling. The WR-1 concept could lead to an advanced generation of Canadian power reactors burning thorium rather than uranium. WR-1 provides some space heating for Whiteshell, but is used primarily for various research and development programs, including the testing of advanced thorium fuel types. In collaboration with universities and federal and provincial authorities, WRNE devotes a very large effort to evaluating the disposal of radioactive HAZARDOUS WASTES, the by-products of nuclear-power generation. Another major concern is tests of reactor safety. Test rigs simulate the effects of system failures, which are studied to determine the correctness of safety codes and the effectiveness of safety-design features. Work is also in progress on the effects of radiation on living cells to ensure that human safety is adequately protected by codes and regulations (*see* NUCLEAR SAFETY). WNRE's annual budget was $57 million for 1982-83 and revenue from industrial contracts $7-8 million.

F.H. KRENZ

Nuclear Safety Few choices are more plagued by uncertainty than the weighing of risks and benefits in the decision to use NUCLEAR ENERGY. It is a daunting problem, for the cost of being wrong is so high: overestimation of the risks denies access to a clean, high-quality ENERGY source; underestimation endangers the peace, health and freedom of the human race. The threat to peace is the greatest hazard. The first use of nuclear power, at Hiroshima and Nagasaki in 1945, was as a weapon. The danger of nuclear proliferation has been heightened since 1974 when India used Canadian nuclear technology to fashion an atomic bomb; India joined the nuclear "club" that already included the US, the USSR, Britain, France and China. Israel, South Africa and Pakistan are believed to possess nuclear-weapons capability, all developed in the guise of peaceful nuclear power. Intense competition among reactor sellers has led to a softening of international antiproliferation safeguards. During Britain's war with Argentina in 1982, Canada continued shipping fuel to Argentina's Canadian-built nuclear reactors. The relatively safe, reliable Canadian reactor design (CANDU) is well suited to production of plutonium for atomic weapons. A horrifying device could be made by packing radioactive wastes around conventional explosives, or simply by sabotaging a reactor. Only an effective nonproliferation treaty, presumably combined with some sort of policing, could substantially reduce this danger.

The second great issue of nuclear safety concerns the hazards power-plant operation may pose to workers, nearby residents, the general population and the biosphere. This is always a relative risk: any increment of radiation from the sun, medical or dental X rays, even coal ash, increases the likelihood of cancer and genetic defects. However, a great deal of scientific work



Ontario Hydro's nuclear generating plant on Lake Ontario, at Pickering (*photo by Jim Merrithew*).

has gone into designing reactor facilities to minimize health risks during normal operation, and compared to the black-lung, ACID RAIN foulness of coal power, the deadly vapours of high-sulphur natural gas and the belching stacks and dirty tailings ponds of tar-sands plants, nuclear power does seem alluringly safe and clean. In man-days lost per unit of energy output, US and UK studies indicate that nuclear power is 250 times less hazardous than coal and up to 180 times safer than oil; only natural gas poses fewer hazards to workers. Unfortunately, until the 1970s, much less attention was paid to the health and safety of uranium miners and their communities; the full cost of caring for afflicted miners and of cleaning up low-level radioactive wastes from mines and mills of the 1950s to 1960s has not yet been paid.

Most worries about nuclear safety stem less from normal operation than from the potential for catastrophic accident. There were several serious accidents in the early days of nuclear technology, including radiation releases at Chalk River, Ont, in 1952 and 1958, but the safety record of the nascent nuclear industry up to 1979 was quite astounding; even the reactor accident at Three Mile Island, which shattered that record, caused no direct, immediate deaths. The real importance of Three Mile Island was that it showed that nuclear engineers are fallible. The ultimate disaster would be a "meltdown," in which the reactor loses all its coolant and the core heats up uncontrollably, melting through its steel-and-concrete housing. Although the Three Mile Island reactor did not melt down, it did lose its coolant and release some radiation.

Since the Three Mile Island accident, there have been 2 major changes in nuclear-risk analysis. First, it is no longer assumed that subsystems of a reactor are independent; new studies accept that a failure in any one system can affect the integrity of all the others. Secondly, more and more data have been gathered about the actual operating record of all reactor components, including workers. Prior to the 1979 accident, experts estimated that the odds against a given reactor melting down in a given year were one in 20 000; an analysis of Three Mile Island by the US Nuclear Regulatory Commission dropped the odds to one in 500. However, the more recent analyses claim that the consequences of a major accident would be less catastrophic than had previously been believed. Experts claimed that only one meltdown in 5000 would produce a massive release of radiation that would cause thousands of deaths. The biggest single hazard would be release of the radioactive isotope iodine-131, which is quickly absorbed by living tissues. The new studies suggest much of the iodine might be soaked up by water in the damaged reactor building or condensed on cool surfaces nearby.

ATOMIC ENERGY OF CANADA LTD argues that its unique natural-uranium-fueled, heavy-water-moderated CANDU reactors are safer and more reliable than the reactors that have been analysed so intensely. CANDUs consistently win international honours for technological excellence. AECL officials maintain that a CANDU cannot melt down like an American light-water reactor, but critics are less certain. There have been some disturbing incidents with CANDUs. Ontario Hydro's Douglas Point station operated for 6 months (1980-81) without the proper filters to contain radioactive gases. In Feb 1982 Ontario's Bruce-2 reactor was taken out of service because of a pressure-tube leak. The Point Lepreau nuclear station was allowed to go ahead in New Brunswick although it turned out to be in an area prone to EARTHQUAKES; when Lepreau was first charged with heavy water in Dec 1981, two 15 000-gallon tanks buckled under the weight.

The most serious accident at a CANDU reactor to date occurred at Ontario Hydro's Pickering generating station Unit 2 on 1 Aug 1983, when a pressure tube burst. The "loss of coolant" accident was similar to the accident at Three Mile Island, but no radiation was released to the environment. Later in 1983, less serious leaks were detected at all 3 of Ontario's nuclear megaprojects. The growing list of failures suggests that Canadian risk analysis may be a more optimistic interpretation of a smaller data base.

The odds making is not just an academic exercise: it would take only one serious accident to halt nuclear power, as surely as the crash of the Hindenburg in May, 1937, ended the era of zeppelin travel. Unfortunately, only thousands of reactor-years of operating experience could produce the data for truly accurate accident-risk analysis. To make things worse, as demand for nuclear-generated ELECTRIC POWER sagged in the early 1980s, nuclear-safety research budgets were trimmed at the same time that governments began to expedite the domestic licensing and export sales of reactors. Meanwhile, new problems, such as a brittleness in steel reactor vessels after long bombardment with radiation, were coming to light as more reactors aged.

The final major issue concerns the long-lived radioactive wastes which are piling up in alarming quantities around the world, eventually to be joined by the irradiated rubble of today's nuclear power plants (*see* HAZARDOUS WASTES). For the first quarter century of the nuclear age, lethal, high-level wastes from reactor cores were simply stored in "swimming pools" of cooling water at reactor sites, while the more short-lived isotopes exhausted their radiation. Low-level wastes such as spent coolant, mine and mill tailings, contaminated equipment, etc, were buried or stockpiled. For example, by 1982 there were 100 million tonnes of uranium mine and mill tailings lying around Canada. The industry simply assumed that safe means of permanent disposal would be found. No such solution has been adopted, although scientists expect that high-level wastes will eventually be sealed in inert containers (eg, of glass or ceramic) and buried in geologically stable deep rock, salt caverns or seabed formations. Some might be recycled to make more fuel for future reactors. Certain wastes remain potently toxic for tens of thousands of years: 10 times longer than recorded history.

Ian Burton of the Institute for Environmental Studies at the University of Toronto has suggested the following test for weighing risks, based on the "reasonableness" concept in COMMON LAW: "A risk would be unreasonable where those at risk are not fully informed of all the benefits and risks, the distribution of risks and benefits is unfair, a less risky alternative exists that yields equal or greater benefit, full participation in the decision process has been denied to those at risk, or the value judgements involved in the assessment of risk and benefit have been hidden from view or not clearly articulated." On the basis of this test, nuclear power still poses unreasonable risks. Yet, if the choice is between building a coal-fired power station (a well-documented, highly visible hazard to land, air, WATER and workers) and a nuclear station with vaguely defined risks borne largely by future generations, it is tempting to opt for nuclear power and hope for the best. In that case, priority should be given to quantifying accurately and then minimizing nuclear risks. But that is not the only choice, another option is to build neither coal-fired nor nuclear plants, but to use less power and use it more efficiently and wisely.

ROBERT D. BOTT

Nueltin Lake, 2279 km², elev 278 m, max length 144 km, is located on the border of the NWT and northeastern Manitoba, about 660 km S of the Arctic Circle. An irregularly shaped lake, it has a heavily indented shoreline and contains numerous small islands. It is fed by a number of surrounding lakes and is drained NE into Hudson Bay by the Thlewiaza R. There has long been a trading post on the lake and the area has been explored extensively since WWII — beginning with the Nueltin Lake Expedition (1947). The lake takes its name from the Chipewyan *nu-thel-tin-tu-ch,* meaning "sleeping island lake." Discovered by Samuel HEARNE (1770-72), it appears on his map as Island Lk. Aaron Arrowsmith's map of MACKENZIE's journeys (1789, 1793) shows it as Northlined Lk. DAVID EVANS

Nugent, John Cullen, artist, educator (b at Montréal 1921). Nugent has been making steel SCULPTURE in Lumsden, Sask, for 30 years and has combined this with a teaching career at U of Regina, liturgical commissions and even a candlemaking enterprise. Early in his studies at St John's (Collegeville, Minn), his attitudes were marked by left-leaning ideals stirred by Catholic theology, as reflected in his "Christian craftsman" manufacture of sacred objects for church use and decoration. More significant, however, is his steel collage sculpture. Cutting, welding and adapting prefabricated steel elements, Nugent recombines pieces into sculptures often recalling a prairie landscape metaphor or encoding a primitive agricultural symbolism. His public commissions include works for the National Capital Commission (Ottawa), the Banff Centre and the CBC Broadcast Centre, Regina.

CAROL A. PHILLIPS

Nunatak [Inuktitut, "lonely peak"], MOUNTAIN rising above large ice sheets. Nunataks were first described from Greenland but also occur in Antarctica and Canada, particularly ELLESMERE ISLAND. The term is also used for any nonglaciated area, highland or lowland, which was surrounded by GLACIER ice. Such nunataks may have been biological refugia where plants and animals survived Quaternary GLACIATION and from which they dispersed as the glaciers melted. This controversial "nunatak hypothesis" was developed to explain strange biotic distributions in Canada and Scandinavia. Quaternary nunataks have been identified in the highlands and leeside lowlands of Baffin I and Labrador, above or beyond the Laurentide ice limit. Lowlands around Clyde Inlet (Baffin I) and Iron Strand (Labrador) have undisturbed raised beaches with FOSSILS predating the last glaciation. Mountain nunataks have heavily weathered rock surfaces with former ice limits marked by MORAINES or trimlines, below which the rocks appear freshly ice scoured. Several weathering zones, at different altitudes, indicate that the nunataks survived several glaciations. Similar weathering zones and certain plant distributions suggest that Quaternary nunataks exist around the Gulf of St Lawrence. Counter arguments attack the biological evidence and suggest that cold-based glaciers, known to perform little EROSION, may have protected the weathered surfaces during glaciation.

R.J. ROGERSON

Nursery School, as part of early childhood education, refers to group experience for 3 and 4 year olds and includes DAY CARE as well as various types of "nursery" programs. Influenced by the work of the McMillan sisters in England and their commitment to nurturing all aspects of the child's development, nursery schools in America took root in the early 20th century. Nursery-school practice today is best described as eclectic in its philosophy and is characterized in Canada, as elsewhere, by much diversity in program function, setting and sponsorship. However, the nursery school's long-standing commitment to parent involvement continues and illustrates a feature of its practice that has

influenced thinking about the parent's role in the educational process. *See* EDUCATION, EARLY-CHILDHOOD.

ELLEN M. REGAN

Nursing Marie Hubou has been credited with being the first person in what is now Canada to provide nursing care to the sick. The wife of Louis HÉBERT, a surgeon-apothecary, she arrived in Québec in 1617 and assisted her husband in caring for the sick. The first "trained nurses" to immigrate to the present site of Québec City in 1639 were members of religious orders. In fact, these nurses were not like modern nurses; they served as administrators much of the time, as doctors most of the time (ie, making medicine, undertaking surgery), and many miracles were attributed to them. Three of the nurses were Augustinian Hospitallers whose journey was financed by the Duchesse d'Aiguillon in France (the duchess, a niece of Cardinal Richelieu, had been stirred by the reports published in JESUIT RELATIONS in France of the needs of Jesuit missionaries in New France), while the other 3 were Ursuline sisters (Sisters of Charity). In 1642, in Ville-Marie [Montréal] Jeanne MANCE built a 30-bed hospital called the HÔTEL-DIEU; she was later assisted by nursing sisters from the Society of St-Joseph de la Flèche.

The Grey Nuns, a noncloistered order, began their work in Québec in 1738. Although these sisters, who might be considered Canada's first PUBLIC HEALTH nurses, built a hospital and an orphanage, they concentrated their work on home visits to the sick. Their free health care was funded by philanthropic gifts, but mostly through a number of entrepreneurial activities that they undertook, eg, running a brewery, and operating a freight and cartage company for the government.

In the 18th and 19th centuries the most common health problems in Canada were the frequent EPIDEMICS of smallpox, INFLUENZA, measles, scarlet fever, typhoid, typhus and tuberculosis. Because the nursing sisters recognized the need to segregate the sick, and because much of the population was migrant and homeless, the Grey Nuns built a number of hospitals — one of them (1845) in Bytown [Ottawa]. In 1844 these women canoed to uncharted areas. In 1855 they built a hospital in the RED RIVER COLONY, and they established an orphanage and a home for the aged at Lac Ste-Anne near Ft Edmonton in 1859. Later they built substantial hospitals in Ft McMurray, Alta (1938), Ft Resolution, NWT (1939), and Ft Rae, NWT (1940).

In 1819 the 24-bed Montreal General Hospital was opened in a building on Craig Street. By 1822 it had moved to a new building and expanded to 72 beds. It was affiliated with the Montreal Medical Institution which was eventually absorbed by the medical faculty of McGill University. The early allopathic physicians tried to introduce untrained lay nurses into the hospital — an act that was unheard of in the French community, where it was believed that the sick should be nursed by sisters devoted to the service of God. The outcome of the debate was a duel (not fatal) between one of the anglophone doctors, Dr Caldwell, and a member of the legislature, Michael O'Sullivan; the result was that untrained lay nurses were hired.

During the 19th century the hospitals of the nursing sisters were filled to capacity, so tents and other temporary shelters had to be erected to house the sick. To alleviate some of these problems, wealthy women created benevolent societies in their communities. Assisted by municipal and provincial funds, many of these women's groups managed to construct hospitals. These hospitals were reminiscent of the institutions in England before Florence Nightingale's time — sanitary conditions were not considered important, and the care of the sick was undertaken by untrained staff who were paid in beer and shared the food and lodgings of the patients.

Other hospitals were established as money-making ventures by private individuals. It was in one of these hospitals, started by an entrepreneurial physician, Dr T. Mack, that the first school of nursing in Canada was established, at the General and Marine Hospital in St Catharines, Ont, in 1874.

After several unsuccessful attempts, nursing schools based on a modification of the Nightingale system were also started at the Toronto General Hospital (1881) and Montreal General Hospital (1890). Apart from a director of nursing and perhaps a supervisor-instructor, the student nurses generally comprised the entire nursing staff of the lay hospitals. Often the students were sent out to attend private cases, but their wages were usurped by the hospitals. Graduate nurses, most of whom were not employed in these institutions, marketed their services in the community, undertaking private nursing in the homes of the more wealthy citizens.

To close the gap between the nursing care of the affluent and the poorer working people, the Victorian Order of Nurses (VON) was set up in 1897 by Lady ABERDEEN, the wife of the governor general. The opposition of doctors to an order of health workers who were chosen by their communities and who returned to the communities after a short training in first aid, hygiene, etc, turned this national, nonprofit organization into one that employed many professional nurses under more restricted circumstances than previously designed. In its early years, however, the VON was largely concerned with the treatment and control of communicable diseases and with child health care. To meet an acute need for hospitals, especially in western Canada, the VON built and operated some 40 hospitals, ranging in size from 6 to 40 beds. Its nurses also administered to miners during the KLONDIKE GOLD RUSH and staffed the newly built hospital in Dawson City. After 1924, when control over the last of its hospitals had been transferred to municipal authorities, the VON concentrated on visiting nursing.

Promoted by the International Council of Nurses, an organization arising out of the women's movement in the late 19th century, the Canadian nurses, led by Mary Agnes Snively, the superintendent of nurses at the Toronto General Hospital from 1884 to 1910, established a national organization in Canada and lobbied for legislation granting nurses the status of professionals. Their aims were to ensure the quality of nursing care through improved educational programs for nurses and the licensing of graduates to protect the title of nurse. In 1907 the Canadian National Association of Nurses, the precursor to the present Canadian Nurses' Association (CNA), was formed; in 1908 it joined the international body. In 1916 it founded its national monthly magazine publication, *The Canadian Nurse*.

Securing legislation for nurses was not easy. Legally, women had the same status as imbeciles and children, and many members of Parliament did not feel that women were capable of managing such worldly affairs. The schools of nursing and the hospitals were run by male doctors and administrators who did not wish to relinquish their control over the nursing programs to the professional nurses. Even after nurses' Acts had been passed in all provinces (the first in Nova Scotia in 1910) changes in the nursing curriculum were not easily introduced. The first university degree program for nurses, initiated at UBC in 1919, was for a long time the only one in Canada. In a 1932 report on nursing education across Canada, Dr G. Weir found that between 1913 and 1930 there had been a sevenfold increase in the number of hospital-nursing schools, but that the hospital-training schools did not provide the quality of education necessary for highly competent nurses. The 220 training schools turned out a disciplined work force largely used to make hospitals attractive for patients. The money charged the patients was not paid to the student nurses for their labour but invested in expanding the physical plant. The working day of a typical nurse was between 12 and 20 hours, with one day (or one half-day) free weekly. The schools themselves were mostly primitive and cramped. In response to this situation the Canadian Nurses' Association and the Canadian RED CROSS SOCIETY (which founded the Metropolitan Demonstration School of Nursing in Windsor, Ont, in 1946) initiated a nursing education program, independent of hospital control, to prove that, if it controlled the curriculum, a school of nursing could train skilled clinical nurses in only 2 years.

Another report, issued under the auspices of the Pilot Project for the Evaluation of Schools in Canada in 1960, recommended that the CNA undertake a study of nursing education in Canada; that a national school improvement program be implemented; and that a national evaluation of nursing service programs be undertaken. Within 10 years, in all but the Atlantic provinces, nursing education was to be carried out within the educational system. In 1984 there were 142 diploma schools of nursing. While some are still located in the hospitals, most are in community colleges. All programs are conducted at the post-secondary level under provincial education requirements. From province to province the programs vary from 2 to 3 years. By 1982, 25 universities offered undergraduate degrees (BScN, BN) in nursing; 8 universities offered graduate degrees at the master's level.

Because the primary aim of the hospital schools of nursing had been to supply the institutions with cheap labour, little importance had been paid to the educational programs and none to the community's demand for private-duty nursing. The continual supply of graduates resulted in a high unemployment rate that was exacerbated by the GREAT DEPRESSION. During the 1930s very few people could afford a private nurse. The governments at the time responded by providing funds so that the sick could be sent to hospitals and graduate nurses could be hired to care for them. But high unemployment and poor wages plagued the profession until WWII, when many nurses joined the armed forces as officers. Nevertheless, many women were still attracted to nursing because it was one of the few "respectable" occupations open to them.

The military recruitment of the nurses resulted in a shortage in Canada that was filled by older women returning to the profession they had been forced to leave when they married. Because of demands of homes and families, hospital authorities could no longer require nurses to live within hospital premises and many single women also took this opportunity to move out of nurses' residences. In the community the nurses found their living costs to be higher than their salaries, and they began to demand higher wages. Married nurses also argued for shorter hours to enable them to manage their home responsibilities. Legislation had granted nurses professional status and had given them rights and some power over educational curriculum, but it had not given them the power to improve their wages or working conditions. Thus, they turned to unionization.

The first group of nurses to negotiate an employment contract in 1939 did so through a professional organization formed by a nursing sister in Québec City. In 1945 the BC nurses' professional association became the first to assist nurses in becoming unionized province wide. It was not until 20 years later that nurses in the rest of the country followed suit. In 1973 the Saskatchewan Supreme Court ruled that the pro-

fessional association in that province could no longer involve itself in union activities. As a result the collective bargaining arm of the association split off and became a full-fledged nurses' union. Similar separations occurred in other provinces as well; by 1980 all of the medical nurses had 2 provincial organizations to represent their interests — a professional body and a nurses' union.

In 1981 the 3 nurses' federations (unions) in Québec joined together to form a bargaining cartel called the Regroupment of Nurses in Québec. That same year the nurses' unions in other provinces joined to form the National Federation of Nurses' Unions. At the national level the nurses' interests were then represented by the union and by the professional body, the Canadian Nurses' Association.

In 1984 there were some 185 000 active practising registered nurses in Canada. Most of them were employed in hospitals while others worked as nurse educators or nurse practitioners. About 7% were employed in areas such as community health, public health, outpost nursing, home-care nursing and industrial nursing. Only 2% (some 4300) nurses are male.

Military Nursing It was through the work of the American nurses in the Civil War and the English nurses in the Crimean War that nursing as a laywoman's occupation gained social status and acceptance in a medical world dominated by male physicians. The first Canadian military nurses were those who volunteered to help the wounded in the NORTH-WEST REBELLION of 1885. Four VON nurses were attached to the YUKON FIELD FORCE in 1898 and Canadian nurses joined the British Medical Staff Corps in 1899, during the SOUTH AFRICAN WAR. In WWI some 2500 nurses served overseas with the Canadian Army Medical Corps and almost twice that number went overseas during WWII. Over 380 decorations were awarded to Canadian nurses who distinguished themselves in the war. During the Korean War 60 Canadian nurses served with the Canadian forces in field dressing stations and field surgical teams. Currently, some 350 nurses serve in 61 military bases across Canada and Europe.

Psychiatric Nursing The history of psychiatric nursing is separate from that of medical nursing but follows a similar pattern. The first psychiatric nurses were the French religious sisters who in 1714 established a 12-bed ward in the hospital in Québec City. The forerunners to the contemporary psychiatric nurses were employed as custodial workers in the new asylum in Brandon, Man. In 1921 regular training programs for nurses were organized by the psychiatric hospital; other training programs were soon established in the psychiatric hospitals in the other 3 western provinces.

In contrast to the medical nurses, psychiatric nurses were unionized with the rest of the public service beginning in the 1940s, but they soon felt the need for control of their own profession. The movement for professionalization of psychiatric nurses began in Saskatchewan in 1948. The BC psychiatric nurses gained recognition as recently as 1968. A few years prior to this, the precursor to the Psychiatric Nurses' Association of Canada had been formed. In 1961 the *Canadian Journal of Psychiatric Nursing* succeeded an earlier publication devoted to issues in the profession.

In 1984 there were 5000 registered active psychiatric nurses in Canada, most of whom were employed in psychiatric hospitals and homes for the mentally handicapped. A new area has opened up for psychiatric nurses in community health and a few are employed in this type of work.

Public Health In 1919 a federal department of health was founded in response to the influenza epidemic, and provincial departments of health began to replace provincial health boards. Provincial public-health nursing services were developed, beginning in Manitoba in 1916, to assist with municipal immunization and child health-protection programs. The federal health department, which was replaced in 1944 by the Department of NATIONAL HEALTH AND WELFARE, is now responsible for all federal matters relating to the promotion and preservation of health, social security, emergency health services, provision of health, medical and hospital services to Indians, Inuit and the general population of the 2 territories, etc (*see* NATIVE PEOPLE, HEALTH). Since 1945, nursing positions have been established to advise the department, provide consultative services to the provinces and direct services to certain segments of the population. The Medical Services Branch of Health and Welfare also provides direct nursing services to a small segment of the population, ie, Indians, Inuit and other residents of the territories. The branch administers and staffs the outpost nursing stations and health services where registered professional nurses function as general practitioners.

PHYLLIS MARIE JENSEN

Nuthatch (Sittidae), family of small, tree-climbing BIRDS with short tail, pointed bill and long, sturdy toes and claws. Of the 18 species of true nuthatches in the genus *Sitta*, 3 occur in Canada. Red-breasted nuthatch (*S. canadensis*) is found coast to coast; white-breasted nuthatch (*S. carolinensis*) has a patchy distribution in southern areas. The pygmy nuthatch (*S. pygmaea*) is restricted primarily to the southern interior of BC. Nuthatches can climb up and down tree trunks with equal facility by using their lower leg as a prop and hanging from the upper one. The tail is not used for support. They eat invertebrates and seeds and often store seeds in crevices in bark. Hard-shelled seeds are hammered open in such crevices, hence the name "nuthatch." Nuthatches excavate nest cavities in trees and may modify natural cavities with mud masonry to reduce the size of the entrance hole. They lay 4-10 eggs. The young have a very long nestling period (22-24 days). Nuthatches do not migrate but sometimes undergo massive eruptive flights. They are easily identified by their loud and characteristic calls and sometimes associate with chickadees, kinglets and other birds in mixed-species feeding flocks.

JAMES N.M. SMITH

O Canada, written by Calixa LAVALLÉE (music) and Adolphe-Basile Routhier (words in French), was first performed at a banquet of skaters in Québec City on 24 June 1880. Originally called "Chant nationale," the anthem was sung widely in Québec but was not heard in English Canada until the turn of the century. The English translation most widely used is by Toronto schoolteacher Robert Stanley Weir. "O Canada" was approved as the national anthem by the Parliament of Canada in 1967 and designated offically by the National Anthem Act, 27 June 1980. The words in English, which were altered somewhat after parliamentary debate, are as follows:

O Canada! Our home and native land!
True patriot love in all thy sons command.
With glowing hearts we see thee rise,
The True North strong and free!
From far and wide, O Canada, we stand on guard for thee.
God keep our land glorious and free!
O Canada, we stand on guard for thee.
O Canada, we stand on guard for thee!

Oak (*Quercus*), genus of TREES and shrubs of the beech family (Fagaceae). Of the estimated 200 species found worldwide, 75-80 occur in N America and 10 in Canada. Canadian species grow very locally in Ontario and eastward, except Garry oak, found only in BC, and bur oak, which occurs as far W as Manitoba. Oaks are usually divided into 3 groups: red or black oaks (red, black and pin); white oaks (white, Garry and bur); and chestnut oaks (swamp white, chinquapin, dwarf cinquapin and chestnut). These beautiful trees have a fairly short trunk, a broad crown and alternate, simple, usually lobed leaves of variable shape and size. The acorns, produced in large quantities, are important to the diets of various wild animals. Oaks are generally found in areas with moderate precipitation. They flourish on hillsides where the most suitable lighting and well-drained soil are found, except swamp white oak which prefers low, wet terrain. The hard, strong wood, highly valued for cabinetmaking and parquetry, is also used for casks for whisky. Known for its strength and longevity, the oak has been the national symbol of several peoples and is often referred to in literature. The generic name means "most excellent of trees." ESTELLE LACOURSIÈRE

Oak Bay, District Municipality, pop 16 990 (1981c), area 1637 ha, inc 1906, is located on the SE corner of Vancouver I, adjoining the city of VICTORIA. Oak Bay is surrounded by the Pacific Ocean on the S and E and overlooks Haro Strait. Oak Bay has developed into a high-quality residential area and retirement community, and contains no large industries. A strong British influence can be seen in the many tea shops, English-styled buildings, English accents and private schools. Forty-one percent of the population are over 55 years old and 85% are of British descent. Oak Bay is governed by a mayor and 6 aldermen, and shares some responsibility with the Capital Regional Dist. The townscape includes many fine examples of BC's grandest architectural era, including many residences designed by F.M. RATTENBURY. Oak Bay also contains the oldest continuously occupied dwelling in western Canada — Tod House, built in 1851 for John Tod, an HBC fur trader. The most famous annual event is a giant tea party held in early June. ALAN F.J. ARTIBISE

Oak Island, one of over 300 islands in MAHONE BAY on Nova Scotia's Atlantic coast, is about 1.6 km long and 0.8 km wide. It is reputed by legend to be the site of buried treasure, the loot being attributed to various pirates, including William Kidd, Henry Morgan and Blackbeard, as well as to Inca refugees fleeing from Spanish conquistadores in S America. In 1795, 3 men discovered a depression in the ground near a



huge oak tree and evidence that a block and tackle had been used there. Their digging revealed a filled-in shaft with platforms of decayed oak logs at 3 m levels. They quit digging after 9 m, but in 1804 another group reached the 30 m level before the shaft filled up with salt water. Subsequent digs uncovered tunnels connecting the "money pit" with the ocean. A dam built to solve the problem was destroyed in a storm. Vast sums of money have since been spent in excavations that have cratered the island, and 3 treasure hunters died in an accident in 1965. Though no treasure has yet been found, a submarine TV camera, lowered into a cavity 60 m below the surface in 1971, produced faint images of 3 chests, a pick and a dismembered human hand. EDWARD BUTTS

Reading: W.S. Crocker, *The Oak Island Quest* (1978).

Oakes, Sir Harry, prospector, mine owner (b at Sangerville, Maine 23 Dec 1874; d near Nassau, Bahamas 8 July 1943). A graduate of Bowdoin College, Oakes abandoned medical school in 1898 to prospect in the Klondike. After working in mining camps around the world, he staked the Lakeshore and Tough-Oakes properties near Swastika, Ont, in 1912. He became immensely wealthy from the Lakeshore mine, N America's second-largest gold producer, but ill health, disappointment at not being appointed to the Senate, and rising taxes were apparently the reasons for his move to the Bahamas in 1935. There he became a member of the legislature and council and a major real-estate developer. He received a baronetcy in 1939 for his philanthropy in England. Eccentric, unpopular in Canada and exuding the manner and dress of the mining frontier, Oakes died at his home — victim of an unsolved murder. His former estate in NIAGARA FALLS, Ont, forms the basis of that city's scenic parks. J. LINDSEY



Bur oak (*Quercus Macrocarpa*), with flowers and acorn (*artwork by Claire Tremblay*).

Oakville, Ont, Town, pop 75 773 (1981c), inc 1857, located on Lk Ontario at the mouth of Sixteen Mile (Oakville) Cr, midway between Toronto and Hamilton. The site, originally inhabited by Mississauga Indians, was purchased 1827 by William Chisholm, a wealthy merchant and politician, and developed as a townsite. The name derives from the local oak-stave industry. Blessed with a good harbour, it became a shipbuilding centre as well as serving an extensive agricultural hinterland. Several buildings have been preserved from the 19th century, including decorous Georgian manses, Victorian follies, the Old Post Office Museum (1835), Thomas House (1829) and a customhouse (1855). An important component of the local economy is the FORD MOTOR CO plant which was built following WWII. A campus of Sheridan College of Applied Arts and Technology is located here. DANIEL FRANCIS

Oats (*Avena sativa*), member of the GRASS family (Gramineae) grown for its CEREAL grains. For commercial purposes, oats are classed as a small or coarse grain. The origin of cultivated oats cannot be traced, but the species came to Canada with settlers from Europe, and was used primarily as livestock feed (principal grain fed to horses) and as a staple breakfast food for humans. Oats are best suited to cool, moist climates. The plant usually reaches 1-1.5 m and requires 90-115 days to mature, depending on variety and growing conditions. Under field conditions, each seed yields 1-3 stems, each of which carries a single panicle (cluster of reproductive organs) bearing hulled seeds. At one time, oats were second only to WHEAT as a grain crop in Canada, occupying up to 6.8 million ha. Oats now occupy about 2 million ha, the reduction resulting partly from the decline in horse population and partly from the introduction of herbicides to control the closely related WEED, wild oats (*A. fatua*). These herbicides affect common oats but do not interfere with CROPS such as wheat and barley. Canadian scientists have developed many oat varieties with improved disease and lodging resistance, earlier maturity and better yield, as well as hull-less varieties. Oats are still used primarily for livestock feed or breakfast food. M.L. KAUFMANN

Oblates of Mary Immaculate, *see* CHRISTIAN RELIGIOUS COMMUNITIES.

Obomsawin, Alanis, singer, filmmaker (b near Lebanon, NH, 31 Aug 1932). An Abenaki, raised on the Odanak reserve, Qué, and later at Trois-Rivières, she was committed at an early age to the celebration of native tradition and the preservation of its culture. In the late 1950s she began to sing professionally and to collect and write songs on Indian and folk themes; she has since become a popular performer, native activist and philanthropist. She has made educational and documentary films and audio-visual packages, recording elders' and remote peoples' experiences of Indian life. She directed *Christmas at Moose Factory* (NFB, 1971) and directed and produced *Amisk* (1977), *Mother of Many Children* (NFB, 1977) and *Incident at Restigouche* (1984). BENNETT MCCARDLE

O'Brien, Lucius Richard, painter (b at Shanty Bay, UC 15 Aug 1832; d at Toronto 13 Dec 1899). He studied art under John G. HOWARD at Upper Canada College, Toronto. Although he demonstrated youthful artistic ability, he worked as a civil engineer in Toronto until about 1872. Thereafter, as a professional artist, he was considered the country's most proficient landscap-



Lucius O'Brien, *Sunrise on the Saguenay*, oil on canvas, 1880 (*courtesy National Gallery of Canada/Royal Canadian Academy, Diploma Work, deposited 1880*).

ist, in both oil and watercolour. O'Brien painted widely, in Ontario and Québec, on Grand Manan and along the Atlantic seaboard and, sponsored by the CPR, in the Rockies and along the Pacific. Many of his landscapes are distinguished by a sense of light similar to that in paintings by Albert Bierstadt and the American "luminists," and by the realism in paintings by John A. Fraser and other artists associated with the Notman photographic studios. O'Brien supported the Ontario Society of Artists, helped organize the Royal Canadian Academy, serving as its first president, 1880-90, and edited *Picturesque Canada* (1882). After 1882 he painted and taught in Toronto.

J. RUSSELL HARPER

Obscenity became an offence in 1663 when Sir Charles Sidley was convicted for his behaviour after a drinking orgy. He appeared naked on a balcony and threw bottles down among the people in Covent Garden. This case was the basis for convicting Curl in 1727 for publishing a pornographic book, an English case that established the crime of obscene libel. The Obscene Publications Act of 1857 (England), with its definition of obscenity, was most famously applied in the *Hicklin* case (1868). In upholding an order for the destruction of a publication, Chief Justice Cockburn declared, "I think the test of obscenity is this, whether the tendency of the matter charged as obscenity is to deprave and corrupt those whose minds are open to such immoral influences, and into whose hands a publication of this sort may fall."

From its enactment in 1892, the Canadian Criminal Code has included as an offence the publication of indecent matter tending to the corruption of morals. Definition of "obscene matter" was not provided; the test applied was the *Hicklin* case. The 1959 amendment to the code (s159.8) reads: "For the purposes of this Act, any publication a dominant characteristic of which is the undue exploitation of sex, or of sex and any one or more of the following subjects, namely, crime, horror, cruelty and violence, shall be deemed to be obscene." The "undue exploitation of sex" is determined either by "the internal necessities" of the work itself, or by "the standards of acceptance of the community," the best guide for which was provided by Mr. Justice Freedman of the Manitoba Court of Appeal in the *Dominion News & Gifts* case (1963), upheld by the Supreme Court of Canada: "Those standards are not set by those of lowest taste or interest. Nor are they set exclusively by those of rigid, austere, conservative, or puritan taste and habit of mind. Something approaching a general average of community thinking and feeling has to be discovered. Community standards must be contemporary. Times change, and ideas change with them. Community standards must also be local. In other words, they must be Canadian. In applying the definition in the Criminal Code, we must determine what is obscene by Canadian standards, regardless of attitudes which may prevail elsewhere, be they more liberal or less so." *See* CENSORSHIP. WALTER S. TARNOPOLSKY

Observatory Since the earliest civilizations, princes and priests have maintained observatories where, by observing the SUN, MOON, stars and planets, astronomers could determine the passage of the months, seasons and years, and watch the skies for any changes, which they often interpreted as portents. Remains of these early observatories are found worldwide, Stonehenge being one well-known example. Early observatories were located to take advantage of their surroundings, ie, in open terrain with natural or artificial markers, and modern observatories continue to be located at carefully selected sites.

Of the observatories in use before invention of the telescope, perhaps the most scientifically productive was that of Tycho Brahe, built 400 years ago on the island of Hveen in the Baltic Sea. Johannes Kepler used Tycho's precise sightings of the planets to establish his laws of planetary motion. The first telescopic observatory was that of Galileo (1609). The telescope consisted of tiny lenses mounted in wooden tubes. The era of big-telescope observatories began just over 200 years ago with Sir William Herschel and his metal mirrors in England. The 20th century has seen a constant growth in telescope size, number, complexity and performance.

Optical Observatory

Optical observations are made by means of light, ie, those "optical" photons to which our eyes are sensitive. Stars emit them in great abundance. Modern optical telescopes employ concave (parabolic) mirrors of low-expansion glass as the primary means of collecting photons. One or more following mirrors help form the images of celestial bodies in the focal plane of the telescope. There they are recorded photographically or by means of a modern photon detector. The aim is to extract the maximum information carried by the photons about the nature, origin and behaviour of the object from which they came. Knowledge is greatly increased if the spectrum of the object, rather than its direct image alone, can be observed.

Successful observations depend on many factors, one of which is the siting of the observatory. The best locations will have relatively few cloudy periods throughout the year, air as transparent as possible (mountain tops preferred) and freedom from local air turbulence of thermal origin, which could blur the image by causing the photons to arrive "out of step." Stable electric power, staff living quarters and technical support facilities must be provided. The largest observatories are usually so remote and of such complexity that they must be supported at the national or international level. Astronomers from distant places take turns as users. It is commonplace for one observatory to contain several telescopes, ranging from 3 or 4 m to a few tens of centimetres in mirror diameter. A small telescope can be effective and is often preferred for certain types of observation.



The Canada-France-Hawaii Telescope on Mauna Kea in Hawaii is located at an elevation of 4600 m, above 40% of the Earth's atmosphere. It is regarded as the best site for an observatory in the Northern Hemisphere (*courtesy National Research Council*).

The earliest observatory in N America was likely that at LOUISBOURG (1750-51) and a number of observatories with modest telescopes were created in Canada in the 19th century: Fredericton, 1851; Québec City, 1854; Kingston, Ont, 1856; and Montréal, 1862. An early observatory at Toronto, under government auspices, was devoted to observations of geomagnetism and, later, METEOROLOGY as well as ASTRONOMY. In those days, much effort was expended in the determination of longitude by astronomical observations, and indeed it was the opening up of the Canadian West and the need for accurate surveys and maps that led to the founding of the Dominion Observatory in Ottawa in 1905. Although its primary purpose was geodetic and included the provision and distribution of precise TIME signals, research in "physical astronomy" was not neglected. Physical astronomy, now called astrophysics, was to develop rapidly.

Within 8 years the federal government decided to build an astrophysical observatory to be furnished with a telescope which, in its time, was the largest in the world. After a careful survey, Victoria, BC, was selected as the best site in Canada, with "good seeing" and a large percentage of clear nights. The Dominion Astrophysical Observatory (DAO) began its work in 1918, specializing in observing the spectra of faint stars and measuring their radial velocities by means of the Doppler effect. The DAO now operates 2 large telescopes, the original (1.83 m) and a more modern, smaller one (1.22 m).

A generous gift from the DUNLAP family enabled University of Toronto to establish the David Dunlap Observatory in 1935. Equipped with a 1.88 m telescope, it is located outside the city but near enough to serve as a teaching and research centre. As enrolment in graduate studies increased in the 1960s, it became necessary for U of T to provide additional, dependable observing facilities. In 1971 a 61 cm telescope was erected by the university in Chile at one of the most highly prized observing sites in the Southern Hemisphere, Las Campanas.

Canada's latest development in optical observatories has been the construction of the Canada-France-Hawaii Telescope (CFHT) on Mauna Kea in Hawaii. During the 1960s several groups in Canada pointed out the need for a larger and more up-to-date telescope. The federal government was sympathetic and finally decided on a joint undertaking with France and the state of Hawaii. The site, at an altitude of 4600 m (and above 40% of Earth's atmosphere), is regarded as the best in the Northern Hemisphere. A 3.6 m telescope of the most modern design (the mirror was ground and polished in Victoria) was inaugurated in Sept 1979. This telescope is being equipped with the best of modern instrumentation and will rapidly become one of the world's most productive telescopes.

Canada, like other countries searching for a fuller understanding of the universe, has many smaller observatories from coast to coast. Most major universities now maintain telescopes for instruction and research, including Université de Montréal and Laval (jointly at Mégantic, Qué), University of Western Ontario (at London), York University, University of Alberta, University of Calgary, University of British Columbia and University of Victoria. Several amateur centres across Canada have their own telescopes. Virtually all observatories, including the CFHT, admit the public at scheduled times.

DONALD A. MACRAE

Radio Observatory

Soon after the discovery of radio waves by Heinrich Hertz in 1887 came the realization that objects that emit light and heat also emit radio waves. Thomas Edison appears to have been the first to suggest the possibility of detecting radio waves from the sun and several early attempts were made. However, extraterrestial radio signals were not discovered until 1932. During an investigation of the origin of radio interference (static) Karl Jansky, an American engineer, noticed that his antenna was receiving radio noise from the direction of the centre of our GALAXY. Momentous as this discovery was, it was not actively followed up until after WWII. The first radio astronomical observations in Canada were made in 1946 by A.E. COVINGTON, working at the NATIONAL RESEARCH COUNCIL, Ottawa. When RADAR research was curtailed at the close of WWII, Covington used surplus equipment to construct a radio telescope which he used to detect radio emissions from the sun. The NRC has continued the program of radio observations of the sun to the present day.

Both optical and radio telescopes collect energy in the form of electromagnetic radiation. They differ, however, in the frequency (wavelength) of the radiation that they can detect. Radio waves that can penetrate Earth's atmosphere have wavelengths ranging from a few millimetres to tens of metres (about 10 000 to 100 million times longer than light waves). Telescopes for observations at shorter radio wavelengths often resemble optical telescopes and normally consist of a parabolic dish, analogous to the mirror of a reflecting telescope. Telescopes for use at long wavelengths are quite different, usually consisting of large arrays of individual radio antennae.

Radio signals reaching Earth from celestial sources are exceedingly weak; therefore, radio telescopes must have large collecting areas. A more important consideration is often the telescope's resolving power, ie, its ability to reveal detail in an object's radio image. The resolving power of a telescope is directly proportional to its linear dimensions (not its collecting area) and inversely proportional to the operating wavelength. Since radio wavelengths are long, radio telescopes must have large dimensions to possess even modest resolving powers. For example, the human eye can just distinguish 2 points with an angular separation of one minute of arc. To do the same thing, a radio telescope operating at a wavelength of one metre must have a diameter of about 3 km. Since it is impractical to build single structures of such dimensions, radio scientists have devised ways of interconnecting several smaller elements (dishes or antennae) to produce a single telescope. Both single- and multi-element telescopes are used at Canadian radio observatories.

The NRC's Herzberg Institute of Astrophysics operates 2 national radio observatories: Algonquin Radio Observatory (ARO) and Dominion Radio Astrophysical Observatory (DRAO). Both sites were chosen for their freedom from manmade radio interference which can readily spoil measurement of the very weak signals from astronomical sources.

ARO, located in the central region of Ontario's ALGONQUIN PROVINCIAL PARK, began operation in 1960 with the transfer from Ottawa of the solar program, which was becoming increasingly affected by radar and radio interference. A parabolic telescope was installed to monitor solar emission continually at a wavelength of 10.7 cm. To extend the time during which the sun is under continuous observation, an identical telescope was later installed at DRAO. The dish is relatively small (1.8 m diameter), since its purpose is to collect radiation from the sun's entire disk. The intensity of the radiation at a wavelength of 10.7 cm is an effective measure of the general level of solar activity and a sudden enhancement indicates the occurrence of a solar flare. The measurements are important in studies of the relationship between solar activity and geophysical phenomena (eg, NORTHERN LIGHTS). Determination of the position of localized regions of intense solar emissions is made at noon each day, using a multi-element telescope that produces strip scans of the sun with a resolution of 1.5 minutes of arc (ie, one-twentieth of the sun's diameter) in the E-W direction. When compared with optical photographs, these scans enable the regions of enhanced emission to be identified.

The principal telescope of the ARO is a large parabolic dish (46 m diameter) completed in 1966. The dish is supported by a mounting, which permits it to be moved, under computer control, to point to any position in the sky or to scan a selected region. Several receiving systems and an associated spectrometer are available for observing at various wavelengths. The shortest usable wavelength, determined by the accuracy of the parabolic surface, is about 1 cm. There are, however, plans to replace the original surface with a more accurate one enabling observations to be made down to a wavelength of about 3 mm. This versatile telescope has been used by observers on a wide variety of programs, including studies of planets, external galaxies and quasars.

DRAO, situated in a secluded valley S of Penticton, BC, opened in 1960. The first instrument, a 26 m parabolic telescope and associated receiver, was designed primarily for studies of our galaxy, a field in which Canadian optical astronomers have made significant contributions. The dish's surface is aluminum mesh, an almost perfect reflector at a wavelength of 21 cm, which is the wavelength of emission and absorption of hydrogen gas, the major constitutent of interstellar space. From observations of the distribution of this gas in the galaxy and its motions, as revealed by shifts in the observed wavelength, much has been learned about our galaxy's structure and dynamics.

The telescope accepts radiation from an area of the sky about 0.5° in diameter, but the much smaller angular structures of many nebulae and other objects in our galaxy cannot be revealed by the telescope. In addition the resolving power is inadequate for studies of even the closest external galaxies. Since construction of a parabolic telescope of sufficient size is impractical, a different instrument has been constructed, the Aperture Synthesis Telescope, which employs a technique first developed at Cambridge University. The telescope consists of four 8.5 m parabolic dishes, the outputs of which are combined. Two of the dishes are movable on an E-W track 300 m long; 2 are fixed, one 300 m E of the track and the other 300 m W. The 4 dishes observe the same region of the sky for 12 hours at each of about 120 positions of the movable dishes. When used with its spectrometer receiver, the system produces computer maps at 128 wavelengths of an area of the sky 2° in diameter, with a resolution of one minute of arc.

For observations at a wavelength of 13.5 m, the observatory employs a telescope consisting of a large number of collecting elements or dipole antennae, laid out in a horizontal plane in the form of a "T." Each dipole is connected by cable to the centre of the array, where the signals are amplified and recorded. The crossbar of the "T" is 1.3 km long and the entire array occupies an area of 65 000 km^2. Its performance is approximately equivalent to that of a conventional paraboloid 750 m in diameter.

In 1967 radio astronomers and engineers from Canadian universities and the NRC pioneered the development of a powerful new technique which has dramatically increased the resolution attainable at radio wavelengths. Known as Very Long Baseline Interferometry, the technique allows signals collected with widely separated telescopes to be combined to form a single instrument. Independent, highly stable atomic clocks are used to convert the signals collected at each telescope to lower frequencies which can be recorded on magnetic tape, together with accurate time markers. The tapes are subsequently brought together and played in unison. For the initial experiments, the parabolic telescopes at Penticton and Algonquin Park were used to form a 2-element interferometer. More recently, however, a number of the world's radio telescopes have been used simultaneously to form a powerful, integrated instrument capable of producing images that reveal detail of the order of one-thousandth of one second of arc. This is 100-1000 times better than can normally be obtained with the largest optical telescopes. Thus, it is now possible to study the structure of quasars and the small cores of galaxies, to observe changes in their structure with time and to investigate details of many other radio sources. In addition, very accurate determinations of the positions of radio sources are now possible, permitting the investigation of relativistic and other effects. In geophysics the ability to measure small angular displacements can be inverted to study the motion of Earth's axis of rotation, variations in its rate of rotation, movements of its crust, etc. These and other possibilities have led to an imaginative proposal by Canadian scientists to build a Canadian Long Baseline Array, consisting of 8 radio telescopes, in a line from BC to Newfoundland, operating as a single instrument. If constructed, it would be the world's largest telescope, as large as Canada itself.

J.L. LOCKE

Space Observatory

Various kinds of electromagnetic radiation (ie, very low-energy infrared radiation and high-energy ultraviolet and X-ray radiation) are incapable of penetrating Earth's atmosphere and must be observed from the upper atmosphere or from space. Upper-atmosphere observations have been an ongoing part of Canada's satellite-research program since its inception, and NRC is involved in various space-oriented programs with the US and European space authorities (NASA and ESA, respectively). The most dramatic of these projects is Starlab, a joint Australia-US program to construct a 1 m telescope equipped with a camera and spectrograph, to be carried to one of NASA's proposed space platforms aboard a Space Shuttle flight in the late 1980s. The Canadian government withdrew from the program in 1984.

Occupational Disease today includes not only those diseases associated with industry, but diseases that may be indirectly related to occupation, eg, ALCOHOLISM and stress. Since the time of the Pharaohs, scholars have commented on the diseases caused by various occupations. In 1472 goldsmiths and metalworkers were warned about the poisonous effects of MERCURY and LEAD, but the first systematic account of occupational disease did not appear until 1713, when Ramazzini observed, "Various and manifold is the harvest of disease reaped by certain workers from the crafts and trades that they pursue. All the profit that they get is fatal injury to their health." Since the Industrial Revolution, workers have been exposed to thousands of potentially hazardous substances and to generally dangerous working conditions. In fact 2 out of 3 workplaces expose workers to many cancer-causing substances absorbed through skin contact, the respiratory tract or the mouth and digestive tract. Those who work with rubber, ASBESTOS, steel, uranium, aluminum, vinyl chloride and dyes, as well as nickel workers, machinists, garage employees, painters, petroleum workers, pesticide workers, cleaners working

with solvents and workers in copper, gold and lead smelters have been cited by researchers as particularly vulnerable to a wide variety of CANCERS. Some occupations are particularly dangerous. For example, in 1981, 49.5% of deaths from occupational disease (eg, pneumoconiosis, asbestosis, exposure to radiation) occurred in mining.

Occupational disease hazards can be classified as chemical, biological, physical or those affecting mental health. In Canada safe-exposure levels are based on American standards adopted by the American Conference of Government Industrial Hygienists. Unfortunately the data cover only about 5% of the chemicals now used in various workplaces. As well, workers are often in contact with more than one substance at a time, and the hazards associated with combined chemical reactions have never been researched. Biological hazards include the inhalation of cotton dust, which can lead to the lung disease byssinosis, and dusts from wool, hemp and wheat. Farmers are particularly susceptible to lung problems caused by inhaling plant fungi that gather on damp hay and other dried animal feed. Physical hazards include noise, vibration and extreme temperature, and radiation which may lead to deterioration of hearing, injury to soft tissues, and injury to the circulation system. Mental illness as an occupational hazard is associated with alcoholism, drug abuse and depression.

National and international statistics on industrial disease are unreliable, partly because the period between exposure to a substance and onset of disease can be as long as 10 or 20 years, so the cause and frequency of an illness have often been misdiagnosed; because medical schools have not traditionally provided much training in this area; and because little research on industrial disease has been conducted by independent, qualified scientists as opposed to those who have an interest in minimizing the risks. However, by a rough extrapolation of US government figures, it is possible to estimate that each year 10 000 Canadians will die, and 39 000 more will be disabled, by industrial diseases.

The intense and critical media coverage of industrial diseases since the mid-1970s has prodded some medical schools into taking a more active role in the area of occupational disease, but government response, often qualified by the interests of industry, is divided among a host of unintegrated and often contradictory regulatory agencies such as workers' compensation boards and the provincial and federal departments of health, mines, environment, labour and justice.

ELLIOTT LEYTON

Ocean The world ocean and its marginal seas cover about 71% of the Earth's surface. Its division into individual oceans and seas is largely arbitrary and has varied through the years. Historically, people referred to 5 oceans: Atlantic, Pacific, Indian, Arctic and Antarctic (or Southern). Modern convention speaks of only the first 3: the Arctic is considered a marginal sea of the Atlantic; the Southern, the southern continuation of the Atlantic, Indian and Pacific oceans. Thus, Canada can be seen to be surrounded by 2 (Atlantic, Pacific) or 3 (Atlantic, Pacific, Arctic) oceans, depending on the scheme of division used. The interplay of these ocean waters with freshwater runoff from land creates the conditions that support large biological production on Canada's continental shelves and embayments (*see* COASTAL LANDFORM; DRAINAGE BASINS). The COASTAL WATERS also affect SHIPPING, offshore RESOURCE industries and maritime CLIMATE. OCEANOGRAPHY is the science that studies the physical and biological properties of the oceans and analyses the impacts resulting from exploitation of their resources.

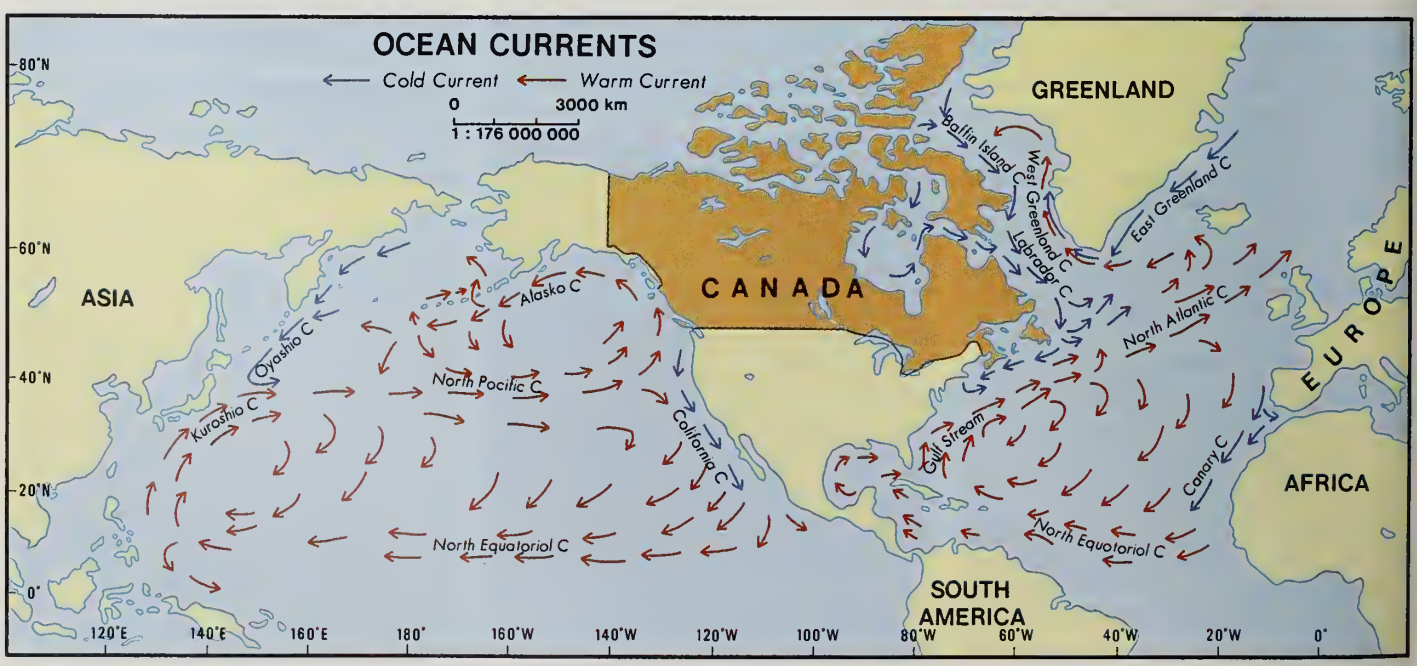
The average oceanic depth is nearly 4000 m; that of the marginal seas 1200 m. The continents generally extend under the ocean, forming continental shelves tens to hundreds of kilometres wide and up to 500 m deep. At their outer edge, the WATER depth increases rapidly to the ocean basin depths of 3000-6000 m. This region is called the continental slope. The oceans are divided into several deep basins by mid-ocean ridges where new oceanic crust is formed (*see* PLATE TECTONICS). Rising to depths of 2000 m or shallower and sometimes forming ISLANDS (eg, Iceland, the Azores), these ridges constrain the distribution of the deep waters and affect the upper-ocean circulation. Transverse ridges (eg, the shallow ridges joining Greenland to Iceland and Scotland) also separate ocean basins.

Island arcs and deep-sea trenches are formed where oceanic crust is moving under another tectonic plate. The deepest oceanic depths are found in such trenches, the greatest being over 11 000 m in the Mariana Trench, western N Pacific. Island arcs (eg, Antilles, Aleutians) frequently form the boundaries between marginal seas and the adjacent ocean. The deep basins are also interrupted by isolated seamounts rising several thousand metres from the seafloor and often forming elongated chains. Some of these volcanic structures rise above the surface and form islands (eg, Hawaiian Is).

The density of seawater is determined by its salinity and temperature, colder or more saline water being denser. In the ocean, water characteristics change with depth: the least dense water is at the surface; the most dense at the bottom. In tropical and temperate latitudes, density is largely controlled by temperature; temperature generally decreases with depth. In polar and subpolar regions, salinity plays a more important role; here cold, low-salinity surface layers overlie warmer, saltier deep layers.

In the upper few tens of metres of the ocean, the euphotic zone, one-celled planktonic organisms use sunlight to convert various nutrients (eg, inorganic carbon, nitrates, phosphates) into organic molecules through photosynthesis. By this means they multiply to form a food source for larger organisms, thus forming the basis for marine food chains and webs. The upper ocean usually consists of a "mixed layer" some tens of metres thick which is homogenized through wind and wave action. At the bottom of the mixed layer, the density of the water increases markedly; this region is called the seasonal pycnocline. During spring and summer, in temperate latitudes, shallow mixed layers are formed because solar radiation absorbed in the surface layers makes them warmer and less dense. Biological productivity within the mixed layer depletes the nutrients and the seasonal pycnocline inhibits the transfer of nutrients from below; hence, after an initial spring bloom, biological productivity is limited by the rate at which nutrients can be regenerated from the standing crop. In fall and winter, stronger winds and waves as well as convection caused by cooling at the surface causes the mixed layer to become denser and deeper, incorporating deeper nutrient-rich waters into the surface waters in preparation for the following spring. In subpolar regions, mixed layers deeper than 2000 m can form in late winter.

In general any mechanism which causes mixing of ocean waters contributes to an increase in biological productivity. Frontal mixing between lower salinity inshore waters and warmer offshore waters results in the injection of heat, salt and nutrients into the coastal waters. On Canada's East Coast the boundary or front between



inshore and offshore waters generally lies beyond the edge of the Continental Shelf, making this an especially rich area for fishing. Other factors which can promote horizontal and vertical mixing include wind action and eddies spinning off major currents. Mixing between surface and bottom waters occurs more readily if the water is relatively shallow (up to 200 m). Hence, the continental shelves are more productive than open-ocean areas. Canada has a much greater area of shelf on the East Coast than on the West Coast, a fact reflected in much greater fish catches in the East. In 1982, for example, 1.2 million t were landed on the East Coast, compared with 0.13 million on the West Coast.

The seasonal pycnocline changes in depth and temperature from season to season. Below it is found the main thermocline where, from depths of 200-4000 m, the water temperature falls from as high as 18°C to 2.5°C. The main thermocline arises because water from the progressively colder, denser, winter-mixed layers of higher latitudes flows equatorward below the warmer, less dense layers. The deepest waters of the main thermocline are formed by winter convection in a few high-latitude locations, then spread to fill the deep basins of the world oceans. These deep waters are remarkably uniform in temperature and salinity. For example, fully 10% of the total volume of the ocean has temperatures of 0.6-1.6°C and salinities of 0.03467-0.03472.

Half of the ocean's volume occurs in 2 concentrations. The first, with temperatures of -0.8 to 2.6°C and salinities of 0.03457 to 0.03476, is formed off Antarctica (especially in the Weddell Sea). It sinks, flows eastward around Antarctica and northward to fill the deep basins of the Indian, Pacific and S Atlantic oceans. The second concentration, with temperatures of 1.7-3.0°C and salinities of 0.03487-0.03496, is formed in the Norwegian and Greenland seas and enters the Atlantic between Greenland and Iceland, and Iceland and Scotland, filling the entire N Atlantic Basin below 2000 m and continuing to flow southward in the S Atlantic, above the Antarctic water moving northward.

Only a small percentage of the total volume of these waters is affected even by an exceptionally severe winter. To change the properties of the deep waters requires periods of hundreds of years or longer; this stability is believed to have a direct effect in moderating short-term climate variations. The deep ocean also contains a vast volume of dissolved carbon dioxide (CO_2) and, by regulating the atmospheric levels of CO_2, plays an important role in determining the world's temperature (*see* CLIMATE CHANGE).

Early in the atomic age, nations began using the deep oceans as disposal sites for low-level nuclear wastes. It was theorized that these concentrations would be diluted by the large volumes of water and diminished by radioactive decay to levels inconsequential to health before reaching surface waters. The tracking of radioactive isotopes injected into the oceans by atmospheric nuclear testing in the 1950s and 1960s and the direct measurement of deep current velocities, have forced a change in the idea of a nearly motionless deep ocean. The practice of dumping in the deep oceans is now being reevaluated by international agencies. *See* HAZARDOUS WASTES; LAW OF THE SEA; NUCLEAR SAFETY.

R. ALLYN CLARKE

Ocean Industry The search for hydrocarbon resources in offshore areas, the driving force behind the development of the ocean industry, began in earnest in the early 1960s in the shallow waters of the Gulf of Mexico. Since then, the hunt has expanded to include the coastal waters of the North Sea, Australia, SE Asia, India and Canada. More than 40 countries have plans for supporting such activities, creating a potential for the export of services and equipment, which has heavily influenced the development of the Canadian ocean industry.

In 1978 a federally sponsored sector task force identified 180 companies engaged in the ocean industry. Of these, 40 were core organizations depending on the market for most of their revenues. By the end of 1982 the number of companies in the field had grown by about 15% and the industry had gained a public voice, though the Canadian Ocean Industries Association (COIA). According to federal government estimates, sales by ocean industry companies increased to about $1 billion in 1982 from $200 million in 1976. Exports, accounting for about 50% of sales, included hardware (drilling rigs, SUBMERSIBLES, offshore-drilling accessories) as well as diving and subsea SURVEYING services.

Drilling Platforms The largest items produced in Canada for offshore work are the various platforms which support drilling equipment. Between 1978 and 1982, Davie Shipbuilding Ltd of Lauzon, Qué, one of the 3 largest shipyards in Canada, moved strongly into this field when orders for conventional vessels dropped off in the wake of a worldwide shipping slump (*see* SHIPBUILDING). By early 1983 Davie had orders for construction of 12 jack-up platforms under licence to the designer, Marathon le Tourneau Inc of Vicksburg, Miss. Most of these systems, designed to operate directly on the seafloor in relatively shallow water, were destined for the Gulf of Mexico. By the early 1980s, none of the Canadian-built jack-ups had been built specifically for use in Canadian waters, although foreign-constructed rigs of the bottom-supported type were in use in the shallow, ice-free zone off SABLE ISLAND, NS. Development of bottom-supported systems capable of withstanding impact by moving SEA ICE is being studied by several Canadian organizations, including Mobil Oil Canada Ltd and Dome Petroleum Ltd.

In areas where floe ice and ICEBERGS do present dangers, such as the BEAUFORT SEA in the western Arctic and the Grand Banks off Newfoundland, the most widely employed strategy is one of avoidance rather than confrontation. Hence, mobile drilling platforms are used, either drilling ships or semisubmersible rigs (ie, platforms mounted on submerged, neutrally buoyant pontoons, which are anchored or positioned by motors over the drill site). The first Canadian-built semisubmersible was under construction in 1982 at Saint John Shipbuilding and Dry Dock Co Ltd of Saint John.

Undersea Vehicles It is in the HIGH-TECHNOLOGY field associated with exploration in the deeper waters of the world's continental shelves that Canadians are probably best known — particularly in the design and construction of manned and remote-control undersea vehicles and systems. One of the most famous Canadian submersible builders (until it went into receivership in 1978) was International Hydrodynamics Co Ltd of Vancouver, which manufactured the Hyco family of manned submarines, named after signs of the zodiac. During its best year, 1976, Hyco employed 165 people, but a surplus of submersibles on the world market, coupled with a drastic cutback in North Sea operations by a major British customer, eventually contributed to the breakup of this innovative company.

Submersibles have been around for nearly 20 years, but only since the mid-1970s have remote-control vehicles (which do not require complex and expensive life-support systems) become sophisticated enough to challenge manned craft. Remotely operated submersibles, built by International Submarine Engineering Ltd of Port Moody, BC, are being used in the Far East, the North Sea, the Middle East and other oil-producing areas. Founded by company president James McFarlane in 1974, when the field was still in its infancy, ISE had designed and built more than 70 systems by the end of 1982, mostly for export. ISE manufactures a family of submersibles, most of which are unmanned and controlled through cables by a surface operator. New technology is conceived and developed with breathtaking speed. Early remote-control submarines were equipped with cameras for PIPELINE inspection; modern computer-controlled machines can perform more complex tasks, including oil-rig inspections and underwater shackle-ups at depths exceeding 1000 m. On-board diagnostic apparatus on the latest models enables technicians at ISE's Port Moody laboratory to monitor the internal workings of a submersible operating from a drillship as far afield as Australia.

A 2-vehicle package, designed to support drilling to even greater depths (about 2700 m), was under construction at ISE in 1983, together with the first in a new generation of untethered submersibles known as ARCS (automatic remotely controlled submersible), ordered by the BEDFORD INSTITUTE OF OCEANOGRAPHY, Dartmouth, NS.

In addition to manned and remote-control self-propelled submersibles, Canadian companies also design and manufacture towed underwater devices, designed to perform tasks ranging from location of enemy submarines to identification of shipwreck sites and of geological structures capable of containing hydrocarbon deposits. A leader in this field is Fathom Oceanology Ltd of Mississauga, Ont, which has grown steadily since it was founded in 1978. Fathom's products include fish-shaped housings for detection packages and associated shipboard towing systems; drilling-rig accessories (eg, fairings for cables, pipes, drill risers) and SONAR domes for naval vessels. Acquisition of British, US and Canadian subsidiaries in 1981 and 1982 allowed the company to expand its expertise from the purely mechanical side of underwater towing systems into microprocessing and electronics. From the start, most of Fathom's revenues came from the navies of N America and western Europe, but by the end of the company's 1982 fiscal year (anticipated revenues, $8 million), the military share was expected to drop to 65%. A towed system known as BATFISH, designed by the Bedford Institute of Oceanography and equipped to carry oceanographic-research instrument packages, is manufactured by Guildline Instruments Ltd of Smiths Falls, Ont.

Diving For the most delicate tasks associated with the ocean industry, divers working with their hands are still needed. Because they are exposed to enormous pressures and other potential dangers, Canadian divers earn good wages. In 1982, those working in domestic offshore oil and gas fields earned up to $60 000. Specialists willing to work elsewhere in the world earned even higher wages, a situation that raised concern over whether these highly trained people would be available to work in Canadian waters. In 1982, about 50% of divers working in the domestic industry were Canadian. At that time, Newfoundland was the only province that discriminated in favour of residents in its offshore industry.

Divers operating from diving bells now work at depths of more than 330 m and tests have indicated that humans can survive (though not very efficiently) at more than twice that depth. Work at even 200 m by unprotected divers was unheard of until 1968, when Phil Nuytten, president of Can-Dive Services Ltd of Vancouver and a pioneer in the development of underwater systems, established a commercial DIVING record to that depth.

As humans have gone deeper into the oceans, new problems have been encountered and, while technology has provided some solutions, many dangers are still only partially understood. Rapid compression to working depths

was found to cause uncontrollable muscle tremors, dizziness and nausea. Consequently, divers now spend up to 24 hours inside a hyperbaric chamber, slowly adjusting to the immense pressure. This delay in attending to an underwater problem can cost tens of thousands of dollars in oil rig downtime. Under pressure, divers sometimes complain of painful stiffness, where joints creak and pop and any movement causes discomfort. Sometimes bone necrosis (bone death) occurs under pressure, a problem whose cause is not fully understood.

Perhaps the best-known danger associated with deep diving is decompression sickness ("the bends"), which can occur if a diver ascends too quickly. On the way down, under increasing pressure, gases are dissolved in the blood. Reduced pressures during ascent cause the gases to bubble out; if this occurs too quickly, the bubbles can lodge in joints and cause severe pain, even death. Divers must ascend slowly or, as is often done with divers working in waters too cold for dallying, spend hours, days or even weeks in a surface decompression chamber which gradually reduces outside pressure on the body. Divers are paid for time in the chamber, so deep dives, even of short duration, are expensive.

Wherever possible, the dangers and associated costs are reduced by using one-atmosphere armoured diving suits that allow diver-operators to breathe air at sea-level atmospheric pressure. The suits are not cheap (they can cost about $1 million) but they offer greater safety, quicker response time and savings in breathing gas. A 2-week decompression can consume more than $100 000 worth of helium and oxygen breathing gas.

Can-Dive (formerly part of the Oceaneering International group of Houston, Texas, now an independent, Canadian-owned company) operates several one-atmosphere systems, eg, Jim and Wasp. Jim is an articulated suit with arms and legs, meant for walking on the ocean floor or on underwater platforms. Wasp is a midwater suit with jets instead of legs (Nuytten calls it a "submarine that you wear"); the diver "flies" it underwater by using foot pedals. Can-Dive also has ARMS (atmospheric roving manipulator system), a diving bell that permits operations to 1000 m. In 1982 these and other one-atmosphere systems accounted for about half the manned deep-water work in Canada.

In 1983 Can-Dive was developing a new lightweight version of the Jim suit, with improved flexibility in the joints, for operations to 200 m. The company was also working with Deep Ocean Technology of San Francisco on an acrylic "bubble," known as the underwater helicopter, which was expected to operate 2000 m deep. *See* OCEAN MINING; OCEANOGRAPHY.

CAREY FRENCH

Ocean Mining Several types of valuable MINERAL deposits are known to exist under the oceans or under other large bodies of water. Where water is shallow, placer deposits can be recovered by large dredges (eg, tin minerals off the coasts of Java and Borneo). Where deposits lie in shallow water near the shore, dams may be built around sections of the shoreline and the areas pumped out so that shovels or scrapers can be used to excavate the material. Diamond-bearing gravels are mined in this way along the coast of southwestern Africa. Conventional, underground MINING methods may be used to follow mineral deposits extending beyond shorelines, if the rock strata above the ore body or COAL seam are thick, strong and not porous or fractured. For example, coal is mined beneath the Atlantic Ocean over 8 km from CAPE BRETON I. The seams were first found on land and mine buildings, shaft and slope entrances were established on land. Mining by the longwall method has followed the seams as they dipped beneath the ocean. Although the rock strata above the seams subside into the excavated areas after they are mined, no water has entered the mines. Mining of IRON ORE extended 5.5 km beyond the shore at Wabana, Nfld. The empty chambers remained dry and are available for storage purposes.

Deep-ocean exploration has discovered jets and springs of hot water (to 350°C) rising from fissures and vents in ocean floors. These emissions appear to occur mainly along major ocean ridges and along fractures of the Earth's crust, such as in the Red Sea and off the BC coast. They may carry various metals and other elements in solution which, on encountering cold ocean water, precipitate as muds, layers, crusts or chimneys. Sulphides of copper, zinc, iron and other metals have been found in such deposits. These discoveries provide new information to geologists about the origin of hydrothermal mineral deposits. They may also provide future sources of economically recoverable minerals, if deposits of suitable size, grade and location are found.

The recovery of such deposits and of other mineral deposits known to lie at some depth below the ocean floor and at considerable distances from the nearest land will be difficult. Where the distance is too great to warrant driving long tunnels from shore-based shafts, it may be necessary to adapt the techniques which are now being developed for offshore PETROLEUM recovery. The difficulties are further complicated by the need to establish national and international legal controls. The recovery of metal-bearing nodules, for example those occurring on the ocean floor in the mid-Pacific at depths of up to 5 km, is a challenge for the future. These fist-sized nodules contain manganese, copper, nickel and cobalt. Recovery will depend on the development of suitable technology and on the establishment of international agreements to regulate the work. Several multinational groups are investigating methods of recovery, including use of continuous lines of buckets, drag scrapers and suction devices. Research is also needed to develop suitable methods of processing nodules on boats or barges at sea.

T.H. PATCHING

Oceanography is the SCIENCE that studies the OCEANS and seas in all their aspects: the movement and composition of their WATERS; their origin; the evolution of their form; the nature, distribution and interactions of their PLANT and ANIMAL denizens; and their interactions with the atmosphere which affect CLIMATE and WEATHER.

Subfields From descriptive beginnings as the GEOGRAPHY of the sea, oceanography has matured into a quantitative, multidisciplinary science bringing together experts from many basic fields. The interconnectedness of marine problems demands from scientists of many disciplines a close collaboration which gives oceanographic research a special flavour. Physical oceanography combines the work of instrument makers who design sophisticated apparatus to measure or sample the corrosive and often inaccessible oceanic medium, analysts and computer specialists who interpret the data, and theoreticians who explain the observed physical properties of the ocean using the PHYSICS of rotating fluids. HYDROGRAPHY is an applied branch of physical oceanography concerned with mapping the ocean depths, calculating TIDE tables and producing navigational charts (*see* CARTOGRAPHY). Chemical oceanography studies the composition of seawater, the elements and compounds it holds in solution, their reactions with inert and living matter, and the effects of natural and man-made POLLUTION. Marine geology and geophysics study the origin of ocean basins, the spreading and shrinking of seas through geological ages, the erosion of shorelines and the evolution of bottom sediments. BIOLOGICAL OCEANOGRAPHY brings together botanists, zoologists, bacteriologists, FISHERIES experts and other biological specialists in the study of marine life and its availability to mankind. Marine ecology, an important interdisciplinary aspect of oceanography, studies marine ecosystems.

Relations to Other Fields Oceanographers share common theoretical and methodological approaches with researchers working in related areas. For example, oceanography is closely related to limnology, the study of LAKES; and physical oceanography has much in common with METEOROLOGY, which studies the motion of another fluid, the atmosphere. Oceanographers can also supply important practical data to workers in other fields. For example, ocean engineering combines oceanographic knowledge with ENGINEERING techniques in the design and protection of coastal installations and offshore structures.

History in Canada The growth of oceanography in Canada, a country abutting 3 oceans (Atlantic, Pacific, Arctic) and containing large freshwater inland seas, has been continuous for almost a century. Oceanography was first applied, in Canada as elsewhere, to problems of navigation. The Canadian Tidal Survey (now Canadian Hydrographic Service) was formed in 1893. Under the leadership of its first director, William Bell DAWSON, it started its work of compiling marine charts and measuring currents and sea levels, a task which rapidly transcended its purely practical goals. Hydrography is the progenitor of physical oceanography. In the same period a board of management for fisheries and marine research was established under the Department of Naval Service. The board was superseded by the Biological Board of Canada, later the Fisheries Research Board of Canada.

Although biological oceanography originated, in part, in the practical concerns of fisheries, it received much of its life breath from the scientific interest generated by voyages of discovery in the second half of the 19th century, especially the CHALLENGER EXPEDITION (1872-76). The expedition, based in Halifax for a time, pioneered deep-sea dredging for marine organisms. During the late 19th century, marine research laboratories proliferated in Europe and the US. Two marine stations were established in Canada in 1908, at St Andrews, NB, and Nanaimo, BC, under the impetus and direction of E.E. Prince. These establishments, formally under the direction of the federal Department of Fisheries, were given a broad mandate to study not only FISH, but also the plants, chemistry and motions of the ocean. Under the direction of the Fisheries Research Board of Canada, the Atlantic and Pacific biological stations were for decades focal points of Canadian oceanography, mapping fisheries resources and water properties, mounting deep-sea expeditions and providing expertise for Canadian participation in international bodies. On the Atlantic coast, fisheries oceanographers W. Huntsman, W. Mackey and L. Lauzier participated in the description of local waters and in the work of the International Commission for North Atlantic Fisheries; W. Ford led Canadian participation in the study of the Gulf Stream during Operation Cabot in 1950. In the Pacific J.P. TULLY and his colleagues in Nanaimo pioneered the study of FJORDS and participated (with the US and Japan) in the North Pacific expeditions that mapped the ocean habitat of salmon. The waters of the ARCTIC ARCHIPELAGO were also explored; in the East, the *Calanus* expeditions (1948-1979) led by M. DUNBAR of McGill University investigated Hudson Bay and its approaches; in the West, W.M. CAMERON played a leading role in the joint Canadian-US expeditions to the Beaufort Sea in the early 1950s.

Following WWII, defence research laboratories in Canada and elsewhere rapidly became interested in physical oceanographic problems, such as ocean wave forecasting and ocean acoustics. In the late 1940s and 1950s, the need for professional oceanographers led to the foundation of graduate research and teaching institutes at the universities of British Columbia, Dalhousie and McGill. The spread of oceanographic studies to academic institutions continued in the 1960s with the formation of the Groupe interuniversitaire de recherches océanographiques du Québec (GIROQ), to which Laval, Université de Montréal and McGill contribute, and with the establishment of teaching and research laboratories at Université du Québec à Rimouski. Oceanographic studies are also offered at the universities of Victoria, Guelph and Memorial, and at Royal Roads Military College.

A major recent development in Canadian oceanography has been the concentration and significant expansion, through the 1960s and 1970s, of research and service operations run by the federal government through the Department of Fisheries and Oceans in 3 large institutions: the BEDFORD INSTITUTE OF OCEANOGRAPHY (BIO), Dartmouth, NS; the CANADA CENTRE FOR INLAND WATERS (CCIW), Burlington, Ont; and the Institute of Ocean Sciences (IOS), Sidney, BC. These are on a scale comparable to that of other major oceanographic research centres of the world, housing hundreds of scientists concerned with all aspects of marine science. A smaller laboratory is located in Québec City and a central information storage and dissemination agency (the Marine Environmental Data Service) is based in Ottawa. Fisheries laboratories in Nanaimo and St Andrews (as well as in St John's, Nfld, and Halifax, NS) have become more specialized in fish-stock management. Federal research laboratories also operate Canada's oceanographic fleet, which includes a few medium-sized deep-sea vessels (eg, *Baffin, Hudson, Parizeau, Dawson, Endeavour*) and smaller vessels for hydrographic and coastal work. A research SUBMERSIBLE, the *Pisces IV* (and its tender ship the *Pandora*) is used for deep-visual exploration. Although these ships are used mainly for coastal work, occasional long-range cruises take Canadian oceanographers to remote seas. The Hudson-70 expedition accomplished the first complete circumnavigation of the Americas, taking a group of University of British Columbia oceanographers, led by G.L. PICKARD, on the first scientific survey of the fjords of southern Chile, and taking a team from the Bedford Institute, led by C.R. MANN, to make deep-flow measurements through Drake Passage, S of Cape Horn.

Practical problems now facing Canadian oceanography include fisheries management and the complex interactions between its scientific and socioeconomic aspects; problems of nearshore pollution and deep-ocean dumping; improved understanding of SEA-ICE conditions for purposes of navigational safety and offshore operations; exploitation of offshore PETROLEUM and MINERAL resources on the Canadian continental shelves; and development of instruments for in situ and remote sampling of the ocean to gather the information necessary to tackle the above problems. The arctic regions continue to be an area of special concern. In the early 1970s joint government and industry surveys of the Beaufort Sea paved the way for current hydrocarbon exploration. A few years later, the Eastern Arctic Marine Environmental Studies (EAMES) program gathered extensive baseline information about marine ecosystems and circulation patterns in Baffin Bay, Lancaster Sound and adjacent passages. Geophysical and oceanographic expeditions to the deep Arctic Ocean, north of the archipelago, such as the Lomonosov Ridge Experiment (LOREX, 1979) and the Canadian Expedition to Study the Alpha Ridge (CESAR, 1983), have confirmed Canada's interests in the High North (*see* ARCTIC OCEANOGRAPHY).

Canadian oceanographers also participate in the elucidation of fundamental problems of a global nature, such as the role played by the oceans in CLIMATE CHANGE and, in particular, their capacity for holding in solution much of the carbon dioxide released by the burning of fossil fuels. A significant increase in the concentration of this gas in the atmosphere could lead to a net warming trend, a significant concern to subpolar countries. A detailed understanding of oceanic dynamics is still lacking, and oceanic weather prediction will not be achieved until a more intimate knowledge of ocean currents is attained and supported by a dense network of observation stations. This task will occupy physical oceanographers for years to come. The history of seafloor spreading and its relation to the formation of deep-sea mineral deposits is also of great interest. In Canada seafloor spreading occurs off the BC coast at the Juan de Fuca and Explorer ridges, submarine mountain chains where new ocean floor is continually being created (*see* OCEAN MINING; PLATE TECTONICS).

Of the more than 1000 oceanographers in Canada, most work for the federal or provincial governments, a few teach in universities, and an increasing number are employed by the private sector to help in offshore exploitation and nearshore engineering and pollution problems. The Canadian Meteorological and Oceanographic Society, the principal professional society of oceanographers in Canada, gathers together mainly physical and chemical oceanographers. It publishes a quarterly journal of scientific research, *Atmosphere-Ocean*, and a newsletter of general information, and holds an annual scientific congress. Another Canadian research publication devoted mainly to fisheries science is the monthly *Canadian Journal of Fisheries and Aquatic Sciences*, published by the Scientific Information and Publications Branch of the federal Dept of Fisheries and Oceans. PAUL H. LEBLOND

Reading: K. Johnstone, *The Aquatic Explorers* (1977); D.A. Ross, *Introduction to Oceanography* (1982).

October Crisis, the kidnapping on 5 Oct 1970 of James Cross, the British trade commissioner in Montréal, by members of the FRONT DE LIBÉRATION DU QUÉBEC. The kidnappers' demands, communicated in a series of public messages, included the freeing of a number of convicted or detained FLQ members and the broadcasting of the FLQ manifesto. The manifesto, a diatribe against established authority, was read on Radio-Canada, and on Oct 10 the Québec minister of justice offered safe passage abroad to the kidnappers in return for the liberation of their hostage; but on the same day a second FLQ cell kidnapped the Québec minister of labour and immigration, Pierre LAPORTE. On Oct 15 the Québec government requested the assistance of the Canadian Armed Forces to supplement the local police, and on Oct 16 the federal government proclaimed the existence of a state of "apprehended insurrection" under the WAR MEASURES ACT. Under the emergency regulations, the FLQ was banned, normal liberties were suspended, and arrests and detentions were authorized without charge. Over 450 persons were detained in Québec, most of whom were eventually released without the laying or hearing of charges. On Oct 17 the body of Pierre Laporte was found in a car trunk near St Hubert airport.

In early Dec 1970, the cell holding James Cross was discovered by police, and his release was negotiated in return for the provision of safe conduct to Cuba for the kidnappers and some family members. Four weeks later the second group was located and arrested, subsequently to be tried and convicted for kidnapping and murder. Emergency regulations under War



Demonstrators in Montréal protesting the implementation of the War Measures Act during the October Crisis (*courtesy Canapress*).

Measures were replaced in Dec 1970 by similar regulations under the Public Order (Temporary Measures) Act which lapsed on 30 Apr 1971. The federal response to the kidnapping was intensely controversial. According to opinion polls, an overwhelming majority of Canadians supported the Cabinet's action, but it was criticized as excessive by Québec nationalists and by civil libertarians throughout the country. Supporters of the response claim that the disappearance of terrorism in Québec is evidence of its success, but this disappearance might equally be attributed to public distaste for political terror and to the steady growth of the democratic separatist movement in the 1970s, which led to the election of a PARTI QUÉBÉCOIS government (1976).

After the crisis the federal Cabinet gave ambiguous instructions to the RCMP Security Service, permitting dubious acts which were later condemned as illegal by the federal INQUIRY INTO CERTAIN ACTIVITIES OF THE RCMP and the Keable Commission (D'enquête sur des opérations policières en territoire Québecois) in Québec. The federal minister of justice in 1970, John TURNER, justified the use of War Measures as a means of reversing an "erosion of public will" in Québec, and Prem Robert BOURASSA similarly conceded that it was intended to rally popular support to the authorities rather than to confront an "apprehended insurrection." DENIS SMITH

Octopus, common name for all 8-armed cephalopod MOLLUSCS; it more properly refers to the largest genus in order Octopoda (over 100 species). Octopuses are also called devil fishes for the "horns" (cirri) behind their eyes, but the image of an 8-legged cat is more apt. They have large slit eyes and explore the sea bottom with catlike intelligence, pouncing on prey, eg, crabs. Canada has 2 of the world's largest octopods: the Pacific *Octopus dolfleini*, a slow but typical benthic (bottom-dwelling) hunter of up to 80 kg; and the Atlantic *Alloposus mollis*, which floats in the PLANKTON like a 40 kg jellyfish. There are 9 smaller species. The paper-thin "shells" of the octopod *Argonauta* (paper nautilus) occasionally drift to Canadian shores from the tropics. Not true shells, they are boatlike nests secreted by the female and used by her as a brood chamber and retreat. R.K. O'DOR

Odell, Jonathan, doctor, clergyman, spy, poet, politician (b at Newark, NJ 25 Sept 1737; d at Fredericton 25 Nov 1818). He was trained in medicine but entered the Church of England ministry. He served as parish priest at Burling-

ton, NJ, until his LOYALIST political sympathies forced him to flee to New York in 1776 during the AMERICAN REVOLUTION. There he worked for the Loyalist cause as an administrator and satiric poet-propagandist. He was also a secret go-between in the espionage activities of Benedict ARNOLD and John André. In 1784 he immigrated to New Brunswick, having been appointed provincial secretary as a reward for his loyalty. He was influential and respected in NB politics.

THOMAS B. VINCENT

Odjig, Daphne, artist (b at Wikwemikong IR, Manitoulin I, Ont 11 Sept 1919). Of a Potawatomi father and English war-bride mother, she was encouraged in her early artistic expression by her grandfather and father, tombstone carvers and artists. Leaving the reserve in 1938, she migrated to BC and was ultimately elected to the BC Federation of Artists. Her work has been influenced by the growing political awareness of her people and her experiences in native communities in Manitoba during the 1960s. In 1970 she opened a gallery devoted to native art in Winnipeg and, with MORRISSEAU, JANVIER, BEARDY and others, formed the short-lived but significant Professional Native Indian Artists' Assn (1973). Odjig has developed a unique synthesis of western styles (cubism, surrealism) and native world view to express the universal themes of identity, family relationships and spirituality. A central motif is the curved arch enclosing her figures in lyric, rhythmic line. Her work has been exhibited in Europe, Israel and Japan. Her great mural *The Indian in Transition* (1978) graces the National Arts Centre in Ottawa, and her influence is evident in the work of many younger native artists.

ROSAMOND M. VANDERBURGH



Native artist Daphne Odjig shown with her massive painting *The Indian in Transition (courtesy Canapress).*

Odlum, Victor Wentworth, journalist, soldier, diplomat (b at Cobourg, Ont 21 Oct 1880; d at Vancouver 4 Apr 1971). He served in the South African War and WWI, and between the wars pursued a career as a journalist. He was connected with several newspapers, including the Vancouver *Daily Star,* of which he was publisher 1924-32. In the late 1930s he served on the Canadian Radio Broadcasting Commission. With the rank of major-general, he commanded the 2nd Canadian Division (1940-41) and was released to become high commissioner to Australia and Canada's first ambassador to China, 1943-46. An admirer of Chiang K'ai-shek, Odlum was out of step with events in China, although many of his proposals regarding Canada-China relations were innovative. He was ambassador to Turkey 1947-52. BRIAN L. EVANS

O'Donoghue, Daniel John, printer, trade union leader, politician (b at Lakes of Killarney, Ire 1844; d at Toronto 16 Jan 1907). "The father of the Canadian labour movement" began his apprenticeship as a printer in Ottawa at age 13. He helped organize the Ottawa Typographical Union, 1867, promoted the Ottawa Trades Council, and was elected vice-president of the Canadian Labour Union in 1873. He was elected to the Ontario Legislature in 1874 as an independent workingman, but moved ever closer to MOWAT's Liberal government. As chairman of the legislative committee of the Toronto Trades and Labour Council, he was at the centre of labour politics in the 1880s. Joining the KNIGHTS OF LABOR in October 1882, O'Donoghue quickly emerged as the chief Canadian lieutenant, handling the delicate negotiations with French Canadian Roman Catholic bishops who had condemned the order as a "secret society." Although loyal to what he thought best for his class, he remained a Liberal partisan. Appointed a clerk in the Ontario Bureau of Industry in 1885, he was Canada's first federal fair wages officer, 1900-07. His son John was to become Canada's first prominent labour lawyer.

G.S. KEALEY

Office Automation is a general term that includes a wide range of applications of computer, communication and information technologies in office environments. Though the process is still considered to be in its early stages, it is clear that the TECHNOLOGY available in 1985 is much more advanced than what was on the market in the mid-1970s. Automation is in a state of flux, but the size of the market is already huge, with annual investments measured in billions of dollars. Most experts believe that the progress achieved by the early 1980s is just the beginning of what will be a continued period of rapid expansion.

The technology we see today had its start in the 1960s, when 3 clearly identifiable streams of development became evident. The first was computing, where the earliest applications were automated payroll and inventory-control systems. Other applications were also limited to the processing of numerical data. These systems were usually operated only by programmers in the data-processing divison of the organization, who jealously guarded their computers and the power their knowledge of the computer gave them. Nevertheless the applications of computers in organizational settings grew to include more and more kinds of data processing.

The second stream of technological development was in the area of text processing. In the mid-1970s IBM introduced a product called the MCST — Magnetic Card Selectric Typewriter. This device had a box crammed with electronic equipment. The operator would insert a specially coated card the size and shape of a standard IBM punch card into a slot on the top of the box and type on the attached typewriter as usual. The card served as a memory device, on which the text would be written in a code based on magnetized spots. Once it was entered, the text could be edited and played back, causing a new copy to be typed out on the attached typewriter. Compared to current word-processing systems, this one was primitive, but it was more advanced than anything else on the market at the time and it worked. A string of improved versions of this typewriter-with-a-memory — also known as the word processor — were subsequently developed and made available.

While the first 2 streams were centered around the processing of information in the office, the third, COMMUNICATIONS TECHNOLOGY, focused on the movement of information from one place to another. A wide range of techniques to achieve this end were introduced, from telex and facsimile services to services using specially conditioned TELEPHONE lines and others using sophisticated satellite links between distant points (*see* SATELLITE COMMUNICATIONS).

When the 3 technologies are incorporated into an office environment, many improvements become possible, but they are mostly improvements in the speed with which work is done rather than in the kind of work that is done. Office automation in the 1980s is beginning a new trend — the integration of previously separate capabilities into single powerful "work stations." An automated office using the best technology commercially available in 1984 would probably have at least the following capabilities. *Communicating word-processing* abilities, including spelling correction and access through a local-area network or over telephone lines to information previously stored on files at other locations, together with the ability to communicate with other stations on the net or on other nets. *Electronic messaging systems* including any combination of text, graphics and voice. They help users to compose and send messages to others on the same net or, through gateways, to people on different nets in other places. *Activity-management systems,* including time-management, project planning and scheduling, and electronic calendar capabilities, useful to managers and planners in large organizations. *Electronic filing cabinets,* ranging from straightforward storage and retrieval systems, where the user does much of the work of storing and retrieving, to sophisticated natural-language expert systems. These provide assistance for people who deal with large volumes of diverse types of rapidly changing information. Assistance in managing information is a natural complement to technologies aimed at the creation of more information. *Decision-support systems* — the most complex of the capabilities in office-automation packages. These systems include sophisticated programs that allow the user to perform complex analyses on large data bases in a way that improves the speed and quality of decisions that are made.

Most of the capabilities mentioned above make use of 2 or 3 of the original technologies. It is this integration of the previously separate capabilities that gives the new technology its power, and that provides the base upon which new applications will be developed in the near future.

The Impact of Office Automation The implementors of office-automation systems hope that the technology will improve the productivity of their organizations and lead to improvements in the quality of their products. Some also realize that the more information there is on a complex computer system, the more power they can exercise over the operation and co-ordination of that system. This makes it possible to develop larger, more complex organizations that are able to react more quickly and appropriately in the face of a dynamic economic and political environment. Others realize that the new technologies have the potential to strengthen the power of transnational corporations in Canada and contribute to the erosion of Canadian autonomy; to displace many people (especially women) whose jobs will be automated; and to "de-skill" the jobs of others who must learn to work for the new machines that make the decisions, rather than working with older, less sophisticated technologies.

There is a rising level of fear of the new technologies and the impact they will have on job security and on the privacy of the individual (*see* COMPUTERS AND SOCIETY). There is also concern that the Canadian economy will suffer greatly if Canadian organizations do not develop and adapt to the new technologies. Numerous studies have debated whether or not the new technologies will result in an overall reduction in the number of jobs or a dramatic improvement in the quality of working life. Most of this research is flawed by neglect of the policies and intentions of those making the decisions about what is to be automated and how the automation is to be accomplished. It is safe

to say, however, that the technologies will have a significant impact on the working lives of millions of Canadians in the coming decades. *See also* INFORMATION SOCIETY. WILLIAM RICHARDS

Reading: S.R. Hiltz and M. Turoff, *The Network Nation* (1978); R. Landau, J.H. Bair and J.H. Siegman, eds, *Emerging Office Systems* (1982); H. Menzies, *Women and the Chip* (1981); P.A. Russell, *The Electronic Briefcase: The Office of the Future* (1978); J.M. Shepard, *Automation and Alienation: A Study of Office and Factory Workers* (1971), D. Tapscott, *Office Automation* (1982); G.B. Thompson, *Memo from Mercury: Information Technology Is Different* (1979); R.P. Uhlig, D.J. Farber and J.H. Bair, *The Office of the Future* (1979).

Official Languages, Commissioner of, is appointed to a 7-year term by Parliament under the OFFICIAL LANGUAGES ACT (beginning in 1969); a reappointment may not exceed 7 years. The commissioner, responsible for compliance with the spirit and intent of the Act in the Government of Canada and in Parliament and for ensuring equal recognition of the status of English and French as official languages (*see* LANGUAGE POLICY), has the authority to investigate complaints of violations of the Act as well as to initiate the examination of possible violations. Results of such investigations may be reported directly to the individuals or agencies involved and are outlined in some cases in special reports to Parliament. The commissioner reviews his office's activities and makes recommendations in an annual report.

Official Languages Act (1969), federal statute that declares French and English to be the official languages of Canada, and under which all federal institutions must provide their services in English or French at the customer's choice. The Act (passed following the recommendation of the Royal Commission on BILINGUALISM AND BICULTURALISM) created the office of Commissioner of Official Languages to oversee its implementation. Politically the Act has been supported by all federal parties, but the public's understanding and acceptance of it has been mixed. *See* LANGUAGE POLICY. MAX YALDEN

Official Secrets Act, the most important statute relating to national security, is designed to prohibit and control access to and the disclosure of sensitive government information; offences cover espionage and leakage of government information. The term "official secrets" is not defined comprehensively in the legislation, but broadly, official secrets may be considered any information of an official character. It is clear that prohibited places, code words, passwords, plans, models, articles, notes or other documents can be regarded as official secrets under the Act. There is some controversy over whether information involved must be secret (in Britain there is no such requirement). In the 1978 prosecution of the Toronto *Sun*, the judge presiding at the preliminary inquiry assumed that the information did indeed have to be secret. In one 1948 case the Québec Court of Appeal determined that the Act does not apply to information that has been published, publicized or has fallen into the public domain. The first Official Secrets Act was passed in England in 1889 and with minor modifications became law in Canada in 1890. In 1892 its provisions were transferred to the first Criminal Code of Canada until their repeal and replacement by the Official Secrets Act, 1939. This new Act combined into one the English Acts of 1911 and 1920. Minor changes were made in 1950, 1967 and 1970. An important addition was made in 1973 in the form of a broad power to conduct wiretap investigations pursuant to executive, as opposed to judicial, authorizations.

The Mackenzie Commission of 1969 described the legislation as "an unwieldy statute couched in very broad and ambiguous language" and one possessing "unusual" and "extraordinarily onerous" evidentiary and procedural provisions relating to espionage cases. Successive royal commissions have criticized the broad powers of search and seizure conferred under the legislation of substantive offences, eg, leakage of classified information, created by the statute. Over 50% of the 22 Canadian prosecutions under the Official Secrets Act arose as a result of the defection of Igor GOUZENKO in 1946 and his revelations about a series of Soviet spy rings operating in Canada. Only 4 prosecutions have occurred since 1961. Two of the most recent cases have involved the leakage provisions of the Act, and in both of these 1978 prosecutions charges were dismissed. The Royal Commission of INQUIRY INTO CERTAIN ACTIVITIES OF THE ROYAL CANADIAN MOUNTED POLICE (McDonald Commission) noted in 1979 that "much more is needed by way of legislative reform than the mere dismantling of the Official Secrets Act and the recognition of espionage and leakage as separate kinds of offences. The definition of these offences in the Official Secrets Act leave much to be desired...it is now time for this part of our law to be revised so that it is both clear and in tune with the values and needs of contemporary Canada." STANLEY A. COHEN

Offshore Mineral Rights Reference (1967) The Supreme Court of Canada, in a decision about the ownership of seabed mineral rights off BC and on the legislative jurisdiction over these rights, decided that Parliament, not the BC legislature, owned the territorial seabed adjacent to that province and enjoyed exclusive legislative jurisdiction by virtue of the CONSTITUTION ACT, 1867 (s91.1A), ie, Parliament's residuary power. Rights in the territorial sea derive from INTERNATIONAL LAW and Canada is the sovereign state recognized by international law. BC could not claim the rights of the continental shelf either, according to the rights under international law defined in the Geneva Convention (1958). GÉRALD-A. BEAUDOIN

Ogilvie, Will, painter (b at Stutterheim, S Africa 30 Mar 1901). The first official Canadian war artist (appointed Jan 1943), he painted many of his war works under fire, for which he was awarded the OBE. In Johannesburg Ogilvie studied with Erich Mayer. After emigrating in 1925, he studied at New York's Art Students League (1927-30) with Kimon Nicolaides, whose standard text on drawing, *The Natural Way to Draw* (1941), gave Ogilvie solid preparation for his war work. War artists Alex COLVILLE, Charles COMFORT, Lawren HARRIS and Campbell Tinning considered Ogilvie the best of the group. He himself loved Goya, Piero della Francesca and British war artist Paul Nash. There seem to be few traces of his enthusiasms, however, in his detailed, lovingly drawn work. His drawings in the field were spontaneous; his paintings more formal and symbolic. After the war, he taught at the Ontario College of Art 1947-57, then as lecturer at U of T (1960-69). JOAN MURRAY

Will Ogilvie's fine drawing *Return of a Foot Patrol* shows Canadian soldiers in the flooded terrain of Holland during WWII *(courtesy Canadian War Museum/NMM/NMC/13537)*.



Ogopogo, fabled acquatic monster said to inhabit Okanagan Lake. The Salish called it "snake in the lake"; the Chinook called it "wicked one" and "great beast in the lake." Representation appeared in precontact petroglyphs. Like "Nessie," the Orm of Loch Ness, Ogopogo is variously described as having the head of a sheep or a horse and a long serpentine neck, and is reported to swim with an undulating motion; it is generally "sighted" as several humps moving rapidly through the water. The name "Ogopogo" is a palindrome from a comic English music-hall song, "Ogopogo Song." Okanagan Lake has temperamental weather conditions, which might explain the apparition, and an ill-defined lake bottom, which gives rise to speculation about long-trapped dinosaur eggs released by movements of the Earth's crust. CAROLE H. CARPENTER

O'Grady, Standish, clergyman, farmer, poet (*fl* 1793-1841). Born in Ireland, he was educated at Trinity Coll, Dublin, and was ordained into the Church of Ireland ministry. Poverty forced him to immigrate to Lower Canada in 1836 where he settled on a farm near Sorel. He is remembered in Canada for his long narrative poem *The Emigrant*, published in Montréal in 1841, in which he describes the hardships of settlement life and expresses his profound dislike for the social, cultural and climatic environment of Canada. In his nostalgic yearnings for the "old country" and his unhappiness over hardships in the "New World," he epitomizes the main characteristics of the emigrant theme in early Canadian literature. THOMAS B. VINCENT

O'Hagan, Howard, writer (b at Lethbridge, Alta 17 Feb 1902; d 1982). O'Hagan was one of the first native-born westerners to make a mark on Canadian literature and is best known for his novel of the Rocky Mountains, *Tay John* (1939).

His life is almost as noteworthy as his writing. As a youth, he worked on survey parties in the Rockies. He later studied law at McGill and, upon graduation in 1925, returned West. In his oft-quoted words, "I practised law for a month in Jasper, put one man into jail and got another out." He returned to guiding and packing through the mountains, with the famous Brewster outfitting. After a stint as chief of publicity for the Central Argentine Ry, he lived in Australia, the US, England and Italy.

More than any other modern writer, O'Hagan has been the quintessential "mountain man" who knew the wilderness intimately and celebrated it through fiction. The protagonist of *Tay John* is a blonde giant, "Tête Jaune," whose legend inspired the naming of Yellowhead Pass through the northern Rockies. It is a fictional account, set in 1880, about a primitive half-breed outcast who becomes a myth, both worshipped and despised, before disappearing into the earth from which he had sprung. O'Hagan's short fiction is also respected. *The Woman Who Got on at Jasper Station & Other Stories* (1963) is a collection of 11 powerful short tales. *Wilderness Men* (1958), 10 biographies of western heroes, includes Grey Owl and the legendary West Coast fugitive, Gun-an-noot. A more recent novel is *The School-Marm Tree* (1977). O'Hagan lived in Victoria, B.C. with his wife Margaret Peterson, a noted artist. KEN MITCHELL

Oil, Chemical and Atomic Workers International Union v Imperial Limited et al In 1961 the BC legislature prohibited trade unions from using membership fees paid under collective agreement checkoff provision for political purposes. The OCAW challenged the statute on the ground that only Parliament has constitutional jurisdiction to restrict a union's federal political activities. The majority of the Supreme Court of Canada rejected the union's argument and held that the legislation was within provincial jurisdiction as it concerned the control of labour relations in the province. This decision upheld a major restriction on trade-union political activity. TIMOTHY J. CHRISTIAN

Oil and Natural Gas, liquid and gaseous forms of PETROLEUM, are the most important ENERGY commodities (along with electricity) of the 20th century because of their relatively low cost, convenience of use and widespread distribution. Oil replaced COAL as the world's (and Canada's) most important fuel after WWII. Natural gas has become increasingly important with the spread of PIPELINES, distribution utilities and liquefied-natural-gas tanker and storage systems. Natural gas has already replaced oil in many applications, not only for industrial, residential and commercial heating, but also as an automotive fuel and petrochemical feedstock. In future it may become the dominant fuel in much of the world.

Good-quality crude oil, free flowing and low in sulphur, is formed only under a narrow range of temperatures and pressures in sedimentary basins. After more than a century of exploration, geologists believe they have delineated most of the major, easily accessible reservoirs of crude oil. Most of the remaining large fields are believed to be located in remote arctic regions and offshore waters. The other large source of oil is synthetic crude oil refined from BITUMEN in areas such as the Alberta oil sands and Venezuela's Orinoco heavy-oil deposits. Although there are vast resources of bitumen (known deposits are as large as the conventional oil resources of the Persian Gulf nations), the costs of upgrading it into synthetic crude are almost as high as those of developing competing fuels from COAL LIQUEFACTION and BIOMASS.

Until the rapid price increases of the 1970s, the PETROLEUM INDUSTRIES did not explore for natural gas. The gas was found as a by-product of conventional oil drilling and was considered a waste product. Large quantities were simply burned (flared) on site. The move to petroleum conservation has reduced flaring to a minimum, but there is often no alternative in remote areas far from pipeline hookups. PETROLEUM EXPLORATION now indicates that large reserves of natural gas exist in areas outside the regions already explored. In the US, large reserves of gas have been found in "geopressurized zones" at depths below 4000 m, where oil is seldom found and little drilling had been conducted. In addition to the "glut" of gas discovered in western Canada in the late 1970s and early 1980s, major natural-gas reserves have also been found in the arctic islands and offshore NS.



Turner Valley discovery well (*courtesy Glenbow Archives/ photo by W.J. Oliver*).

Although natural gas can substitute for oil in most uses, it is an expensive and lengthy process to switch an economy from the scarcer to the more plentiful fuel. In 1984, converting a single automobile from gasoline to compressed natural gas (CNG) cost about $1800. However, if world oil shortages recur, Canada is likely to move towards a much greater reliance on natural gas. Government ENERGY POLICY already has encouraged this move, and many technologies are now ready to take advantage of the next major swing in the oil market, but the actual rate of change will depend on patterns of energy pricing, conservation and use. ROBERT D. BOTT

Oil City, Alta, site of western Canada's first producing oil well, known previously as Original Discovery No 1, located in WATERTON LKS NATIONAL PK. Kutenai had used oil from seepage pools along Cameron Cr and early settlers used it to lubricate wagons. In 1878 A.P. Patrick, a Dominion surveyor, drilled a primitive well, but it was not until 1901, when Patrick, John Leeson and John Lineham (a local rancher) formed the Rocky Mountain Development Co, that drilling began in earnest. Oil was struck at 300 m in Aug of that year. Hopes for a local boom were raised, but the well was erratic and was closed in 1906 after producing 32 000 litres. A cairn in the shape of an oil rig marks the historic site of this pioneer development in Alberta's oil industry. ERIC J. HOLMGREN

Oilseed Crops are grown primarily for the oil contained in the seeds. The oil content of small grains (eg, wheat) is only 1-2%; that of oilseeds ranges from about 20% for SOYBEANS to over 40% for SUNFLOWERS and rapeseed (CANOLA). The major world sources of edible seed oils are soybeans, sunflowers, rapeseed, cotton and peanuts. Seed oils from FLAX (linseed) and castor beans are used for industrial purposes. Edible fats and oils are similar in molecular structure; however, fats are solid at room temperature, while oils are liquid. Fats and oils are essential nutrients, comprising about 40% of the calories in the diet of the average Canadian. Edible vegetable oils are used as salad or cooking oils, or may be solidified (by a process called hydrogenation) to make margarine and shortening. These products supplement or replace animal products (eg, butter, lard), supplies of which are inadequate to meet the needs of an increasing world population.

While there are many uses for industrial vegetable oils, total world production is only about 3% of that of edible oils. Industrial applications are based on the properties of particular fatty-acid components of these oils. For example, flaxseed oil, rich in the unsaturated fatty acid linolenic, is a drying oil and is used in protective coatings (eg, paints, varnishes). Vegetable oils are used in putty, printing inks, erasers, coating or core oils, greases, plastics, etc. The residue remaining after the oil has been extracted from oilseeds is an important source of nutrients for farm animals. Oilseed meals from soybeans, peanuts, rapeseed and flaxseed are rich in protein; mixed with other ingredients (eg, cereal grains), they provide nutritionally balanced feeds.

The major oilseeds grown in Canada are soybeans, sunflowers, canola and flax. In addition, experimental production of peanuts on a commercial scale began in 1981 in SW Ontario. Plant breeding experiments are underway at the Agriculture Canada RESEARCH STATION, Saskatoon, Sask, to develop an edible oil from mustard seed and a usable animal feed from the residue. The program involves reducing the content of 2 harmful substances, erucic acid and glucosinolate, which were formerly a problem in rapeseed oil.

Soybeans require a relatively long growing season (100-140 days) and warm temperatures; hence, Canadian production is concentrated in SW Ontario. Sunflowers will tolerate a somewhat shorter (100-120 days), cooler growing season; most Canadian production occurs in southern Manitoba. Flax and canola are adapted to the relatively short, cool growing season of the Prairie provinces and most production occurs in that area. The size of the area of adaptation and the development of varieties with improved quality have permitted canola to become the major edible oilseed crop in Canada.

Cultural practices have been developed to obtain optimum production from each crop. Soybeans and sunflowers are usually grown as row crops; flax and canola are solid seeded. The usual seeding rate for soybeans is 130 kg per hectare; sunflowers, 6 kg/ha; canola, 7 kg/ha;

flax, 38 kg/ha. Small-seed crops, flax and canola, are seeded at depths of 2.5-4 cm; larger-seeded crops, sunflowers and soybeans, may be seeded up to 10 cm deep, if deep seeding is required to reach moist soil. Weeds are controlled by cultivation in the row crops; by crop rotation in solid-seeded crops; and by extensive use of herbicides. Diseases are controlled by using disease-resistant cultivars (commercial varieties), by seed treatments and fungicides. Insecticides are used to control outbreaks of INSECT PESTS (*see* PESTICIDES).

From 1976 to 1980, the average seed yields for flaxseed, canola, soybeans and sunflowers in Canada were 940 kg/ha, 1193 kg/ha, 2174 kg/ha and 1238 kg/ha, respectively. High soybean yields can be attributed to the longer growing season and relatively favourable moisture conditions in Ontario. The other major oilseed crops are grown in a shorter, dryer season and yields are often reduced by moisture deficiencies. From 1976 to 1980, average annual production of flaxseed, canola, soybeans and sunflowers in Canada was 0.5, 2.45, 0.53 and 0.12 million t, respectively, valued at $1 billion annually. Edible oilseed production, which began during WWII, now provides the raw material for a multimillion-dollar crushing, refining and processing industry. During the last 3 decades, Canada has changed from a major importer to a net exporter of edible oil and oilseeds.

B.R. STEFANSSON

Ojibwa The term Ojibwa (Ojibway, Chippewa) derives from Outchibou, the 17th-century name of a group living N of Sault Ste Marie, Ont. They were one of a series of closely related but distinctly named groups residing between northeastern Georgian Bay and eastern Lk Superior to whom the term Ojibwa was later extended. Those peoples who congregated near present-day Sault Ste Marie were also called Saulteurs or Saulteaux. Although groups identified as Ojibwa in 17th-century French records totalled around 4500 persons, historic population movements into new areas, combined with the later application of the label Ojibwa to some neighbouring groups, enlarged the population and the territory occupied. The Ojibwa speak a Central Algonquian language closely related to ALGONQUIN, OTTAWA, CREE and Potawatomi.

At contact, the Ojibwa subsisted by hunting, fishing and gathering, resided in conical or dome-shaped birchbark dwellings, wore animal-skin clothing and travelled by birchbark CANOE in warm weather and SNOWSHOES in winter. Politically autonomous summer villages of 150-300 persons appear to have borne totemic names. An appropriate spouse was a person categorized as a cross-cousin — the child of either the mother's brother or father's sister. Ojibwa religion was animistic, the natural world being inhabited by numerous spirits both good and evil, some of which required special treatment. Bear ceremonialism and the vision quest to obtain a guardian helper were practised. A SHAMAN cured the ill and performed SHAKING TENT rites to communicate with spirits. After about 1700, the MIDEWIWIN or Grand Medicine Society was conducted by an organized priesthood among the more westerly Ojibwa.

The European FUR TRADE profoundly affected the Ojibwa. Initially, they received French trade items for furs from Nipissing and Algonquin, but following the mid-17th-century dispersal of the HURON and neighbouring Algonquians, the Ottawa and their Ojibwa allies became middlemen to tribes farther west. The Ojibwa participated in the occasional multi-tribal FEAST OF THE DEAD at which furs and trade goods were distributed. The western expansion of the French fur trade and the establishment of the English HUDSON'S BAY COMPANY trade near James Bay and Hudson Bay drew some Ojibwa into new areas, first as temporary trader-hunters, but later as permanent residents. Between 1680 and 1800, 4 divisions of Ojibwa emerged, each representing a different adaptation to environmental and contact conditions. Those who moved S of Lk Superior into Wisconsin and Minnesota, displacing, often forcefully, the Dakota, are known as the Southwestern Chippewa. The harsher environment of the coniferous forests of northern Ontario and Manitoba was exploited by the Northern Ojibwa. After 1780 some shifted to Manitoba, Saskatchewan and N Dakota, becoming the Plains Ojibwa or Bungi. Still others, now known as Southeastern Ojibwa, moved into S-central Ontario and the lower Michigan Peninsula. Although most Ojibwa continued to live by hunting, fishing and gathering, some, particularly those in southern Ontario, adopted farming. Today, Ojibwa occupy reserve communities in these 4 areas.

Before 1760 most Ojibwa supported the French but became British allies during the American Revolution and WAR OF 1812. The social and economic life of all Ojibwa groups was affected by the fur trade. Aboriginal items were replaced by western materials and certain natural resources became depleted. Family-possessed fur-hunting territories emerged among northern groups. First in the SE and later in more remote areas, Ojibwa became at least nominal Christians. Most Ojibwa did not sign treaties with the government until after 1850, at which time each BAND-reserve community elected a chief and council.

From perhaps 10 000 persons at contact whose descendants are now called Ojibwa, the population has grown to over 100 000 in 1981, two-thirds of whom live in Canada. There is also a large MÉTIS population. Among and within Ojibwa communities there is considerable socio-economic variability, depending on the ability to exploit natural resources and gain access to Canadian markets. Arts and crafts have recently been revitalized and several Ojibwa artists have gained international recognition. *See also* NATIVE PEOPLE: EASTERN WOODLANDS, and general articles under NATIVE PEOPLE.

CHARLES A. BISHOP

Reading: Handbook of North American Indians, vol 6: *Subarctic*, ed J. Helm (1981); vol 15: *Northeast*, ed B.G. Trigger (1978).



Dancer from the Ojibwa tribe of the Great Lakes region performing at the Odawa Native centre, Nepean, Ont (*photo by Jim Merrithew*).

Oka, Qué, UP, pop 1538 (1981c), is located on Lac-des-Deux-Montagnes, 10 km W of Montréal I. Established in 1875, the village developed at a strategic position on a point of land that extends well into the lake. In 1717 the governor of New France granted the seigneury of Lac-des-Deux-Montagnes to the clergy of the Séminaire de Montréal so they could build a mission to the Indians. In 1881 Trappist monks from France founded their famous Abbey of Notre-Dame-du-Lac. La Trappe, as it is also called, is one of the largest Trappist monasteries in the world. In 1962 the provincial government developed Parc Paul-Sauvé a few km downstream from the village, its main attraction being its large bay, an ecological sanctuary and the Montagne du Calvaire, on whose peak the seigneurs built a pilgrimage site in 1739 for the Indians who went there every autumn before setting out on their hunt. Some 600 Indians still live at Oka.

GILLES BOILEAU

Okak, archaeological sites in northern LABRADOR that represent a microcosm of more than 5000 years of PREHISTORY. Excavations have revealed sites of 4 major cultures that occupied the area. The earliest of these is a southern-derived Indian culture called the Maritime ARCHAIC tradition. About 4000 years ago a new people, known to archaeologists as Early Paleoeskimos, arrived from the north and expanded southward at the expense of the earlier Indian peoples. These people continued to move southward along the Labrador coast and eventually populated the island of Newfoundland. They became extinct shortly after 2200 years ago but were replaced by a second group of Paleoeskimos known as Dorset Eskimo. They, in turn, apparently became extinct sometime following 1200 AD, perhaps at about the same time that the ancestors of the present-day LABRADOR INUIT arrived from the N in the Okak region. *See also* ARCHAEOLOGY.

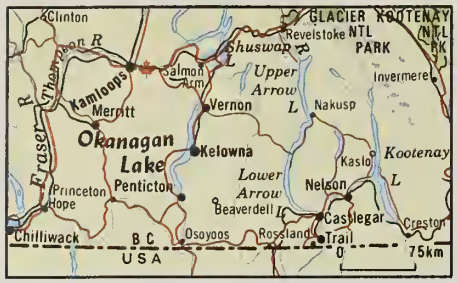
JAMES A. TUCK

Okanagan Valley, BC, roughly 200 km long (in Canada) and 20 km wide, lies between the Columbia and Cascade mountain ranges in S-central BC. Its landscape of low hills and oblong lakes was formed by glacial activity during the Tertiary and Pleistocene eras, the final retreat (between 11 000 and 9000 years ago) leaving large deposits of gravel, silt and sand on the bottom and sides of the valley. These sediments were eroded by water and wind, resulting in large alluvial fans and deltas such as those on which VERNON, KELOWNA and PENTICTON partly stand. It is these sediments which have been colonized and used for agriculture. Spilled along the valley floor are the watery remnants of a large glacial lake, the largest of which is Okanagan Lk. Lying in a string to the E are Swan, Kalamalka and Wood lakes; to the S lie Skaha, Vaseaux and Osoyoos lakes. The whole system drains S through the Okanagan R into the COLUMBIA R.

The valley lies in the shadow of the Cascade Mts, creating a hot, sunny, dry climate. Most of the valley receives about 2000 hours of sunlight per year and 30-40 cm of precipitation. The southern valley, around Vaseaux Lk, which gets less than 30 cm of precipitation, is desertlike, with cactus, rattlesnakes and painted turtles.

The valley contains the largest concentration of population in interior BC (about 8% of the provincial total). The 3 largest centres are Kelowna (59 196), Penticton (23 181) and Vernon (19 987). Enderby (1816) and Armstrong (2683) lie in the dairy and vegetable-growing region of the northern valley, and Okanagan Falls (1030), OLIVER (1893) and OSOYOOS (2738) in the dry fruit-growing area S of Penticton.

The valley was first inhabited by the Okanagan tribe of the Interior SALISH, who likely gave the valley its name, translated roughly as "place of water." There are large Indian reserves



on the NW arm of Okanagan Lk, SW of the lake and N of Osoyoos, and others near Enderby and Kelowna. David Stuart, a Scottish fur trader in the employ of the PACIFIC FUR CO, was likely the first white person to see the valley (1811), and his cousin, John Stuart of the HBC, followed the trail (1814) through the valley that continued to be used until 1847 by fur traders, and later by miners. Missionaries built the first settlements at the head of Okanagan Lk about 1840 and near Kelowna in 1857. Some miners stayed on after a small gold rush at Cherry Creek (50 km E of Vernon), as did a few of the OVERLANDERS OF 1862. Ranching, in the northern valley, was the first viable industry.

Next to the FRASER RIVER LOWLANDS, the Okanagan Valley is the most important agricultural region in BC. The primary crop is fruit, which was first planted by Oblate missionaries near Kelowna (1862) and by Hiram "Okanagan" Smith near Penticton (about 1869). Lord ABERDEEN, who owned a huge range in the northern valley, gave a strong impetus to fruit growing (1890s) by offering land for this purpose. New plantings were made around Osoyoos for soldiers returning after WWI. The pioneer orchards suffered from inadequate irrigation, winter freezes, the codling moth and an inadequate marketing system. It was not until the 1930s that irrigation turned the semidesert of sagebrush into a premier fruit-growing area. Today the valley produces 30% of Canada's apples, 100% of its apricots, 60% of its cherries, 20% of its peaches and 50% of its pears and prunes. The first commercial plantings of grapes were made around Kelowna (1926) and today about 1400 ha support local and coastal wineries.

Growing numbers of tourists are attracted by the valley's scenic splendour, warm summers, freshwater beaches and numerous festivities. There are 2 large (Silver Star and Okanagan Mountain) and several smaller provincial parks in the valley. JAMES MARSH

O'Keefe, Eugene, brewer, banker (b at Bandon, Ire 10 Dec 1827; d at Toronto 1 Oct 1913). He came to Canada in 1832, was educated in Toronto schools and in 1846 became a junior accountant in the Toronto Savings Bank. On borrowed capital he founded Victoria Brewery, Toronto, in 1861, and the next year he bought Hannath and Hart Brewery, also of Toronto. By the 1890s O'Keefe was the largest brewer of lager beer in Canada, using refrigeration technology imported from the US. The company was incorporated as the O'Keefe Brewing Co Ltd in 1891. During the TEMPERANCE agitation he campaigned publicly to defend the sale of beer as an alternative to hard liquor, claiming that whisky was too cheap in Canada. Devastated by the death of his son in 1911, he sold out to a holding company under Sir Henry PELLATT, Sir William MULOCK and Charles Miller. This company was bought by E.P. TAYLOR in 1934 and incorporated into Canadian Breweries Ltd. O'Keefe was recognized for his benefactions to the Roman Catholic Church. ALBERT TUCKER

Okra (*Hibiscus esculentus* or *Abelmoschus esculentus*), annual VEGETABLE of the Malvaceae family, native to the Old World tropics. Many *Hibiscus* species are flowering ORNAMENTALS. Okra thrives best in hot weather, but dwarf types have been developed for sheltered gardens in short-season areas in Canada. Garden types may be 75-150 cm in height; their edible pods, 10-20 cm long. Usually seeded in warm soils, okra may be transplanted from GREENHOUSES or hotbeds at 4 weeks. INSECT PESTS are aphids, leaf miners and stinkbugs; PLANT DISEASES, mainly *Verticillium* wilt. In continuous warm weather, pods are edible 4-6 days after flowering. Okra can be stored for up to 2 weeks at 10°C and 85-90% humidity. Also called "gumbo," okra pods are used primarily in canned soups and stews because of their flavour and natural thickening properties. Okra contains vitamins A and C, magnesium, phosphorus and potash. V.W. NUTTALL

Old-Age Pension The first old-age pension (1927) was jointly financed by federal and provincial governments but administered by the latter. It paid up to $20 per month, depending on other income and assets, and was available to Canadian citizens 70 years of age and older, but only after they had passed a strict means test. In 1951 the federal government introduced the Old Age Security Act, which provided a universal pension of $40 per month paid and administered by the federal government to all Canadians, age 70 and over, without a means test. A second piece of legislation, the Old Age Assistance Act, a cost-shared program with the provinces, made a pension available to Canadians age 65 to 69, but retained the means test. By 1964 the universal pension had been raised to $75 per month, widely regarded as inadequate. The federal government then introduced the CANADA PENSION PLAN (1965), which requires almost all workers and their employers to contribute to a social-insurance plan that provides a wage-related pension on retirement as well as other benefits. It also introduced the Guaranteed Income Supplement program (1966), which paid a supplement of up to $30 per month to pensioners with little or no income other than their Old Age Security pension and which lowered the eligibility age for Old Age Security to 65. In 1975 the Old Age Security system was supplemented by Spouses' Allowances, a guarantee of a minimum monthly income to couples where only one person receives pension income while the other is between 60 and 64 years of age. By Dec 1984 the Old Age Security pension was $272.00 per month and the maximum Guaranteed Income Supplement was $323.00 and $211.00 for single and married pensioners, respectively. Over 2.5 million Canadians receive Old Age Security and about 1.3 million qualify for the supplement. A minority of pensioners also have an employer-sponsored pension to supplement their retirement income. DENNIS GUEST

Old Crow, YT, UP, pop 243 (1981c), a settlement of Loucheux Indians on the Porcupine R, is located 770 km N of Whitehorse and 112 km inside the Arctic Circle. The Loucheux settled at New Rampart House near the Alaska boundary in the 1870s when their original village around Ft Yukon was found to be on American soil. A smallpox epidemic decimated their numbers in 1911 and the survivors moved to the muskrat breeding grounds at the confluence of the Crow and Porcupine rivers. The new settlement was named for Walking Crow, a revered chief who died in the 1870s. H. GUEST



The community of Old Crow, located on the Porcupine R, YT (*photo by Richard Harrington*).

Old Crow Basin, in northern Yukon Territory, is important for the richness of its fossil record and the discovery there of some of the oldest artifacts in Canada. During the last major glacial period (the Wisconsinan), the basin was occupied by a single large lake in which a thick layer of clay was deposited. When the glacial lake drained, about 12 000 years ago, Old Crow R cut through the clay and deeper, older layers creating vertical bluffs more than 30 m high. Hundreds of thousands of fossils, representing many varieties of plants, invertebrates and vertebrates, were eroded from the layers beneath the lake clay. Many fossils were redeposited in and on newly formed riverbanks and bars. Among the vertebrate fossils are bones that bear the distinctive marks of breakage and cutting by people who may have killed or scavenged the animals — bones that radiocarbon dating places at about 25 000 years ago. The analysis of these fossils will yield a record of environmental change spanning more than 100 000 years. *See also* ARCHAEOLOGY; PREHISTORY. RICHARD E. MORLAN

Old Crow Plain, about 5000 km², elev 300 m, referred to locally as Old Crow Flats, is the northernmost part of the Porcupine Plateau in the Yukon, lying N of the Arctic Circle and 150 km S of the BEAUFORT SEA. The name honours the memory of an Indian chieftain of the Loucheux tribe. The plain is a pristine wilderness area underlain by continuous PERMAFROST and covered with a myriad of shallow lakes and ponds, some of which have an oriented rectangular shape related to prevailing wind directions and to patterned ground phenomena, eg, ice polygons and wedges. The vegetation is of the tundra type, with outliers of the boreal spruce forest; willow thickets line the course of the Old Crow R. Geologically the plain represents the floor of the intermontane Old Crow Basin, a structural depression of Tertiary age linking the Eastern and Interior Systems of the Cordillera. The basin is bordered on the E by the Richardson Mts, on the N by the British Mts and on the W and S by the Old Crow Range. The underlying sediments include a veneer of Holocene and Pleistocene clays, silts, sands and organics, overlying a thick sequence of Tertiary, Mesozoic and Paleozoic sediments, some of which are potentially oil bearing. The basin was one of the few areas in Canada untouched by glaciation during the Pleistocene ice ages, and it served as a refuge for many ice-age animals. However, abandoned high-level shorelines indicate that the flats were inundated by proglacial lakes during the ice ages. The modern Old Crow R, which joins the Porcupine R at the Indian village of Old Crow, is a meandering stream with numerous cutoffs and a well-defined terrace system. The river bluffs have yielded an enormous quantity of mammalian bones, together with artifacts of PREHISTORY. ALAN V. JOPLING

Oldman River, 430 km, rises near Mt Lyall in the Rockies of SW Alberta and flows S then E to join the BOW R and form the S SASKATCHEWAN R in Alberta. It receives tributaries from the US (St Mary R) and WATERTON LAKES NATIONAL PARK. One of few major non-glacial-fed rivers in Alberta, it drains 27 500 km² of mountains, foothills and prairie. Important as a water supply for FORT MACLEOD and LETHBRIDGE, it has numerous dams and diversions for irrigation in the Lethbridge Irrigation Dist and St Mary and Milk rivers developments. The new Three Rivers Dam is to be built near Brocket. The Oldman River's name may come from the Cree term for "old man's playground." IAN A. CAMPBELL

O'Leary, Michael Grattan, journalist, senator (b at Gaspé, Qué 19 Feb 1889; d at Ottawa 7 Apr 1976). O'Leary joined Ottawa's Press Gallery in 1911, representing the OTTAWA JOURNAL. He was close to most Conservative Party leaders. PM Arthur MEIGHEN took him along to the 1921 Imperial Conference, and O'Leary repaid the favour by standing as Gaspé's candidate in 1925, though unsuccessfully. O'Leary also supported Liberal ministers, such as C.D. HOWE, in columns and editorials. He eventually became editor of the *Journal*, which earned a reputation for high literary standards and good reporting. In 1961 O'Leary headed the Royal Commission on Publications, and in 1962 PM John Diefenbaker appointed him to the Senate. ROBERT BOTHWELL

Oliphant, Betty, ballet teacher (b at London, Eng 5 Aug 1918). A grande dame of Canadian dance and internationally famed educator, Oliphant came to Canada in 1947, where she founded the Canadian Dance Teachers Assn, opened a school and became ballet mistress of the NATIONAL BALLET OF CANADA (1951). In 1959 she became founding principal of the NATIONAL BALLET SCHOOL, now acclaimed one of the best anywhere. As principal of the school, and as associate artistic director of the National Ballet (1969-75), Oliphant helped shape the company's style and trained dancers and teachers for Canada and the world. Her accomplishments are widely recognized. At Erik BRUHN's request she reorganized the Royal Swedish Opera Ballet School (1967). Among the honours she has received are the MOLSON PRIZE (1978) and the Diplôme d'honneur of the Canadian Conference on the Arts (1982). PENELOPE DOOB

Oliver, BC, Village, pop 1893 (1981c), inc 1945, is located in the Okanagan R valley, 27 km S of Penticton. It was named after Premier John OLIVER, whose Liberal government (1918-27) sponsored the Southern Okanagan Lands Project, irrigating land to be settled by soldiers returning from WWI. Some mining, cattle ranching and fruit growing had existed previously in the area. Agriculture is the most important activity today, followed by mining, logging, tourism and specialized horticultural crops, with some manufacturing. Grape growing has recently expanded. WILLIAM SLOAN

Oliver, Frank, newspaper publisher, politician (b Peel County, Canada W 14 Sept 1853; d at Ottawa 31 Mar 1933). He was the son of Allan Bowsfield, but took his mother's maiden name. He brought the first printing press to Edmonton and in 1880 founded the *Edmonton Bulletin* which he published until 1923. He was a member of the North-West Council 1883-85 for Edmonton, and was elected to the Legislative Assembly of the North-West Territories in 1888 and 1894. He sat in the House of Commons as a Liberal under Sir Wilfrid LAURIER 1896-1917 and was minister of the interior and superintendent general of Indian affairs 1905-11. As the former, he continued the immigration policies of Sir Clifford SIFTON. ERIC J. HOLMGREN

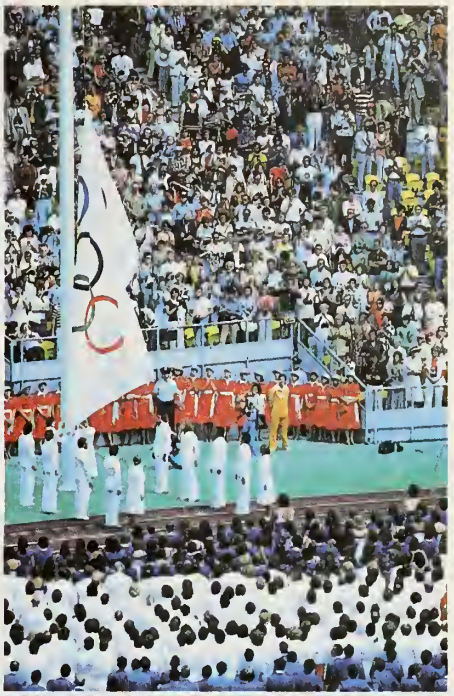
Oliver, John, politician, premier of BC (b at Hartington, Eng 31 July 1856; d at Victoria 17 Aug 1927). Coming to Ontario with his family in 1870, he moved to BC in 1877 and took up a farm in Delta. After serving in local politics he was elected to the BC legislature in 1900 and became leader of the opposition, but lost his seat in the 1909 election. Re-elected in the sweeping 1916 Liberal victory, he was appointed minister of agriculture and railways. On Harlan BREWSTER's death in 1918, Oliver became premier, remaining in office until his own death. Known as "Honest John," he was a plain man of considerable integrity but not an innovative politician. He governed BC through the difficult readjustments after WWI and the economic stagnation of the early 1920s. He was involved in efforts to develop fruit growing in the OKANAGAN VALLEY, to solve the problems of the financially troubled Pacific Great Eastern Ry, and to secure freight-rate concessions from the federal government. Late in his premiership, he passed some social legislation. ROBIN FISHER

Reading: James Morton, *Honest John Oliver* (1933).

Olympic Games The original Olympic Games developed in ancient Greece, probably from harvest festivals held at the religious centre of Olympia in the eastern Peloponnese. Religious rites in honour of Zeus were an integral feature of the celebration. From 776 BC onward the games were held once every 4-year period, called an "Olympiad." Only foot races appear to have been contested during the early years, and by the mid-5th century BC the events took 3 days of the 5-day festival. The program changed over the years, but during the period of greatest Olympic glory it included chariot and horse races, 3 distances of foot races, boxing, wrestling, *pankration* (a wide-open style of wrestling), pentathlon, a race in armour and boys' events. A sacred truce, *ekechieria*, was announced for a period before and after the games to assure safe travel for athletes and spectators and to stop warfare in the areas surrounding Olympia. The Olympic Games exemplified the Greek search for excellence, their love of competition and belief in the development of physical health and skill.

The initiative to revive the Olympic values of harmonizing physical, mental and spiritual development came from French aristocrat Baron de Coubertin, who presided at a congress of some 12 or 13 nations at which it was resolved to hold a sports competition every 4 years, inviting all nations. The first modern Olympic Games were held appropriately in Athens in 1896, and have been held every 4 years since, except during WWI and WWII (1916, 1940, 1944). By 1908, when the games were held in London, England, they were gaining worldwide significance, and they continue to be the premier sporting event in the world. The control of the games rests with the International Olympic Committee. New members are selected by present incumbents and represent the IOC to their countries, not the reverse. The IOC has about 85 members; women were first included on it in 1981. The first Winter Olympic Games held under IOC jurisdiction were in 1928, although a 1924 winter sports competition held in Chamonix, France, was later recognized as the first Winter Olympic Games. The sports comprising the Olympics have altered since the early years. The program has expanded considerably even though some sports (golf) have been eliminated. Getting new sports accepted into the program is not easy, as the IOC wishes to retain a 2-week festival. At present the Summer Games offer 23 sports and the Winter only 6.

Canadians participated in the 1900, 1904 and 1906 ("interim") Olympics, but Canada sent its first real national team — of 84 athletes — to London in 1908. Canadians have won 37 gold medals at the Summer Olympic Games: George ORTON, steeplechase (*Paris, 1900*); Étienne DESMARTEAU, weight throwing, George LYON, golf, Winnipeg Shamrocks, lacrosse, and a team from Galt, Ont, soccer (*St Louis, 1904*); William Sherring, marathon (*Athens, Interim Olympics 1906*); Robert Kerr, 200 m race, Walter Ewing, shooting, and National Team, lacrosse (*London, 1908*); George Goulding, 10 000 m walk, and George HODGSON, 400 m and 1500 m swim (*Stockholm, 1912*); Earl Thompson, 110 m hurdles, Bert Schneider, boxing, and Winnipeg Falcons, hockey (*Antwerp, 1920*); Percy WILLIAMS, 100 m and 200 m dashes, Ethel CATHERWOOD, high jump, and women's 4x100 m relay team (*Amsterdam, 1928*); Duncan McNaughton, high jump, and Horace Gwynne, boxing (*Los Angeles, 1932*); Francis AMYOT, canoeing (*Berlin, 1936*); George GENEREUX, shooting (*Helsinki, 1952*); Gerry OUELLETTE, shooting, and UBC Fours, rowing (*Melbourne, 1956*); Roger Jackson and George Hungerford, rowing (*Tokyo, 1964*); and Jim ELDER, Jim DAY and Tom GAYFORD, equestrian (*Mexico, 1968*). In addition the EDMONTON GRADS won 4 "unofficial" championships in women's basketball (1924, 1928, 1932 and 1936) when it was an auxiliary event.



Olympic Games, opening ceremonies at the 21st Olympiad, Montréal, 1976 (*photo by Frank "Shorty" Wilcox/Masterfile*).

Canada had by far its most successful Olympic performance at Los Angeles in 1984, with 10 gold medals: Larry CAIN, C-1 500 m; Hugh FISHER and Alwyn MORRIS, K-2 1000 m canoeing; Linda THOM, match pistols; Lori FUNG, rhythmic gymnastics; Sylvie BERNIER, springboard diving; Anne OTTENBRITE, 200 m breaststroke, Victor DAVIS, 200 m breaststroke, Alex BAUMANN, 200 m and 400 m individual medley, swimming; National Team, 8s rowing.

In the Winter Olympics, Canadians have won 13 gold medals: Toronto Granite Club, hockey *(Chamonix, 1924)*; U of T Grads, hockey *(St Moritz, 1928)*; Winnipeg Hockey Team, hockey *(Lk Placid, 1932)*; Barbara Ann SCOTT, figure skating, and RCAF Flyers, hockey *(St Moritz, 1948)*; Edmonton Mercurys, hockey *(Oslo, 1952)*; Anne HEGGTVEIT, slalom, and Barbara WAGNER and Bob PAUL, pairs skating *(Squaw Valley, 1960)*; Vic and John EMERY, Douglas Anakin and Peter Kirby, bobsledding *(Innsbruck, 1964)*; Nancy GREENE, giant slalom *(Grenoble, 1968)*; Kathy KREINER, giant slalom (Innsbruck, 1976); and Gaetan BOUCHER, 2 gold medals in speed skating *(Sarajevo, 1984)*.

Montréal hosted the Olympic Games in Aug 1976, amid a cloud of controversy over the runaway cost of its new Olympic stadium. Canada boycotted the 1980 Olympic Games, held in Moscow, to protest the Soviet invasion of Afghanistan. Calgary will host the Winter Olympics in Feb 1988. JEAN M. LEIPER

Reading: Lord Killanin and John Rodda, eds, *The Olympic Games 1980* (1979); H. Roxborough, *Canada at the Olympic Games* (1975); J. Segrave and D. Chu, eds, *Olympism* (1981).

Ombudsman, an independent officer of the legislature who investigates complaints from the public against administrative action and, if finding the action unfair, recommends a rem-

edy. Unlike a court, an ombudsman does not have power to annul a decision, but in most cases recommendations to the administrative authorities are accepted. If not, the matter can be reported to the legislature. The complaint procedure is much less formal and costly than a court appeal; all it involves is writing a letter to the ombudsman. Originating in Sweden (the word is Swedish for "agent" or "representative"), the office of ombudsman was adopted by Norway and New Zealand in 1962, and then spread rapidly to other countries. By 1981 there were 75 offices in 25 countries. Canada's provinces have been among the world's leaders in adopting the institution. Alberta and NB created the office in 1967, Québec in 1968 (*Protecteur du citoyen*) and Manitoba in 1969. Five other provinces followed in the 1970s, and the institution has been successfully established now in all provinces except PEI.

The first International Ombudsman Conference was held in Edmonton in 1976. The International Ombudsman Institute was established at U of Alberta in 1978, and it serves as the centre for research studies on ombudsmanship. In 1977 a committee of senior officials supported the appointment of a federal ombudsman, but, although the government introduced a bill in 1978 to create the office, ombudsmanlike offices for special purposes were created instead. The first, the commissioner of official languages, was created in 1969 to investigate complaints about the use of English or French by federal agencies. A second, the correctional investigator's office, was set up in 1973 for prisoners' complaints. A third office, created in 1977, is the privacy commissioner, a member of the Canadian Human Rights Commission. This office receives complaints and makes recommendations regarding refusals of access to one's own files held by the federal government. In 1980 the government introduced a bill providing for an information commissioner to receive complaints and make recommendations regarding refusals of public access to federal documents. If the federal government creates a general ombudsman office, these specialized offices will perhaps become subunits of it. DONALD C. ROWAT

Reading: Canada, Secretary of State, *The Ombudsman and Similar Institutions* (1981).

On Canadian Poetry, a fine overview of 19th- and early to mid-20th-century Canadian poetry by E.K. BROWN (Toronto, 1943; rev 1944). Brown begins with a cogent analysis of the "problem of a Canadian literature," continues by tracing the development of Canadian poetry from the late 18th century to the 1940s and closes with an evaluation of our 3 "masters" —Archibald LAMPMAN, D.C. SCOTT and E.J. PRATT. *On Canadian Poetry* is largely responsible for the current general view that these poets are the major figures of the era, and that Charles G.D. ROBERTS and Bliss CARMAN are of less importance. Brown provides subtle and penetrating interpretations of individual poems and poets, as well as what Northrop FRYE has assessed as the most clearly defined context within which to study Canadian literature. NEIL BESNER

On to Ottawa Trek In early Apr 1935, 1500 residents of federal UNEMPLOYMENT RELIEF CAMPS in BC went on strike and moved by train and truck to Vancouver. Organized by the radical Workers' Unity League and led by WUL officer Arthur "Slim" Evans, the subsequent Vancouver sit-in grew out of an angry concern for improved conditions and benefits in the camps and the apparent reluctance of the federal government to provide work and wages programs. In Vancouver the strikers organized themselves into divisions, undertook alliances with civic, labour, ethnic and political elements, held demonstrations, and conducted interviews with government officers, among them Prem T. Dufferin PATTULLO and Mayor Gerald McGeer. Highlights of the 2-month sojourn included occupation of the Hudson's Bay store and the city museum and library, and a May Day parade to Stanley Park of some 20 000 strikers and supporters.



Strikers from the unemployment relief camps en route to eastern Canada during the "On to Ottawa Trek," shown at Kamloops, BC, June 1935 (*Public Archives of Canada/C-29399*).

When local governments refused responsibility for the strikers' welfare, and when the men themselves began to grow restless at the apparent failure of their movement, Evans and his associates decided to take the strike to Ottawa. On June 3, over 1000 strikers began the "On to Ottawa Trek," determined to inform the nation of their cause and to lay complaints before Parliament and Prime Minister R.B. BENNETT. They commandeered freight trains and made stops in Calgary, Medicine Hat, Swift Current and Moose Jaw before arriving in Regina. There the railways, supported by an edict from the prime minister, refused further access to their trains. Negotiations with the federal government resulted in the dispatch of 8 Trekkers to Ottawa to meet with Bennett, while the remaining marchers, now 2000 in number, waited in the Regina Exhibition Grounds, food and shelter being supplied by townspeople and the Saskatchewan government.

The talks in Ottawa quickly broke down and the delegation returned, having decided to disband the Trek. A rally was called for July 1 to secure last-minute assistance from the townspeople. Although the Trek was dispersing, Bennett had decided to arrest its leaders. That day Regina constables and RCMP squads moved into the crowd of some 300 to arrest Evans and other speakers, thus provoking the Regina Riot. The conflict raged back and forth on Regina streets, as Trekkers assaulted police with rocks and clubs. The fracas ended by midnight, after the rioters had returned to the Exhibition Grounds. One city constable had been killed and several dozen rioters, constables and citizens had been injured. Four days later, the provincial government assisted the marchers on their way, the majority returning on passenger trains to Vancouver. The repression of the Trek and Bennett's antagonism towards Evans contributed to the PM's political decline. VICTOR HOWARD

Reading: Ronald Liversedge, *Recollections of the On to Ottawa Trek* (1973).

Ondaatje, Michael, poet, filmmaker, editor (b at Colombo, Ceylon [Sri Lanka] 12 Sept 1943). Ondaatje's work often blends or counterposes the factual and the imaginary, poetry and prose. His longer narrative works often include documentary sources, such as photographs, first-person accounts, interviews and newspaper articles. The imagery is characterized by exoticism and surreal wit, a result of the juxtaposition of real and imaginary voices and events, and of Ondaatje's experience in diverse cultures. His work is also notable for its cinematic quality — its frequent presentation of startling freeze-frame images.

Ondaatje immigrated to Canada via England in 1962, and attended U of T (BA) and Queen's (MA). His first books of poetry include *The Dainty Monsters* (1967), *The Man with Seven Toes* (1969) and *Rat Jelly* (1973). *The Collected Works of Billy the Kid,* an account of the factual and fictional life of the notorious outlaw, won the Gov Gen's Award in 1970 and has been adapted for stage and produced at Stratford, Toronto and New York. *Coming Through Slaughter* (1976) tells of real and imagined events in the life of New Orleans jazz cornetist Buddy Bolden. His collection of poems, 1963-78, *There's a Trick with a Knife I'm Learning to Do,* won a second Gov Gen's Award in 1979. *Running in the Family* (1982) tells of the often bizarre life of his parents and grandparents in colonial Ceylon.

Ondaatje's films include *Sons of Captain Poetry* (about poet bp NICHOL), *Carry on Crime and Punishment, The Clinton Special* (about Theatre Passe Muraille's Farm Show) and *Royal Canadian Hounds.* His critical work on Leonard COHEN was published in 1970, and as editor of Mongrel Broadsides he published poems by James REANEY, Margaret ATWOOD and others. He has also edited a collection about animals, *The Broken Ark: A Book of Beasts* (1971); *Personal Fictions: Stories by Munro, Wiebe, Thomas, and Blaise* (1977) and *The Long Poem Anthology* (1979). In 1971 Ondaatje began teaching at York U. SHARON THESEN

One Big Union On 13 Mar 1919 delegates from most union locals in western Canada met at the Western Labour Conference in Calgary and proclaimed support for the Bolshevik and other left-wing revolutions. They decided to conduct a referendum among Canadian union members on whether to secede from the American Federation of Labor and the TRADES AND LABOR CONGRESS OF CANADA, and form a REVOLUTIONARY INDUSTRIAL UNION to be called the One Big Union. The vote, held almost entirely in the West — and during the WINNIPEG GENERAL STRIKE — showed overwhelming support, and the OBU was launched in early June. Thousands of workers joined it, including large parts of the mine, transportation and logging labour force. At its peak in 1920, the OBU had close to 50 000, members from northern Ontario to the Pacific, with other locals in eastern and central Canada and the US. The international CRAFT UNION movement fought back, aided by governments (especially federal) and employers. The counterattack was particularly effective when splits appeared among OBU leaders over policy and tactics. Although by 1923 the union was reduced to approximately 5000 members, it had set an example for later, successful INDUSTRIAL UNIONISM. In 1956 it was absorbed into the CANADIAN LABOUR CONGRESS.

D.J. BERCUSON

Oneida, the smallest of the 5 nations of the IROQUOIS Confederacy, occupied a single village near Oneida Lk in NY state for most of the historic era. They had only 3 matrilineal clans (Wolf, Bear and Turtle). Nine Oneida chiefs sat on the confederacy council. It is possible that it was an Oneida town that CHAMPLAIN attacked unsuccessfully in 1615; their town was burned by the French in 1696. Unlike most of their brethren in the confederacy, the Oneida espoused the rebel cause in the American Revolution, owing to the influence of the New England missionary Samuel Kirkland. They were still subjected to American pressures to sell their NY lands, however, after the war. A sizable portion of the tribe moved to Wisconsin, and another group of 242 individuals purchased a tract of land and settled near London, Ont, in 1839. Al-

though Methodist and Anglican when they migrated to Ontario, some have since taken up the HANDSOME LAKE RELIGION. Over 2000 names are recorded on the Ontario band list as Oneidas on the Thames. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. THOMAS S. ABLER

Reading: B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

O'Neill, James Edward, "Tip," baseball player (b at Springfield, Canada W 25 May 1858; d at Montréal, 31 Dec 1915). He played amateur baseball in Woodstock, Ont, before beginning a 10-year major-league career in 1883. A popular idol in St Louis, Mo, O'Neill was greeted at bat by blaring trumpets, and in 1888 his picture adorned the team's train. He holds the all-time major league season-high batting average of .492, achieved in 1887 when bases on balls were calculated as hits. His career batting average of .326 is a Canadian major league high. WILLIAM HUMBER

Onion (*Allium cepa*), biennial, herbaceous PLANT of the Amaryllidaceae family. It is Canada's most important CONDIMENT CROP. Onions are native to western Asia; their cultivation predates recorded history. Botanical varieties include *A. cepa solaninum* (Multiplier Onion) and *A. cepa viviparum* (Top or Tree Onion). The bulb is formed of hollow leaves, thickened into 1.5-5 mm fleshy layers which overlap near the root juncture. Bulb skins are usually yellow, white or red. Depending chiefly on variety, mature bulbs range from 6 cm to 14 cm in diameter. The pungent taste derives from sulphurous, volatile oils (eg, pyruvic acid). Onions germinate at temperatures of 9-30°C, tolerate frosts to -2.5°C and mature in 115-135 days. INSECT PESTS include onion maggots and thrips; PLANT DISEASES, smut, downy mildew, pink root, damping-off, leaf spot, purple blotch and neck rot. Young, green bulbs and tops contain useful amounts of vitamins A and C; dehydrated onions contain protein, phosphorus and potassium. Average Canadian production for 1979-81 (on 3734 ha) was 114 933 t, worth $14.9 million; Ontario produced over one-half. V.W. NUTTALL

Onley, Norman Antony, "Toni," painter (b at Douglas, Isle of Man, UK 20 Nov 1928). Onley received his early art training on the Isle of Man. His family immigrated to Canada in 1948, and he worked at various occupations in Ontario, later moving to BC. He studied in Mexico (1957-60), where he came under the influence of American abstract expressionism, and moved to Vancouver in 1960. A Canada Council grant allowed him to travel to England in 1963, where he studied the great artists of the British watercolour tradition. He returned to Vancouver in 1964 and began painting sparse, formal landscapes that were so successful he was soon able to earn his livelihood exclusively from his art; in Aug 1980 he sold 800 works for $900 000. Onley's watercolours are always done on location and are the spontaneous reaction to the landscape forms he sees. He works in broad washes, usually using a large Chinese brush. The watercolours are the basis for studio oil paintings or silk-screen prints. ROGER H. BOULET

Reading: Roger H. Boulet, *Toni Onley: A Silent Thunder* (1981).

Onondaga, geographically at the centre of the 5 IROQUOIS nations, were designated "firekeepers" of the Iroquois league, serving as moderators at councils and retaining the WAMPUM records of the confederacy. Thadodaho, the most celebrated title among the 50 confederacy chiefs, was held by an Onondaga. Despite this central position in the confederacy, they often pursued an independent policy, as in 1649 when they remained neutral while the SENECA and MOHAWK fought and defeated the HURON. The main Onondaga town served as "capital" of the Iroquois Confederacy, and as a hub of frontier diplomacy for 2 centuries. The Onondaga themselves burned their town when an army under FRONTENAC invaded their country in 1696. The village was also burned by Americans during the American Revolution, although the Onondaga had for the most part remained neutral. In population the Onondaga were the third-largest Iroquois group immigrating to lands in Canada on the Grand R in 1785. They did not increase as rapidly as other groups and in the 1970s constituted only 6% of the official band list of over 9000 for the Six Nations Reserve. Another portion of Onondaga retain lands in their ancestral homeland, outside Syracuse, NY. *See also* NATIVE PEOPLES: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. THOMAS S. ABLER

Reading: B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

Ontario is Canada's most populous, richest and second-largest province; it stretches from Middle Island in Lake Erie in the S (41°40′ N) to the Manitoba-Ontario border on Hudson Bay in the N (56°50′ N) and from the banks of the St Lawrence R in the E (74°21′ W) to the Manitoba border in the W (95°09′ W). For the most part Ontario's frontiers run through the lakes and rivers of the GREAT LAKES system, on the S, and along the Ottawa R to the E; only in the NE and NW do borders follow geographical abstractions. The name Ontario, from an Indian word generally translated as meaning "beautiful lake" or "beautiful water," is apt, since lakes and rivers occupy almost one-fifth of the province's total area of roughly one million km^2. The word was first applied in 1641 to the easternmost of the Great Lakes, "Old Ontario" was used to refer to the southern portion of land nearest the lake and was applied to the whole province in 1867.

Land and Resources

Ontario has the most varied landscape of any Canadian province. Two-thirds of the province lies under the Canadian SHIELD, which covers most of the N, except the Hudson Bay Lowland. From Georgian Bay in the W and near Renfrew in the E the edge of the Shield forms a triangular wedge, with its apex near Brockville on the St Lawrence R. To the E lies the eastern Ontario plain, between the Ottawa and St Lawrence rivers. To the W, from Kingston on, there are belted rolling hills and plains culminating in the flat country in extreme southwestern Ontario. The NIAGARA ESCARPMENT, traversing the area from Niagara to Tobermory and through MANITOULIN I in Georgian Bay, is the most conspicuous feature.

Ontario is often considered to be 2 distinct regions. To the S of the Shield lies southern Ontario where agriculture and most of the population are concentrated; northern Ontario, with nearly 90% of the land, contains only 10% of the population. Nevertheless, geology, climate, soil, vegetation and other factors combine to create distinct areas within this broad classification.

Geology The rocks of the Shield are among the oldest on Earth, dating from the Archaean and Proterozoic eons of the Precambrian era; the oldest sections date from 2480 million years ago; the most recent a mere 955 million. These formations contain the large mineral deposits that are so important to the economy of northern Ontario. Sedimentary limestone, shale and sandstone underlying southern Ontario are more recent, dating from the Paleozoic era, and are generally of the Ordovician, Silurian and Devonian periods. Outcrops of these rocks are rare, excepting where differential erosion of beds has exposed the Niagara Escarpment.

All of Ontario was, at one time or another, covered by glaciation. About 10 000 years ago the last ice sheet covering the province receded, resulting in the many lakes in the N and the Great Lakes along its southern and western borders. The proto-Great Lakes were considerably larger than their present descendants. As they evolved, they left behind a sand base along which many of the early roads of the province were located. The rivers that once drained them now flow through broad valleys such as the Grand R.

The effect of the ice age is still apparent. Scattered across southern Ontario are rocks left behind by the glaciers. Systems of moraines, marking the edges of stalled glaciers, traverse the province. The Oak Ridge Moraine, forming the



The stark beauty of the landscape of northern Ontario has inspired artists and photographers, notably members of the Group of Seven such as Lawren Harris, whose *North Shore, Lake Superior* is shown (*courtesy Lawren P. Harris/National Gallery of Canada*).







Ontario

Capital: Toronto
Motto: Ut Incepit Fidelis Sic Permanet ("Loyal it began, loyal it remains")
Flower: White trillium
Largest Cities: Toronto, Hamilton, Ottawa, London, Windsor, St Catharines, Kitchener, Oshawa, Sudbury
Population: 8 625 000 (1981c); rank first, 35.4% of Canada; 81.7% urban; 15% rural nonfarm; 3.3% farm; 9.7 per km² density; 3.3% increase from 1976-81; Jan 1984e pop, 8 887 000
Languages: 86% English; 3.9% French; 10.1% Other
Entered Confederation: 1 July 1867
Government: Provincial — Lieutenant-Governor, Executive Council, Legislative Assembly of 125 members; federal — 24 senators, 95 members of the House of Commons
Area: 1 068 582 km², including 177 388 km² of inland water; 10.8% of Canada
Elevation: Highest point — Timiskaming District (693 m); lowest point Hudson Bay shore
Gross Domestic Product: $137.2 billion (1982e)
Farm Cash Receipts: $4.9 billion (1982)
Electric Power Generated: 117 818 001 MWh (1983)
Sales Tax: 7% (1984)

height of land between Lake Ontario and Georgian Bay, is the most conspicuous. The Horseshoe Moraines parallel the eastern shore of Lk Huron to the base of the BRUCE PENINSULA and SE along the escarpment then SW toward Lk Erie. Other deposits, drumlins, are especially frequent in the Peterborough region.

Surface The Canadian Shield is mostly, but not entirely, unsuitable for agriculture. The podzolic soils of northern Ontario are extremely thin and low in fertility, although sufficient to support boreal forests. There are only a few areas, such as the clay belts in northeastern Ontario or the Rainy R area in the NW, where enough farming is possible to create the impression of an agricultural landscape. The forest cover of the N is not uniform. In the extreme N, stunted willows and black spruce struggle to grow in bogs; farther S spruce, aspen and jack pine dominate the northern Shield. Farther S again, to the E and W of Lake Superior, the Shield is covered by a mixed forest, known as the Great Lakes-St Lawrence forest region. In the early 19th century, magnificent stands of white pine, the foundation of the central Canadian forest industry, were to be found in this region, as well as hard maples.

The grey-brown luvisolic (grey-brown podzolic) soils of southern Ontario that developed under forest vegetation from till and glacial deposits are reasonably fertile. Deltas, left behind from the Ice Age, form sand plains, especially to the N of Lk Erie.

Water Of the total surface area of some 177 000 km² of water, almost half is in the Great Lakes. The ST LAWRENCE R and Great Lakes drew explorers, traders, soldiers and settlers into the heart of the continent. More recently, Ontario's abundant rivers and lakes have made possible hydroelectric power and the more obvious forms of INDUSTRIALIZATION. Ontario's water resources are fed by an abundant rainfall, and in most sections of the province by snow. Precipitation is most regular in the southern and central parts of Ontario where variations between winter and summer or spring and fall are not especially great; but winter and spring are somewhat less aqueous in northern and northwestern Ontario. The lower half of the province lies in the Great Lakes-St. Lawrence drainage basin, and the largest amounts of water flow along Ontario's southern borders: a peak monthly mean of 2390 m³/s on the NIAGARA R. Unlike the rivers that connect the Great Lakes, where there are not large variations in volume of flow from month to month, Ontario's inland rivers are subject to large increases in volume during the spring runoff when melting winter snows create an annual threat of flooding. The volume of the OTTAWA R practically triples in May to 2150 m³/s from its lowest monthly mean flow of 735 m³/s in Aug. An even more extreme example is the Thames R of southwestern Ontario, whose mean flow in March of 143 m³/s is over 11 times greater than its Aug mean of only 12.9 m³/s.

Climate Ontario has a wide range of climates. In the N a bitter subarctic climate prevails, with mean daily temperatures near Hudson Bay of 12° to 15°C in July and -22° to -25°C in Jan. Winter temperatures are highest along the Great Lakes in southwestern Ontario and below the Niagara Escarpment, with mean daily temperatures ranging from -3°C near Windsor to -6°C near Toronto in Jan. In July the area between Chatham and Windsor is warmest (22°C). The winters are severe and stormy through much of the province. The areas receiving westerly winds off the Great Lakes are often called the "Snow Belt"; the areas S of Owen Sound, around Parry Sound and W of Sault Ste Marie, receive snowfall in excess of 250 cm. The areas around Toronto and Hamilton are in the partial rain shadow of the Niagara Escarpment and receive less than 150 cm of snow annually. Although differences in relief are not great, they have a significant impact on climate. The upland areas of Grey County, the Algonquin Park area and the Superior Highlands are notably cooler. Hudson Bay freezes over in winter and makes northern temperatures even colder. The Great Lakes, on the other hand, moderate winter temperatures.

The climate of Ontario greatly affects its agricultural patterns. Most specialized crops such as grain corn, soybeans and sugar beets are concentrated in the SW, with 1760 to 2400 growing degree days. Fruit growing is associated with (but not confined to) the Niagara Peninsula and tobacco growing is done in Norfolk County. The northern Clay Belts, with roughly 1480 to 1500 growing degree days, are suitable for a narrower range of crops, such as silage corn, hay, barley and potatoes. Frost is unusual in the S after the first week of May, but can persist into June in the N. Despite frequent bouts of rain and snow, the province's weather tends to sun. Sault Ste Marie receives roughly as much solar radiation in July as sunny Victoria.

Resources

Ontario contains the largest amount of Class I agricultural land of any province and is abundantly endowed with rivers that can be harvested for hydroelectric power. The world's largest deposits of NICKEL and COPPER, along with lead, zinc, silver and platinum, were found in the Sudbury Basin in 1883. The largest GOLD deposits in N America were discovered near the towns of Porcupine and Kirkland Lake from 1905 to 1912 (with another more recent find near Henlo), and one of the largest uranium deposits in the world at Elliot Lake in 1954. Major copper, zinc and silver deposits were discovered near Timmins in the 1960s. There is IRON ORE in the Algoma district N of Lk Superior. Southern Ontario has fewer minerals, although there is iron ore near Marmora, uranium near Bancroft and minor oil and gas deposits in southwestern Ontario. Limestone, sand and gravel are available in many parts of southern Ontario as a result of glacial deposits. Some 425 000 km² of Ontario's forest is considered to be productive, much of it in the relatively inaccessible NW, and the province ranks third in forestry-related industries.

Conservation The history of Ontario's forests has been one of depletion, sometimes from lumbering, sometimes from fires. The principle that forestland belongs to the Crown and that cutting rights are bestowed by licence rather than sale has long been recognized. Ontario has developed an extensive tree-planting program under its forest-resources service, and encourages the planting of "submarginal" land with trees, in the hope that failed farms may at least become productive tree plantations. Consciousness of the value of the wilderness resulted in the establishment of a provincial park system, beginning with ALGONQUIN PROVINCIAL PARK (7511 km²), established in 1893. There are now 128 provincial parks, ranging from RONDEAU PROVINCIAL PARK on Lake Erie in the S to Hudson Bay, whose Polar Bear Provincial Park, a true "wilderness" establishment, is practically inaccessible. Among national parks are GEORGIAN BAY ISLANDS NATIONAL PARK; POINT PELEE NATIONAL PARK; PUKASKWA NATIONAL PARK; and ST LAWRENCE ISLANDS NATIONAL PARK.

The government has encouraged the establishment of local conservation authorities and has promoted various schemes for channelling and controlling waterflow. Ontario has the largest and most complex government structure for dealing with land use of any Canadian province, the loss of agricultural land is a major concern, and has been the subject of political controversy and government study and planning. Areas of great natural beauty, such as the Niagara Escarpment, have attracted both environmental and political interest, and in 1984 the 2 constituencies apparently achieved a conspicuous meeting of minds when a far-reaching plan to preserve the escarpment was announced to universal praise.

Considerable energy has been expended on discovering a means of reversing the trend in the Great Lakes fishing industry. As early as the 1920s efforts were being made to restock the lakes with fish; later, attention was directed towards ridding the lakes of the plague of the LAMPREY eel, which preyed on other fish, further reducing stocks. Governments have attempted to improve water quality along the lakes, in some instances successfully, but problems such


Hudson
Bay
James
Bay
Lake Superior
Lake Michigan
Lake Huron
Lake Erie
Lake Ontario
MANITOBA
QUÉBEC
PUKASKWA
UNITED STATES OF AMERICA
ONTARIO
Trans-Canada Highway
Primary Road
Railway
National Park
POPULATED PLACES
1 - 999
1 000 - 4 999
5 000 - 24 999
25 000 - 99 999
100 000 and over Over
Provincial Capital
Federal Capital
0 50 100 150 km
1 : 6 412 000

as ACID RAIN (with its Canadian-American dimensions) make it difficult to predict ultimate success with any confidence.

People

Indian settlement began in Ontario far back in prehistoric times. By the time Europeans came in the 17th century, the Indian population of the present province was divided into the nomadic Algonquian hunting tribes of the N and NW, and the Iroquoian tribes of the S, including the NEUTRAL, HURON and Erie. HURONIA was destroyed and the Huron dispersed in the IROQUOIS WARS in the 1640s; the wars also forced the abandonment of the Jesuit mission STE MARIE AMONG THE HURONS (1649) — the first European establishment in present-day Ontario.

Large-scale settlement of the province did not begin until the 1780s. There were scattered French settlements, especially around Detroit, but the first major immigration was that of the United Empire LOYALISTS, refugees from the American Revolution. The Loyalists gave the province its Anglo-Saxon character, which was reinforced by waves of immigration from the US and, during the 19th and early 20th centuries, from the British Isles. From the later 19th century there was localized immigration from Québec into eastern and northeastern Ontario, creating a French-language fringe along the province's frontiers. Although northern Ontario received some overseas immigration early in the century, it was not until after 1945 that immigration from continental Europe, the West Indies and East Asia had a discernible impact on the main populated areas.

Ontario was first settled mostly by farmers, but in the mid-19th century the population was channelling into the cities until by the time of WWI Ontario had become predominantly urban. Despite the attraction of the US, the province has had Canada's largest population from 1867 to 1984, and by a considerable margin: according to the 1981 census, Ontario had gained 360 000 people over the previous 5 years, bringing the total population to 8 534 265, of whom about 7 million were classified as urban and 1.5 million as rural.

Urban Centres Ontario is the most highly urbanized province in Canada, with 81.7% of the population found in urban centres at the time of the 1981 census. The outstanding feature of the urban pattern is the south-central conurbation around the western end of Lk Ontario — the so-called "Golden Horseshoe" — which includes the cities of ST CATHARINES (CMA pop 304 353), HAMILTON (CMA pop 542 095), TORONTO and OSHAWA. Nearly one-half of the population of Ontario lives in or around these 4 cities. With a census metropolitan area population of 2 998 947 (1984) Toronto is Canada's largest city and plays a dominant role in Ontario's economy. Hamilton ranks ninth in Canada in population but third in manufacturing.

The urban centres of southwestern Ontario lie around KITCHENER-WATERLOO (pop 287 801) and LONDON (pop 283 668); both are transportation, service and manufacturing centres. WINDSOR (pop 246 110), the longtime home of the AUTOMOTIVE INDUSTRY, is geographically part of the Detroit urban complex. Apart from KINGSTON, the largest city on the eastern end of Lk Ontario, and OTTAWA, which has the largest part of its work force in the federal public service, eastern Ontario has no substantial urban concentration.

The cities of northern Ontario are strung out along the railway lines to which most of them owe their origin. NORTH BAY is still a transportation centre; SUDBURY is at the heart of Canada's largest mining district; SAULT STE MARIE is the country's second-ranked steel producer; and Thunder Bay is a major transshipment port. With the exception of THUNDER BAY on Lake Superior (121 379 inhabitants) and Windsor on the Detroit R, the other Great Lakes have no major urban centres along their Canadian shores.



Typical brick farmhouse near Wyevale, Ont (*photo by Bill Brooks/Masterfile*).

The trend of habitation over time has been, and continues to be, to the suburbs: cities such as Toronto, Ottawa and Hamilton have tended to lose population as their surroundings sprout. In the Toronto area, for example, Scarborough and Mississauga show strong growth rates; however, older postwar suburbs, such as North York, virtually ceased to grow between the 1976 and 1981 censuses. Unlike their American counterparts, the central core of Ontario's large cities have remained in large part residential; there are relatively few blighted areas.

Labour Force Ontario was once predominantly agricultural. Out of a labour force totalling 4.4 million in 1981, workers in agriculture and related occupations numbered only 141 805 on 82 448 farms. But for those who believe that Ontario is still largely industrial, there is another surprise in store. Jobs in manufacturing (1 million) certainly overwhelm those in agriculture, but the growth industries of the 1960s, 1970s and 1980s are in the service (1.3 million) and public sectors. The industrial work force suffered serious attrition in the recession of the early 1980s, as reflected in the drastic decline in numbers of the once powerful steelworkers union. The most powerful, and best entrenched, unions in Ontario in the 1980s are those in the civil service or other public enterprises. Ontario now has more than 70 000 provincial civil servants, almost 600 for every member of the Legislative Assembly, as compared with 7 for every MPP in 1904. Traditionally male-dominated industries have also suffered, at least in the number of persons employed. The labour force is divided between 2.6 million males and 1.8 million females. Those areas where men heavily outnumber women, such as agriculture and mining, are employing fewer and fewer people, while clerical and service occupations, where women tend to outnumber men, are on the rise. The number of women is also growing in professional occupations and in management, although in the latter category, the census shows that men still outnumber women by a ratio of roughly 3 to 1. UNEMPLOYMENT is a major problem of the 1980s, the burden falling heavily on the young, but the level of unemployed compared favourably with the national rate, as it has consistently over the decades.

Language and Ethnicity Three-quarters of Ontario's 8.6 million people counted English as their mother tongue in 1981. Of the remainder, 467 000 had French as their mother tongue, and 1.5 million were grouped into "other" languages. But these figures do not tell the whole story. Almost 160 000 of the French use English as their home language, while only 22 000 native English speakers return the compliment in French. As for the "others," they seem to have assimilated quite rapidly, with 660 000 claiming to use English as their household tongue. Only 3700 use French.

About 652 000 Ontarians claim French as their sole ancestry. Although the Ontario French community is still numerous and, on the whole, centered in the E and NE of the province, it appears to be slowly declining. In part this can be ascribed to ease of access for Francophones in the Ottawa area to suburbs on the Québec side of the border, so French speakers holding federal jobs can and do locate in a more concentrated French-language environment. In part the trend also reflects the decline of farming and other primary industries and the general drift to the cities (*see* FRANCO-ONTARIANS).

If Ontario's citizenry of French ancestry have been dwindling as a proportion of the population, so have the British (including, for this purpose, the IRISH). Once overwhelmingly so, Ontario is now barely 50% "British." No other ethnic group, however, constitutes even 10% of the population, although the French come close. There are 487 310 Ontarians of ITALIAN descent, including 256 000 born in Italy, and 373 390 of GERMAN ancestry, 94 000 of whom were European born. The PORTUGUESE are even more recent arrivals. Only 34 000 Ontarians of Portuguese descent were actually born in Canada; the other 95 000 were born in Portugal. Immigration from the West Indies, the Indian subcontinent and East Asia has also greatly increased the population, but the largest single group of residents born outside Ontario still hails from the United Kingdom, to the tune of almost 500 000.

English is Ontario's sole official language, although in practice and to a lesser extent in principle its exclusive use has been modified. The Ontario government has gradually extended French rights in the legal and educational systems and in areas of provincial administration. Other languages have been encouraged by a variety of programs of MULTICULTURALISM up to and including the level of university chairs in Ukrainian, Baltic and Hungarian studies, while school authorities have been experimenting with the teaching of "heritage" languages in Toronto schools. The teaching of French has increased at the elementary-school level, but relaxed educational policies have not encouraged

Ontario students to persevere with a difficult and noncompulsory subject in the high schools. University study of French has also fallen off over time, a fate shared with other modern languages. The results of this confusing pattern of concern and neglect are not yet apparent.

Religion Ontario's population continues to be divided among what are traditionally its largest religious denominations. The biggest church is the Catholic Church, strong among the French, Irish and Italian communities, with nearly 3 million members. Next is the UNITED CHURCH, with 1.6 million. ANGLICANS constitute 1.2 million while those Presbyterians who did not join the United Church number 517 000. The remaining larger sects are the BAPTISTS (288 465), LUTHERANS (254 175) and Eastern Rite (167 320). JEWS number 148 255, while ISLAM claims 52 110 adherents. HINDUS and SIKHS count 41 655 and 16 645 among their numbers, respectively. In most cases, women predominate in organized religion. The number of people professing no religious belief (359 085 men and 259 515 women) shows the dramatic change in religious affiliation since the early 20th century.

Economy

Ontario's economy began with hunting and trapping. It expanded with the arrival of the settlers and until the latter part of the 19th century remained predominantly rural and agriculturally based. By the early 20th century rail lines built across Ontario's northland opened up rich mineral resources in places such as COBALT and TIMMINS. The discovery and growth of hydroelectric power, combined with the export boom of the turn of the 20th century, stimulated great industrial expansion and the growth of cities, large and small. Ontario has been predominantly urban since 1911, and agriculture has adapted to the new realities, shifting from mixed diversified grain and livestock to more specialized regional patterns serving broad urban markets — dairy products, corn to fatten livestock, vegetables, fruit and tobacco.

Ontario is a major exporter of the goods it produces — such as automobiles — but the principal market for Ontario products is and always has been in heavily populated central Canada. Sales to the West and the Maritimes were for the most part marginal, if profitable. As with other parts of the country, the greatest expansion of recent years has been in service industries, while older, heavier industries have tended to decline. After lagging behind the national rate of growth in overall real domestic product for most of the 1970s, Ontario inched ahead in the early 1980s.

Agriculture Ontario has the largest proportion of Canada's "best" agricultural land, just under 20% of the Canadian total; if the category of "good" is included, the proportion comes close to 60%. Ontario ranks second behind only Saskatchewan in cash receipts for farm products. Most farming is done in the S, although clusters of farms on the Shield serve local dairy markets. Forage crops are the largest, but CORN, mixed grains, winter wheat and BARLEY are also grown. Ontario is therefore well able to sustain commercial hog, dairy and beef livestock farms; as of 1981 it has the largest number in Canada. It ranks second in dairy farms to Québec. The latter are most numerous in the London-Woodstock region, in the Bruce Peninsula and in eastern Ontario. Only Québec ranks ahead of Ontario in milk and dairy products; total Ontario receipts in this category were $871.4 million in 1981. Despite heavy regulation at both the federal and provincial level, 4 big companies process 87% of Ontario's milk (1984). One of the 4 is the brewery John Labatt, which accounts (using the Silverwood and Sealtest brand names in Ontario) for one-seventh of Canada's milk.

Ontario is first in Canada by a very wide margin in prosperous and lucrative farms — those producing $100 000 or more of products a year. There are equally a large number of farms at the lowest end of the scale as well, and while both the federal and provincial governments have encouraged the depopulation of submarginal farmland, this process is not complete. The lowest incomes in the province, according to the 1981 census, are to be found in counties with large amounts of marginal or submarginal land still under cultivation — along Georgian Bay, Lk Huron or in parts of eastern Ontario.

As in other jurisdictions, Ontario farmers are accustomed to selling their products through marketing boards, established as far back as the 1930s. These boards do not command universal support, even among farmers, but they are intended to introduce a degree of regularity and predictability into the marketing of agricultural products. Economic conditions during the late 1970s and 1980s stimulated protests from "survival" groups that the economic system was operating to the disadvantage of small farmers burdened by debt and high interest rates.

Industry Ontario is and always has been the leading manufacturing province in Canada. This situation was well established at the time of Confederation, and the trend since has been to place industry in a province favoured by ample transportation, abundant natural resources and accessibility to export markets in the US. Proximity to the American automotive industry, for example, encouraged the location of manufacturing plants in Ontario. The establishment of Ford, General Motors and Chrysler in Ontario in turn spun off a vast series of related industries dotted all across southern Ontario. Transportation equipment of all kinds, including aircraft and railcars, accounts for $1 out of every $5 of value-added production in industrial Ontario.

The latest available estimate (1981) establishes that Ontario produces over half the gross domestic product of manufacturing industries in Canada, or $31.3 billion. Metropolitan Toronto has the largest number of manufacturing establishments in the province — indeed the largest number in Canada — shipping, in 1976, $19.9-billion worth of manufactured products. Hamilton, Windsor, St Catharines-Niagara and London each shipped more than $1-billion worth that same year. During the late 1970s, Ottawa, frequently seen as a staid national capital completely dependent on the largesse of the federal government, confounded its critics by emerging as Canada's equivalent of California's Silicon Valley, a centre for HIGH TECHNOLOGY industries, producing computers and the like. Ontario accounts for almost 60% of Canada's high-tech output, but remains (like the rest of Canada) a net importer of technology.

The appearance of this new and promising venture consoled commentators in the early 1980s, when a slump in the automobile industry seemed to indicate that the industrial system was creaking at its joints, becoming obsolete in precisely those areas where Ontario's greatest strength and heaviest investment was concentrated. The concurrent weakness of an earlier generation of high-tech industries, such as the DE HAVILLAND LTD aircraft company just outside Toronto, gave pause as well. As a result, certain prominent Ontario companies became targets of official concern and well-publicized governmental rescue efforts, with Chrysler, MASSEY-FERGUSON and de Havilland leading the way.

Mining The development of Ontario's mining industry is closely associated with the rise of Toronto as Ontario's and Canada's financial centre. The exploitation of minerals in northern Ontario from around 1900 made Toronto first a competitor and then a winner in its long-standing competition with Montréal. Nickel made the prosperity of the Sudbury Basin; silver, lead and zinc caused a rush to Cobalt in the early 1900s; gold helped keep the provincial (and to some extent the national) economy afloat during the 1930s. In the 1950s another great impetus was given the Ontario economy by the discovery of fabulously rich uranium deposits at Elliot Lake.

Mining is still extremely important in the provincial economy, although recent years have been grim ones for the industry. Employment dropped by one-third to 30 000 in the years 1975-83, as downturns occurred in the international market for one major metal after another. Even so, in 1983 the value of nickel production in Ontario was $595 million; uranium, $518 million; copper, $412 million; gold, $363 million; zinc $325 million; and iron ore, $181 million.

Forestry In 1976 Ontario had 570 000 km^2 of forestland, all of which was available for forest farming. Most of it was owned by the province, meaning that forestry was carried on under licence by companies obtaining the necessary permission from the government. 1983 sales in the Ontario forest industry were estimated to be $8.4 billion, with lumber production at 1.7 billion board feet. Most of Ontario's pulp and paper products — about 70% — are directed southward to the US for export.



James Wilson and Son Grist Mill, Fergus, Ont. Much of Ontario's 19th-century industry was concentrated at mills such as this (*photo by Bill Brooks/Masterfile*).



The INCO smelter in Copper Cliff, northern Ontario (*photo by Karl Sommerer*).

Fisheries Ontario's once prosperous fishing industry has gone into a considerable decline. Whitefish, pickerel and trout were once the principal fish produced in Ontario's Great Lakes fishery, but overfishing and deterioration in water quality, especially in Lk Erie, have taken their toll. During the 1920s, approximately 10 000 people gained their employment from Ontario's inland fishery. By 1981 fishing accounted for only 3.7% of Ontario's economy.

Ontario's modest commercial fishery has been hurt by POLLUTION, which also affects the TOURIST industry of SPORTFISHING, especially in parts of northern Ontario. Nevertheless, sportfishing in the late 1970s was estimated to generate $500 million in total expenditures.

Finance Toronto's Bay Street area is the centre of the Canadian financial system. All the principal Canadian chartered banks have their head offices in Toronto, in fact if not in name, as do many of Canada's major corporations and brokerage firms. The Toronto Stock Exchange, housed in opulent new quarters, is the country's largest. First Canadian Place, chock full of lawyers, accountants and executives, is Canada's tallest building at 290 m. The CN TOWER, another monument to commerce, is the world's tallest, free-standing structure at 533 m. BANKING is a national business in Canada, and there is no study that shows whether Ontario as a whole secures any quantifiable benefit from the location of banks in its provincial capital beyond the *joie de vivre* that bankers and their staffs impart to their community. There is, however, a discernible architectural impact as the banks compete in raising towers to the sky — ziggurats rather than the basilicas that characterized an earlier period in Canadian banking symbolism

Canadian banks maintained 2875 branches in Ontario in 1979. If numbers of branches are any indication, Ontarians tended to favour the CANADIAN IMPERIAL BANK OF COMMERCE, a bank with a long history in the province. A largish number, second only to Québec, preferred to do business with CREDIT UNIONS rather than chartered banks. Toronto is the principal clearing centre for cheques cashed in Canada, and (as of 1979) accounts for the vast majority cashed in the province, not to mention more than half those cleared in the whole country. Toronto is, as well, the headquarters for some of Canada's largest insurance companies, with all the financial resources they bring in their train. Other cities also sport insurance headquarters: Kitchener-Waterloo has several, and London even more.

Transportation Ontario had 15 732 km of railway track in 1977, and rather more than 19 000 km of paved roads operated under the 2 senior levels of government, federal (the TRANSCANADA HWY) and provincial. Roads reach most of the province S of the watershed between Hudson Bay and the Great Lakes; N of that line roads are few; reliable transportation is either by air or by water. Sales of gasoline and diesel fuels in 1977 totaled 12.4 million litres, propelling a very considerable motor transport industry as well as an enormous fleet of private motor vehicles.

Much debate has occurred in recent years concerning the best or most economical means of transportation. The Ontario government has supplied several answers. It has built and is still expanding a superhighway system across the southern tier of the province, stretching from Montréal to Windsor (although it is still impossible to travel all the way from Toronto to Ottawa by 4-lane highway except via Montréal). The province has also created a rail-and-road commuter service, GO (Government of Ontario) Transit to serve the Hamilton-to-Oshawa corridor along Lk Ontario, and has intervened in municipal transport through its Urban Transit Development Corporation.

Ontario has a large navigable water system, the ST LAWRENCE SEAWAY, along its southern frontier. The WELLAND CANAL, an important part of the seaway channel, links Lakes Ontario and Erie. The advent of the seaway, and subsequently the practice of "containerization" of cargo unloaded at East Coast ports, have had a considerable negative impact on the structure of Ontario's water transport. The most notable casualty has been the port of Toronto, where the number of tons shipped and employment have dropped drastically — Montréal, Saint John and Halifax being the beneficiaries.

Energy Ontario is and always has been an importer of ENERGY. The primeval forest provided sufficient fuel in pioneer times, but with urban and industrial growth Ontario's energy needs were met by COAL from the nearby pits of Ohio, Pennsylvania and West Virginia. This coal was of a higher quality than that from Nova Scotia, and cheaper to ship. Ontario does have coal deposits of its own, near James Bay, but they have so far been judged uneconomical.

Oil and gas were also possibilities, and here Ontario had a slight initial advantage. The oil fields around Petrolia were first exploited in the late 1850s. Natural gas came somewhat later, and for many years Ontario ranked first as a Canadian producer of these commodities. Production, however, is now insignificant in the overall energy picture.

Oil and gas therefore also have to be imported. For many years this meant imports from the US or through East Coast ports. This could sometimes prove precarious, when American shortages of oil and gas (and coal too) placed Ontario heating at risk. During the 1950s the federal and provincial governments made it a priority to connect Ontario with western Canadian oil and gas fields. Oil came first, followed by gas through the TRANSCANADA PIPELINE, completed in 1958.

Technological advances during the 1880s and 1890s brought Ontario its first large and significant energy source from within the province itself: HYDROELECTRICITY. Ontario is abundantly endowed with streams, rapids and falls. First used for SAWMILLS, these falls could be put to work to generate electricity. NIAGARA FALLS, Ontario, has one of the great waterfalls of the world, as well as one of its major tourist attractions. When Niagara power was developed southern Ontario acquired a significant advantage over rival industrial areas. In 1906 most electricity in Ontario was nationalized under the aegis of ONTARIO HYDRO and its aggressive and



The Adam Beck No 2 powerhouse opened in 1954 at Niagara Falls, Ont (*photo by John Reeves/Masterfile*).

dynamic founder, Sir Adam BECK. (There is still one private power source, Great Lakes Power). Over the years Ontario Hydro expanded into the Ottawa R system and then the St Lawrence. From an early date, however, Hydro began to import power from Québec, emphasizing that there were very limited untapped sources of power for the province.

As this realization was dawning, in the early 1950s, Ontario faced the possibility of building thermal (coal- or oil-fired) power plants, or of taking a new road. It did both. Thermal plants were built in the 1950s and 1960s, raising the proportion of power generated thermally from practically none in 1960 to over one-third in 1970. At the same time, in conjunction with Atomic Energy of Canada Limited, the federal government's reactor arm, Ontario Hydro began to build nuclear power stations. The first full-scale nuclear power station, at Douglas Point, was opened in 1966, and others have followed at Pickering and Bruce. In 1984 coal, water-power and nuclear power each accounted for about one-third of Ontario's electricity, but nuclear was in the lead (if slightly) for the first time in the province's history. Sales of electricity to the US — some $447 million in 1983 — are expected to continue at around 10% of production. More nuclear plants as well as a new coal-generating station are planned for 1987, despite the controversies and problems that have surrounded NUCLEAR ENERGY.

Government and Politics

Ontario's governmental structure is similar to that of other Canadian provinces. A LIEUTENANT-GOVERNOR, appointed by the federal government, nominally heads the administration, assisted by an executive council or Cabinet, led by a PREMIER. The Cabinet governs as long as it maintains the confidence of the Legislative Assembly or provincial Parliament, a unicameral body of 125 members, elected for a maximum term of 5 years. The term can, however, be extended by legislative action. All Canadian citizens over the age of 18 resident in Ontario can vote in elections. The judiciary, as in other Canadian provinces, is appointed by the province only at the lowest level — "provincial judges," formerly known as magistrates. All other levels of the judiciary are appointed by the federal government. These judges' salaries are paid by Ottawa; the other costs of the courts are borne by the province.

Local Government For many years the basic structure of local government in Ontario was that provided by Robert BALDWIN's Municipal Corporations Act of 1849, which divided the southern part of the province into COUNTIES, cities, towns and villages. The growth of urban population in the 20th century began to strain the traditional jurisdictions. Rather than let the province's cities expand indefinitely into the surrounding suburbs and countryside, the provincial government looked to the creation of supermunicipalities that could operate on a regional basis and encompass a variety of jurisdictions. The first of these to be created (1 Jan 1954) was the Municipality of Metropolitan Toronto, a federation of Toronto and its suburbs carved out of the southern half of York County. In the 1960s and 1970s various "regional municipalities" on the model of Toronto were created, sometimes to the intense resentment of the local citizenry and their politicians (*see* LOCAL GOVERNMENT.)

There are now 11 regional municipalities, governed by assemblies of locally elected politicians, with jurisdiction over such items as police, water supply and arterial roads. Local cities that come under them have not, however, been abolished, and still enjoy limited powers. There are 48 cities in the province, 145 towns, 1 borough (actually a city), 119 villages and 478 townships, all of which enjoy powers of local taxation based on property. There are also 8 "improvement districts" and 71 police villages, entities that have no independent taxation powers. All Ontario municipalities are subject to the review of their actions by the Ontario Municipal Board, which must approve any bylaws creating debt, and which acts as the court of last resort for appeals against municipal actions.

Federal Representation Ontario has 95 members in the House of Commons and 24 senators. Metropolitan Toronto and its environs have more MPs than any province outside Ontario and Québec. When judging its political "clout" it is useful to see Ontario as an assemblage of subregions that seldom vote together federally or provincially. It is difficult for any single federal politician to say that he or she "represents" Ontario in Ottawa, as Alexander MACKENZIE was able to claim over 100 years ago. Mackenzie KING, a Torontonian by upbringing, found it possible to constitute most of his governments from 1921 to 1930 and 1935 to 1948 without a single serious representative from that city. Nevertheless, since then federal prime ministers have given adequate representation to Toronto and the regions of Ontario in forming their Cabinets.

Third parties have enjoyed a smattering of support in various federal elections, but they have usually been a distant third in the number of MPs sent to Ottawa.

Public Finance Much of Ontario's history has been concerned with wringing what the province considered to be adequate tax resources from the federal government in Ottawa. This traditional rivalry abated considerably after 1948, when premier George DREW left for federal politics in Ottawa. Since then, while there have been tensions, co-operation and soft words have been more usual vehicles of discussion than the traditional bellowing practised by many previous administrations.

Ontario derives large revenues from such items as the taxation of liquor and cigarettes (much higher today than in earlier times), as well as the more commonly thought of forms of revenue, such as income tax. Ontario's income and corporate income taxes are collected by the federal government as part of its national tax system, and the proceeds remitted to the province. In fiscal year 1981-82 provincial gross general revenues totaled $19.73 billion, and provincial expenditures were $20.86 billion.

Health In 1983 Ontario had 194 "general" and 75 "special" hospitals, and about 50 000 hospital beds, an average of 5.8 beds per 1000 population. According to the 1981 census, Ontario employed 186 560 people in medicine and health occupations, of whom a large majority, 147 350, were lower-paid women. In governmental (but not personal) health expenditures, this cost $5.948 billion in 1981.

Ontario's health services, and the means by which they are supported, are similar to those in other provinces. Federal Acts in 1958 and 1966 established first hospital insurance, paid for by the general public from compulsory premiums, and then comprehensive medical care services (usually abbreviated as "medicare"). These acts are federal-provincial in nature, as is the co-operation that is necessary to make them work. This co-operation did not occur without some initial political pain, and there are frequent stresses as the 2 levels of government debate the amount that each should put into the system, as well as the ways in which it should be spent.

Ontario's public-health insurance system is now consolidated in the Ontario Health Insurance Plan, into which solvent citizens pay a premium, and which supports, through subsidy, those unable to pay full or partial premiums. There are, in addition, "extra charges" levied by some doctors, particularly in specialist fields. These charges became the subject of lively political debate in the mid-1980s.

Politics There are 3 political parties in Ontario with representation in the provincial legislature. Two, the Progressive CONSERVATIVE PARTY ("Tories") and the LIBERAL PARTY ("Grits"), go back to before Confederation. The third party, the NEW DEMOCRATIC PARTY (NDP), grew out of the Co-operative Commonwealth Federation. The Liberals were in power most of the time to 1905, and the Conservatives most of the time since then.

The PC Party has governed Ontario since 1943. Part of the explanation for its success lies in the noisy and somewhat gamey government which preceded it, that of the Liberal Mitchell HEPBURN (1934-42), and in the fragmentation of the opposition vote between the Liberals and CCF-NDP. But the Conservative Party has consistently found ways to appeal to widely differing groups across the province and to rely on their solid and continuing support, as with the Conservative voting bastion in eastern Ontario. It has a formidable political organization: the "Big Blue Machine," strengthened under the successive premierships of Leslie FROST (1949-61), John ROBARTS (1961-71) and William DAVIS (1971-85). One recent case regarding French-language rights illustrated the government's flexibility and acumen. Davis had cautiously

Lieutenant-Governors of Ontario 1867-1984

	Term
Henry William Stisted	1867-68
William Pearce Howland	1868-73
John Willoughby Crawford	1873-75
Donald Alexander Macdonald	1875-80
John Beverley Robinson	1880-87
Alexander Campbell	1887-92
George Airey Kirkpatrick	1892-97
Oliver Mowat	1897-1903
William Mortimer Clark	1903-08
John Morison Gibson	1908-14
John Strathearn Hendrie	1914-19
Lionel Herbert Clarke	1919-21
Henry Cockshutt	1921-27
William Donald Ross	1927-32
Herbert Alexander Bruce	1932-37
Albert Matthews	1937-46
Ray Lawson	1946-52
Louis Orville Breithaupt	1952-57
John Keiller MacKay	1957-63
William Earl Rowe	1963-68
William Ross Macdonald	1968-74
Pauline Emily McGibbon	1974-80
John Black Aird	1980-

Premiers of Ontario 1867-1984

	Party	*Term*
John Sandfield Macdonald	Liberal-Conservative	1867-71
Edward Blake	Liberal	1871-72
Oliver Mowat	Liberal	1872-96
Arthur Sturgis Hardy	Liberal	1896-99
George William Ross	Liberal	1899-1905
James Pliny Whitney	Conservative	1905-14
William Howard Hearst	Conservative	1914-19
Ernest Charles Drury	United Farmers of Ontario	1919-23
George Howard Ferguson	Conservative	1923-30
George Stewart Henry	Conservative	1930-34
Mitchell Frederick Hepburn	Liberal	1934-42
Gordon Daniel Conant	Liberal	1942-43
Harry Corwin Nixon	Liberal	1943
George Alexander Drew	Conservative	1943-48
Thomas Laird Kennedy	Conservative	1948-49
Leslie Miscampbell Frost	Conservative	1949-61
John Parmenter Robarts	Conservative	1961-71
William Grenville Davis	Conservative	1971-85
Frank Miller	Conservative	1985-

and gradually conceded the substance of BILINGUALISM — for example, education in the French language, or the right to a French trial anywhere in the province — without giving in on the principle. The Conservatives have consistently refused to give constitutional recognition and protection to the French language or to make it an official language of the province. This has permitted amelioration in practice for Francophones without rousing anti-French voters in various parts of the province — all the while allowing the probilingual Liberals to be tarred with the French-language brush.

Education Ontario has the traditional 3-tiered educational system common to most Canadian provinces: primary, secondary and post-secondary. The system comes under strict provincial control, reflecting whatever the province and its educational advisers for the time being think is most appropriate for study by Ontario learners.

The basic system is further divided between 2 kinds of public school: public, in the strict sense, or nonsectarian; and "separate" or Roman Catholic. Each of these systems enjoy powers of taxation, and each is run by boards elected by members of the public who choose to support them through their taxes. This is the result of a compromise at the time of Confederation, when rights for Catholics in Ontario were traded off against those for Protestants in Québec. Unluckily for the Catholics, the Confederation bargain was held not to include complete financial support of separate schools. This was the cause of occasional political protest and action, most notably during the provincial election of 1934. In the 1960s the government decided to extend its full support of elementary separate schools to grades 9 and 10, but for years steadfastly declined to go further, even in the face of pressure from Catholic leaders. In 1984 premier Davis startled Catholics and non-Catholics alike with a sudden announcement that his government would cover all the costs of separate school education in grades 11, 12 and 13 by 1988.

Ontario's primary system runs through grade 8; high schools then take up the burden through to graduation, what was formerly called junior (grade 12) or senior (grade 13) matriculation. Grade 13, however, is gradually being phased out. The curriculum the students study has varied considerably through the years, according to the fashions current in education. The Ontario curriculum reflected the "progressive" ideas current in the 1930s and early 1940s; it showed a greater concern with structure during the 1950s and early 1960s; and it frequently dissolved into a free-form exercise appropriate to the shapeless decade of 1965 to 1975. At the time of writing, it has been lurching back to a greater concern with the basic skills which seemed to be lacking in recent graduates from the school system.

About 5% of Ontario's students are Francophones. Although French-language schools existed in eastern and northern Ontario long before 1968, boards since then were able to set up French schools "when numbers warrant" (*see* SEPARATE SCHOOL). The interpretation of this phrase has caused much dispute in certain parts of the province, Penetanguishene being a notable example. In 1984 the Ontario Court of Appeal ruled that every francophone (and anglophone) student in the province has a right to education in his or her mother tongue. Linguistic minorities, the court also made clear, must be guaranteed representation on school boards and a say in minority-language instruction. The government immediately moved to give effect to the court's ruling, which was based upon the Charter of Rights and Freedoms.

Beyond high school there is the post-secondary structure: 21 degree-graduating UNIVERSITIES, scattered from Ottawa to Windsor to the Lakehead; 22 colleges of applied arts and technology, or COMMUNITY COLLEGES, and 4 colleges of agricultural technology, a school of horticulture, a chiropractic college and an institute of medical technology. The post-secondary system was expanded greatly during the 1960s, at a time when politicians held education in high regard as a motivator of economic growth. Later, when opinion changed to hold that education and growth were not strictly related, politicians discovered that education cost a great deal and had no obvious constituency. Cut-backs and freezes on spending followed. Education in general nevertheless remained a large item in the provincial budget. In 1981-82, $4.39 billion (over 20% of gross provincial general expenditure) was spent to keep 1.9 million primary and secondary students and 259 000 post-secondary students in school.



Toronto Parliament Buildings (*photo by J.A. Kraulis*).

Cultural Life Little now survives of indigenous art forms, although early inhabitants of Ontario left behind considerable cultural remnants, from the Serpent Mounds near Peterborough to subsequent more sophisticated examples of carving and pottery. Later settlers brought their own cultural heritage with them, derived from European models. The forms of the mid-19th century, embodied in contemporary handicrafts, still enjoy a considerable popularity and sale with tourists in quest of their heritage. As a general rule, Ontario artists follow international styles, whether literary, artistic or architectural, and their work should be, and sometimes is, judged by the best international standards. Artistic and cultural endeavour is encouraged through a variety of government subsidy programs, some federal and some provincial, such as the Ontario Arts Council (fd 1963), an independent government agency which gives grants to individuals and organizations alike. Ever practical, the government points out that the arts create jobs. Every grant dollar to orchestras, the taxpayer is reminded in Arts Council literature, directly produces almost $7.00 in wages, fees and operating expenditures. There are symphony orchestras in Toronto, Ottawa, Hamilton and Kitchener-Waterloo, as well as a major Shakespearean festival (STRATFORD FESTIVAL, fd 1953) held each year in Stratford, and the Art Gallery of Ontario and the ROYAL ONTARIO MUSEUM in Toronto.

Communications Except for Toronto, Ontario's cities support only one English-language daily paper each, and these NEWSPAPERS are almost invariably owned by newspaper chains. Toronto's newspaper life is the most lively, with 3 widely differing newspapers. Toronto is also the home for the large majority of Canada's large magazines, including *Maclean's*, *Canadian Business* and *Saturday Night*, and the headquarters of the larger national publishing firms, such as MCCLELLAND & STEWART and UNIVERSITY OF TORONTO Press, are located there. The main English-language facilities of the CANADIAN BROADCASTING CORPORATION and the private CTV network are also in Toronto; besides the English-language media there are 3 French-language TV stations in Ontario, plus dozens of repeater stations and 16 radio stations, not to mention stations broadcasting in a variety of other languages. TVOntario, a public station, broadcasts in both languages.

Most of Ontario is, however, not confined to domestic Canadian television. The 3 major American networks, and the Public Broadcasting System, are within viewing range, either by direct transmission or through cable TV networks. Their availability gives southern Ontario one of the largest choices of TV programming anywhere in the world.

Historic Sites Ontario has long enjoyed a vigorous HISTORIC SITE program and rare is the township lacking a plaque or cairn commemorating a notable event. Provincial legislation makes possible the designation of heritage building, and while not an absolute protection this has made possible the preservation of buildings of greater or lesser merit throughout the province.

Among the first historic sites to attract interest were the mid-17th-century Jesuit missions to the Hurons. Having supported research in the area since 1890, the Ontario government undertook the reconstruction of STE MARIE AMONG THE HURONS near Midland in 1964, and opened it to the public 3 years later. Picturesque forts, the legacy of a hundred years of tension along the Canadian-American border from the beginning of the American Revolution, dot the southern reaches of the province. At Kingston, FORT HENRY, whose stone walls were originally completed in the 1830s, is perhaps the best known, but Fort George and FORT ERIE on the Niagara frontier, Fort Wellington (Prescott), Fort York (Toronto) and Fort Malden (AMHERSTBURG) have also been restored to their appearance at the time of the international crises and conflicts during the first part of the 19th century. The life of the province's pioneers is depicted in reconstructed townsites, including UPPER CANADA VILLAGE near Morrisburg and BLACK CREEK PIONEER VILLAGE north of Toronto; in 1973 the Ontario government began to rebuild FORT WILLIAM (at Thunder Bay), a fur-trading post established

by the North West Company in 1803. Boating enthusiasts enjoy two 19th-century canals — the RIDEAU CANAL, built from 1826 to 1832 by the Royal Engineers for the movement of troops and military supplies, and the Trent, which dates back to 1833 but was fully developed from 1895 to 1918 for commercial traffic.

History The first immigrants to Ontario seem to have arrived during the last ice age, approximately 10 000 years ago. As the ice retreated, Ontario's paleo-Indian inhabitants moved into the northern region of the province. For many years Ontario's peoples probably lived by fishing and hunting; deer, elk, bear and beaver were to be found in the S and caribou in the N. By 1000 BC pottery had been introduced, and archaeological sites disclose a far-flung trading system, with importations from as far as the Gulf of Mexico. By 100 AD the inhabitants of the province can be identified with the Algonquian tribes (OJIBWA, CREE and ALGONQUIN found by the explorers), and with the Iroquoian tribes of the S (Iroquois, Huron, Petun, Neutral, Erie and Susquehannock).

Exploration The first Europeans known to have approached the present frontiers of Ontario were the luckless Henry HUDSON, cast adrift off the N coast, Etienne BRÛLÉ and Samuel de CHAMPLAIN, who travelled along the Ottawa R in 1613, reaching the centre of the province in 1615. Brûlé was likely the first to see Lakes Huron and Ontario. Champlain allied the French with the Huron. After the dispersal of the Huron in the late 1640s, the OTTAWA took the role of middlemen in the fur trade. The 5 nations (later Six Nations) of the Iroquois Confederacy, located across Lakes Ontario and Erie in what is now New York state, dominated the region without significantly settling it.

Despite the hostility of the Iroquois, the French continued their penetration of the Great Lakes region, utilizing both the Ottawa-French R-Lk Huron route to the W and the St Lawrence-Great Lakes path. The adventurer LA SALLE built and sailed the GRIFFON on the lakes, and the Ontario region became a vital link between the French settlements in Québec and their fur-trading posts in the Mississippi. During the 18th century the main French posts in the Great Lakes region were FORT FRONTENAC [Kingston], Fort Niagara, Fort Detroit and Fort Michilimackinac. France's rivals, the British, did not successfully penetrate the region until 1758-59, when they burned Fort Frontenac and captured Fort Niagara. British occupation was not secure until the Indian allies of the French were defeated after an uprising in 1763-64. The Great Lakes region also served as a base of operations for British (regular and loyalist) forces during the American Revolution. A series of bloody campaigns and raids did not shake the British hold over their Great Lakes forts, but did result in the arrival of Loyalist and Iroquois refugees displaced from the American frontier. The TREATY OF PARIS (1783) divided the Great Lakes down the middle, and created the southern boundary of what is now Ontario.

Settlement The modern settlement of Ontario began with the arrival of some 6000 to 10 000 Loyalists during and after the American Revolution. After them came other Americans, attracted by cheap land; crown land was available for sixpence an acre plus survey costs and an oath of allegiance. Under the CONSTITUTIONAL ACT, 1791, the old PROVINCE OF QUEBEC was divided and UPPER CANADA created. A regular colonial government was established, with a lieutenant-governor, an elected legislative assembly, and appointed legislative and executive councils. The first lieutenant-governor was John Graves SIMCOE, an English veteran of the revolutionary war, who aimed to turn Upper Canada into a bastion of the British Crown in the heart of the continent. Simcoe only half succeeded; Upper Canada continued to mark the northern fringe of the American frontier, but by 1812 approximately 80% of the estimated 100 000 settlers in southern Ontario were of American origin. When the WAR OF 1812 broke out with the US, the attitude of parts of the province's population proved highly ambivalent, and a few Upper Canadians actually sided with and fought alongside the invaders. The British army, with assistance from Indians and local militia, succeeded in defending most of the province, repelling American invasions along the Niagara frontier in 1812 (Queenston Heights) and 1813 (Beaver Dams and Stoney Creek). But also in 1813, Americans thrust into southwestern Ontario and raided the provincial capital, York [Toronto], where the government buildings were burned. After several more bloody battles in 1814, the war drew to an end. When news of peace arrived, each side handed back what it had conquered and the boundary remained unchanged.

In the years between 1825 and 1842 the population of Upper Canada tripled to 450 000 and doubled again by 1851. Most of the immigrants came from the British Isles, roughly in the percentages of 20% English, 20% Scottish and 60% Irish. Settlement spread generally from S to N, moving away from the lakes as land along them was occupied. Accessibility to land away from the lakes depended on roads — usually of abominable quality — many of which were built by the settlers themselves. Rampant land speculation added greatly to the irregularity of early settlement patterns. Southern Ontario's fertile land was substantially occupied by the mid-1850s, by which time the form of government had changed again. In the aftermath of the REBELLIONS OF 1837, led in Upper Canada by Toronto "firebrand" William Lyon MACKENZIE, the British government brought Upper and Lower Canada together in the united PROVINCE OF CANADA. A further decade of fractious politics resulted in a measure of RESPONSIBLE GOVERNMENT in 1848-49, by which time immigration, combined with a prolific birthrate, had raised Upper Canada's population (952 004 in 1851) to about 60 000 more than its partner, LOWER CANADA. The agitation, led by George BROWN, for REP BY POP ("representation by population"), so that Upper Canada would receive additional representation in the legislature, led to the increasing paralysis of the province's political system. The crisis was finally resolved only in 1864 by the formation of a joint-party regime (*see* GREAT COALITION) to seek a union of the British North American colonies. This CONFEDERATION was gained in 1867, and Ontario became a province of the new Dominion of Canada.

Development Ontario's economy in the 1850s was primarily agricultural, with the emphasis on wheat. Over time the balance shifted to dairy, fruit and vegetable farming, and at the same time there was a drift away from farming areas; emigration took place to the US, to the Canadian West or to the cities. Urban and industrial growth rose apace from the 1850s through the 1860s, with the development of textiles and metalworking, farm implements and machinery. Moreover, Toronto grew especially, both as a railway and manufacturing centre and as provincial capital.

Ontario's governments thereafter took up developing the province's natural resources — lumber, mines and later hydroelectricity. Much political energy was consumed by a lengthy series of quarrels with the federal government over patronage, waterpower and the northern BOUNDARIES of the province — a problem settled in 1889, at the expense of Manitoba, by confirming Ontario's western boundary at the LAKE OF THE WOODS. The final boundary was drawn in 1912. Under Sir Oliver MOWAT's Liberal government (1872-96), Ontario led the way in advocating provincial rights against the overriding powers of the federal government under Sir John A. MACDONALD. It also extended government services for a province now thriving on quite intensive agriculture, widening resource activities and industrial advance in Canada's richest internal market. But the Liberal regime gradually declined from the later 1890s and was at last terminated in a flurry of scandals in 1905.

Its Conservative successor, under Sir James WHITNEY (1905-14), made its mark by establishing the Ontario Hydro-Electric Power Commission. Whitney's successor, Sir William HEARST, was turned out by a political revolution among the province's farmers, who took office with labour support in 1919 as the UNITED FARMERS OF ONTARIO. Although the UFO government curbed some of the peculiarities of its Conservative predecessor, it was politically accident prone and quickly fell victim to a revitalized Conservative Party under Howard FERGUSON (1923-30). Ferguson was a determined man, as well as an able and wily politician. He ended wartime prohibition at last by channelling Ontario's drinking energies into "beverage rooms" which served beer, for years to men only. Ferguson tapped Ontarians' desire to enhance the provincial revenues through the provincially owned Ontario Liquor Control Board, which was designed to promote TEMPERANCE as well as revenue. He also defused a long-standing controversy with the province's French-language population by reintroducing official French classes in schools; and as his predecessors had done, he continued a policy of developing provincial resources, including the colonization of the Ontario northland, an enterprise with many pitfalls. Ferguson's successor, George HENRY, had to cope with the ravages of the Great Depression, not to mention the attacks of a reinvigorated provincial Liberal Party under Mitchell Hepburn. Hepburn swept Henry out of office with promises of reform and economy in 1934. Neither object was really achieved, although Hepburn did succeed in achieving pasteurization of Ontario's milk against the cries of opposition from dairy farmers.

Hepburn battled the appearance of industrial unionism from the US and in 1937 fought and won a provincial election on the issue. His regime is principally remembered for his violent attacks on his fellow Liberal, Prime Minister W.L.M. King, and for his obstructionist attitude towards attempts to solve Canada's constitutional perplexities. Hepburn resigned in 1942, and his party was promptly turned out of office in an election in 1943 that made the Conservatives under George Drew the government and the Socialist CCF the official opposition. Drew's government vigorously promoted immigration, especially from the British Isles, and a series of overdue reforms. Like Hepburn, Drew combatted Ottawa and its "centralizing" schemes. It was only after Drew's departure in 1948 that Premier Leslie Frost adopted a quieter and more co-operative attitude to the central government, a major reversal in Ontario's policy. Frost shared the developmental objectives of Liberal ministers in Ottawa such as C.D. HOWE and the 2 governments co-operated on major projects such as the St Lawrence Seaway, the Trans-Canada Pipeline and the development of nuclear power. Frosts successors, John Robarts and William Davis, were cast in his low-key, down-to-earth mold; both strove to minimize conflict between Conservative Ontario and the usually Liberal federal government. Through his Confederation for Tomorrow conference in 1967, Robarts tried to work out an accommodation that would satisfy Québec and keep it in Confederation. In 1981-82 Davis was Pierre Trudeau's strongest provincial supporter in patriating and reforming the Canadian constitution.

Though Ontario has often been perceived by

other parts of Canada as a massive "central Canada" monolith, it is in reality itself a conglomerate of considerably different subregions — most obviously in its far-flung, primary-resource-based northern area and its industrialized, urbanized south. Despite its overall prosperity, Ontario itself suffers from regional disparities. Peripheral areas believe that they experience discrimination at the hands of the urbanized core, particularly metropolitan Toronto. Attempts to classify these regions (eg, the Ontario government's *Ontario Economic and Social Aspects Survey*, 1961, which outlined 10 "economic regions") have proven inadequate because of the complexity of factors that must be considered. Nevertheless, many of the problems that are sometimes referred to on a national level, such as rural poverty, heavy concentration of industry in a few areas, the precarious life of communities based on a single economic activity, and disparities of income and of economic growth are clearly evident within the province itself.

Still, Ontario does have some aggregate distinctive traits: a political conservatism, seen in the longevity of its provincial regimes; a practical readiness to adapt, evinced in many applications of the power of its governments; and a keen awareness of the all-but-embracing United States around its core, which has meant both strong cross-border ties and determined responses to perceived threats of American power.

ROBERT BOTHWELL AND NORMAN HILLMER

Reading: C. Armstrong, *The Politics of Federalism* (1982); G.P. de T. Glazebrook, *Life in Ontario: A Social History* (1975); D.C. MacDonald, ed, *Government and Politics of Ontario* (rev ed 1980); H.V. Nelles, *The Politics of Development* (1974); F.F. Schindeler, *Responsible Government in Ontario* (1973); Joseph Schull, *Ontario Since 1867;* J.D. Wood, ed, *Perspectives on Landscape and Settlement in Nineteenth Century Ontario* (1975).

Ontario Agricultural College, *see* AGRICULTURAL EDUCATION.

Ontario Centre for Microelectronics, *see* ELECTRONICS INDUSTRY.

Ontario College of Art is Canada's best known and largest art school. It was founded in 1876 by the Ontario Society of Artists with the assistance of a $1000 provincial grant. The college received a provincial charter in 1912 to teach fine art and design and opened its own building in 1921 beside the Art Gallery of Toronto (now ART GALLERY OF ONTARIO), which had donated the site. This was the first building in Canada to be used solely for art education. In 1984 the college accommodated 2890 full-and part-time students and 194 instructors in 3 buildings in Toronto and off-campus study centres in Florence, Italy, and New York City. Many Canadian artists and designers, including Michael SNOW, Allan Fleming, Jack BUSH and members of the GROUP OF SEVEN, have attended OCA as students or staff. In recent years, the traditional skills such as drawing and painting have been augmented by contemporary courses such as holography and photoelectric arts. *See also* ART EDUCATION. JON MCKEE

Ontario Economic Council, est 1968 to advise the Executive Council of Ontario on ways to contribute to public awareness, discussion and understanding of socioeconomic issues of special significance to the people of Ontario. The council is composed primarily of economists and business persons and maintains a small staff in Toronto. Past studies have examined a range of issues, including the elimination of rent controls, the possibility of user charges for social services, the establishment of a N American free trade area and appropriate sale of industrial policy and income distribution. It has advocated a N American free-trade area.

W.F. FORWARD

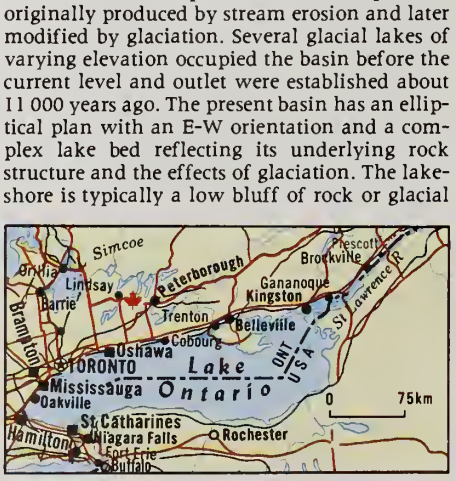
Ontario Hydro is a CROWN CORPORATION owned by the Ontario government. In 1983 it held assets of $23.2 billion (ranking 2nd among companies in Canada), had sales or operating revenue of $3.8 billion (ranking 19th) and employed 31 2334 people. It was the first provincially owned electric utility in Canada and is one of the largest public ELECTRIC UTILITIES in N America. Its generation and transmission system includes 68 HYDROELECTRIC, 7 fossil-fueled and 3 NUCLEAR POWER stations (3 more are under construction), along with over 128 000 km of transmission and distribution lines. The system provides power to an estimated 3 million customers in Ontario, in all areas of its 650 000 km² jurisdiction. The utility is a special statutory corporation established by the provincial legislature in 1906. Its founding chairman was Sir Adam BECK. In 1908, just 2 years after Ontario's legislature passed the Hydro-Electric Power Commission of Ontario Act, the novice utility entered into agreements with 14 municipalities to provide power at cost. Similar agreements now link Ontario Hydro and 324 co-operating municipalities. Ontario Hydro is responsible for the generation and transmission of ELECTRIC POWER and for its sale to participating utilities. It also acts as a central supervisory body with authority to approve and control certain features of the utilities' operations. Ontario Hydro also plays a prominent role in nuclear technology, operating uranium-fueled generating stations at Bruce "A" (3.2 million kW), Pickering (2.2 million kW) and Rolphton (20 thousand kW). Nuclear technology has brought new problems and responsibilities, eg, NUCLEAR SAFETY, irradiated fuel management and other environmental concerns, each of which is given high priority by Ontario Hydro.

The mandate of the corporation is to provide power to its customers at the lowest feasible cost. Applications for increases in rates to meet costs are subject to examination at public hearings before the Ontario Energy Board. Ontario Hydro has also been called to account before various committees of the Ontario legislature. The corporation's board of directors consists of a chairman, a vice-chairman, a president and not more than 10 other directors.

J.R. WHITEWAY

Ontario, Lake, 19 700 km² (10 000 km² in Canada), drainage area 90 130 km², elev 74 m, mean depth 86 m (max 236 m), length 311 km and width 85 km. It is the smallest in surface area and most easterly of the GREAT LAKES and eighth-largest body of fresh water in N America. The lake receives most of its water supply from the other Great Lks through the NIAGARA R and discharges into the ST LAWRENCE R through the Kingston Basin at its NE end. Other tributaries are the Genesee, Oswego and Black rivers in New York state and the Trent R in Ontario.

Lk Ontario occupies a bedrock depression originally produced by stream erosion and later modified by glaciation. Several glacial lakes of varying elevation occupied the basin before the current level and outlet were established about 11 000 years ago. The present basin has an elliptical plan with an E-W orientation and a complex lake bed reflecting its underlying rock structure and the effects of glaciation. The lakeshore is typically a low bluff of rock or glacial



sediment with a narrow beach. The intersection of older and higher glacial and lake deposits just E of TORONTO has produced the Scarborough Bluffs — spectacular, cathedral-like cliffs rising as high as 100 m above the lake. Other scenic shore features include the rocky coasts and islands of the Kingston Basin and the extensive sandy beaches at HAMILTON and Toronto on the Canadian side and Mexico Bay in the US. Because Lk Ontario is deep and its winter climate is moderated by incursions of warm air from the SW, its open waters rarely freeze in winter. From Nov to May the main body is well mixed at uniform temperature. From June through Oct the lake is stratified, with a warm upper layer 10-20 m thick and a cool lower layer. Temperatures at depths below 100 m are almost always less than 5°C. The average residence time of water in Lk Ontario is 8-10 years, compared with 3 years for Lk ERIE and more than 100 years for Lk SUPERIOR.

The first European known to have visited the lake was Étienne BRÛLÉ in 1615. The name Ontario is thought to be of Indian origin, meaning "beautiful lake" or "sparkling water." It was first applied to the lake by Europeans in 1641 and appears on maps of N America as early as 1656. Conflict between the English and French and their Indian allies over the local fur trade inhibited European settlement until after the English takeover in 1763. The first major group of settlers were LOYALISTS, many of whom settled on the N shore. The most vigorous campaigns of the WAR OF 1812 between the US and Great Britain were fought on or near Lk Ontario. (The vessels *Hamilton* and *Scourge,* lost in a squall during a naval engagement at that time, have recently been found on the lake bed near Niagara.)

Nearly one-quarter of the present population of Canada lives in southern Ontario near the lake. The "Golden Horseshoe," which encompasses the western end of the lake and includes the major cities of ST CATHARINES, Hamilton and Toronto, is the industrial heartland of the country. Urban centres on the lake E of Toronto include OSHAWA, PORT HOPE, COBOURG, BELLEVILLE and KINGSTON. The other major factors promoting vigorous settlement and growth have been the productive farmland of southern Ontario and northwestern New York state, and access to ocean shipping via the ST LAWRENCE SEAWAY and to upper Great Lake ports via the WELLAND CANAL. Smaller craft can travel the RIDEAU CANAL from Kingston to Ottawa and the TRENT CANAL between the Bay of Quinte and Georgian Bay. Unfortunately, industrial and agricultural wealth has also led to the degradation of Lk Ontario water quality by pollution. Cautious optimism prevails, however, since the lake seems to be recovering as pollutant levels are reduced.

N. RUKAVINA AND F.M. BOYCE

Ontario Northland Transportation Commission is a provincial CROWN CORPORATION which operates a transportation and communication network throughout northeastern Ontario. Established by provincial statute in 1902 as the government-owned Temiskaming and Northern Ontario Railway, it was designed to open up resources and encourage settlement northward from the city of NORTH BAY.

Between 1902 and 1908, construction of the railway extended to a junction with the National Transcontinental Railway at the town of Cochrane, a distance of 390 km. Branch lines made possible the exploitation of mineral and timber resources and the founding of new towns such as Cobalt, Timmins and Iroquois Falls. In the 1920s the railway was extended another 300 km northward, from Cochrane to Moosonee at the southern tip of James Bay, and from Swastika eastward to the gold of Kirkland Lake and the copper and zinc of Rouyn-Noranda.

At the same time that lucrative gold mines were being established (Hollinger, Dome, McIntyre, Lake Shore and Teck), and forest products hauled southward, the T&NO Railway was also opening northeast Ontario to farming and settlement. It was a community railway; the first 4 decades of its history were identified with the social and cultural life of the northeast, before the advent of highways, automobiles and buses.

Because of its vital regional function, the commission has been administered like a public corporation by successive Ontario governments, the Cabinet and the premier functioning as major shareholders. The beneficiaries of their partisan politics, however, have generally been small businessmen from the north, so that local political patronage has been combined with a genuine commercial approach to the operation of the commission as a vehicle of development.

To reflect its expanding role for the whole of northeastern Ontario, the provincial government of Premier George DREW changed the name to Ontario Northland Transportation Commission in 1946. Over the following 2 decades, diesel locomotives steadily replaced steam; trucks, buses, boats and Otter aircraft were purchased to extend transportation facilities, while further investments were made to gain control of electronic means for the integration of long-distance TELEPHONES and TELECOMMUNICATIONS into a separate division called Ontario Northland Communications.

In 1982 assets of the ONTC were valued at $194 million. Its net income was $13.6 million, more than 60% of which came from telecommunications and 33% from railway freight revenue. Passenger rail service is subsidized annually by the provincial government, which has recently directed the mechanical department of the ONTC at North Bay to become a servicing and manufacturing unit for GO Transit locomotives and for the Urban Transportation Development Corporation, both of which also come under ownership of the Ontario government.

ALBERT TUCKER

Ontario Research Foundation (ORF) was established as an independent corporation by a provincial Act in 1928; laboratory facilities were provided at the outset. Although initially academic in outlook, ORF gradually shifted its focus and began to promote industrial development, especially of small companies, through scientific and technological innovations. ORF has developed expertise in textile and knitting technology, asbestos analytical methodology, SOLAR ENERGY and POLLUTION research. Its facilities were expanded substantially in 1969. The president is responsible to a board of governors appointed by the lieutenant-governor-in-council from the industrial, commercial and scientific communities. The foundation has a total staff of over 430. Initial funding was provided by an endowment fund through the CANADIAN MANUFACTURERS' ASSOCIATION and by a matching provincial grant. Since 1967, annual provincial grants have been tied to foundation income. ORF receives about half of all federal funding granted to provincial research organizations. About half of exploratory research is federally funded; industrial contracts finance most applied research. In 1981 ORF served over 2100 industrial clients. Investigations are conducted in 8 departments at ORF laboratories at Sheridan Park Research Community, Mississauga. A subsidiary, ORDCO Technology Ltd, manufactures and markets patented inventions of ORF and its clients, eg, low-polluting waste-disposal technology that produces useful heat. ORF is also responsible for drawing the attention of government and industry to research opportunities that promise social and economic benefits.

MARTIN K. MCNICHOLL

Ontario Schools Question, regarding the French language in Ontario elementary schools, was the first major schools issue to focus on language, rather than religion. The conflict aligned English-speaking Catholics and Protestants against French-speaking Catholics. English had been made a compulsory subject in 1885. In 1890 regulations further required that English be the language of instruction except where impracticable. In 1910, after their numbers had grown, Franco-Ontarians organized the French-Canadian Education Assn of Ontario to promote French language interests. They were opposed by the ORANGE ORDER, which demanded "English only" education, and by Irish Catholics, led by Bishop FALLON of London. In 1912 Ontario Prem James WHITNEY's Conservative government issued Regulation 17, which limited French as the language of instruction and communication to the first 2 years in elementary schools. Regulation 17 was amended in 1913 to permit French as a subject of study for one hour per day.

Supported by French Canadians in Québec, Franco-Ontarians resisted Regulation 17. The Ontario schools issue escalated to a national conflict, contributing to the tensions of the 1917 CONSCRIPTION crisis and further alienating French Canadians from PM BORDEN's Conservative government. The JUDICIAL COMMITTEE OF THE PRIVY COUNCIL decided that Regulation 17 was constitutional, because denominational school guarantees did not include language, but that the commission appointed by the government to enforce its policy in Ottawa was unconstitutional. A political compromise came after war tensions were removed, and in 1927, unable to enforce Regulation 17, Howard FERGUSON's Conservative provincial government accepted the recommendation that each school be considered on its merits by a departmental committee. *See also* MANITOBA SCHOOLS QUESTION; NEW BRUNSWICK SCHOOL QUESTION; NORTH-WEST SCHOOLS QUESTION.

MARILYN BARBER

Ontario Science Centre, located in the Don Valley, Toronto. It was opened (1969) as one of Ontario's projects for the Canadian CENTENNIAL, funded both provincially and with a federal grant. Construction costs were approximately $23 million and an additional $7 million was spent on initial exhibit development. The full-time staff of 200, plus students, have built over 1000 exhibits, of which 400 are participatory experiments in 15 disciplines. Yearly attendance at the centre is about 1.3 million, but another 200 000 people are reached by a travelling "Science Circus." A day school teaches and gives credits to 25 senior high-school students, all talented in science, who attend for one semester. The centre publishes a small monthly paper, *Newscience*, which is given to visitors and mailed to subscribers. Britain, the US, France, China and Japan have purchased exhibits and rented exhibitions from the centre. To meet this demand the centre has licensed private industry to manufacture and sell copies of its exhibits to museums and SCIENCE CENTRES around the world and in Canada. In 1984 the centre was an agency of the Ontario Ministry of Citizenship and Culture which provided the annual operating budget of about $9 million.

J. TUZO WILSON

Ontario Veterinary College, Guelph, *see* VETERINARY MEDICINE, INSTITUTIONS and VETERINARY MEDICINE, HISTORY.

Ookpik [Inuktitut, "snowy" or "Arctic owl"] is the name of one of the most popular of Inuit handicrafts, a souvenir sealskin owl with large head and big eyes. The appealing figure was created at the Ft Chimo Eskimo Co-operative in Québec in 1963, and it has become a symbol by which Canadian handicrafts are identified around the world.

JOHN ROBERT COLOMBO

Oomiak, *see* UMIAK.

Oonark, Jessie, "Una," artist (b in the Back R area, NWT 1906; d at Baker Lake, NWT 7 Mar 1985). She is known for her drawings and wall hangings, and her decorative, hieratic, brilliantly coloured images come from a lifetime of cutting caribou skins and sewing them into clothing. She created a unique personal vision by combining traditional Inuit images of the SHAMAN's flight with symbols from her experience as a devout Christian. A widow with 8 children, she moved from the land to Baker Lk in 1955; 5 of her children have become recognized artists. The printmakers at the Sanavik Co-op have made many stone-cut and stencil prints from her drawings, and one of their largest and most important wall hangings was commissioned by the National Arts Centre in Ottawa. She was elected to the Royal Canadian Academy of Arts in 1975.

K.J. BUTLER



Untitled hanging (1972-75) by Jessie Oonark (*courtesy Sanavik Co-operative, Baker Lake, NWT*).

Opera was slow to take root in Canada. Once established, it blossomed sporadically before finally flourishing. One musico-dramatic forerunner of opera was Marc LESCARBOT's masque *Le Théâtre de Neptune*, played from small boats in PORT-ROYAL harbour on 14 Nov 1606. An isolated incident, this was concurrent both with the first European settlements in Canada and with the early flourishing of opera in Italy.

Operatic performances by itinerant foreign theatrical companies began in the late 18th century in Montréal, Québec City and Halifax, with light operas of English and French provenance such as Charles Dibdin's *The Padlock* of 1768 (performed in Québec City in 1783 and Montréal in 1786) or Egidio-Romualdo Duni's *Les Deux Chasseurs et la laitière* (performed in Montréal in 1789). Indigenous Canadian opera started with Louis-Joseph QUESNEL's *Colas et Colinette* (composed in 1789 (?) and performed in Montréal in 1790). At this time, operas were performed as "afterpieces" to evenings consisting of a play, in addition to a song, dance or recitation. Typically, the operas had spoken dialogue alternating with musical numbers (ie, ballad opera or opéra-comique).

From the 1790s to about 1830, the repertoire favoured Arne, Duni and Shield. The first operas performed in Toronto were John Braham and C.E. Horn's *The Devil's Bridge*, Coleman's *The*

Mountaineers, and Stephen Storace's *No Song No Supper* in 1825.

Social and political considerations exert an influence on operatic production, and the improvement in means of travel affected the dissemination of opera. In the 1830s, however, political unrest and cholera epidemics seem to have caused a lull in performances. In the 1840s and 1850s opera revived, in abridged form staged by small visiting companies, and the repertoire expanded to include more demanding works by Auber, Bellini, Boïeldieu, Donizetti, Rossini and Verdi. International vocal stars, including John Braham, Jenny Lind, Henriette Sontag and Adelina Patti, visited Montréal, Québec City and Toronto to perform operatic excerpts in recital. During the second half of the 19th century, Montréal and Toronto enjoyed performances of numerous travelling US companies led by American manager-entrepreneurs and prima donnas, even the expatriot Canadian soprano Emma ALBANI. By the end of the century the repertoire included Meyerbeer, Wagner, Gounod and Puccini, though not Mozart.

The formation of resident opera associations in Montréal and Toronto during the 1850s, 1860s and 1870s — the Holman English Opera Troupe and the Cooper English Opera troupe — was an important step followed, in Montréal, by the shorter-lived Société d'opéra français (1893-96) and the Montreal Opera Co (1910-13). The majority of performances, however, were by foreign companies, and cities such as Montréal and Toronto enjoyed more opera than at any other time in their history. After WWI, over 30 opera associations, including amateur, student and light-opera companies, were formed in Montréal and about a dozen in Toronto, though most were short-lived. Of these, the CANADIAN OPERA CO (COC) has been most successful. The Théâtre lyrique de Nouvelle-France began in 1961, changed its name to Théâtre lyrique du Québec in 1966, and dissolved in 1970. L'Opéra du Québec, a co-operative venture for productions in Montréal and Québec City, 1971-75, was revived as the touring company Opéra de chambre du Québec and l'Opéra de Montréal in 1980. The main opera associations currently are based in Vancouver, Calgary, Edmonton, Winnipeg, Hamilton, Toronto, Montréal and Québec City. The Vancouver, Edmonton, Manitoba and Southern Alberta Opera Assns (Calgary) joined forces as Opera West in 1973.

Opera has been promoted in Canada through the CANADIAN BROADCASTING CORPORATION, BANFF CENTRE SCHOOL OF FINE ARTS, JEUNESSES MUSICALES DU CANADA (JMC), and various FESTIVALS and universities. CBC broadcasts in the 1940s and 1950s on radio and from 1953 on television helped disseminate opera. The CBC has commissioned operas from Healey WILLAN, John BECKWITH, Kelsey Jones, Ben McPeek, Murray ADASKIN, Godfrey RIDOUT, Maurice Blackburn, Raymond Pannell and Robert Turner. Festival performances have included the STRATFORD FESTIVAL, Guelph Spring Festival, Vancouver International Festival, and Festival Ottawa (until 1983).

The Metropolitan Opera tours to Montréal and Toronto, which began in 1899, ended in 1961 because of prohibitive costs, except for the one-week tour to the Toronto International Festival, 1984. In 1967 some of the leading opera companies in the world — La Scala, the Royal Swedish Opera, the Vienna State Opera — visited EXPO 67. Although the COC no longer tours, the COC Ensemble has increased its touring in Ontario, including a production with Orchestra London in 1984.

Among the more prestigious of Canada's operatic performers have been conductors Wilfrid PELLETIER and Mario BERNARDI, singers Emma Albani, Pauline DONALDA, Edward JOHNSON, Raoul JOBIN, James Milligan, Victor Braun, Maureen FORRESTER, Louis QUILICO, George London, Lois MARSHALL, Léopold SIMONEAU, Teresa STRATAS, Jon VICKERS, Claude Corbeil, Ermanno Mauro and Allan Monk.

From the time of Quesnel's *Colas et Colinette*, indigenous Canadian opera has followed a sporadic course. Nineteenth-century works include Calixa LAVALLÉE's 3 light operas of the 1870s and 1880s, Charles A.E. HARRISS's *Torquil*, 1894, and Susie Frances Harrison's *Pipandor* of the late 1880s. In the 20th century, more Canadians have written operas, aided from the 1940s by the CBC. Many of the works composed in the 1950s and 1960s were one-act operas, commissioned by CBC or JMC. The trend begun by Eugène Lapierre in the 1940s or Barbara PENTLAND in the 1950s to focus on Canadian subjects was augmented during Canada's CENTENNIAL YEAR in 1967, the most successful being Harry SOMERS's *Louis Riel*, commissioned by the COC. Through the 1960s and 1970s short operas for small orchestra were most common, by composers such as Gabriel CHARPENTIER, Pannell, Charles Wilson, Tibor Polgar, Violet ARCHER, Somers, Norman SYMONDS, Paul McIntyre, Barrie Cabena and John Rea.

Large operas are relatively rare in recent years owing to production costs. Exceptions are Wilson's *Heloise and Abelard* (commissioned by the COC in 1973) and *Psycho Red* (commissioned by the 1978 Guelph Spring Festival), Derek Healey's *Seabird Island* (commissioned by the 1977 Guelph Spring Festival), and Beckwith's *Shivaree* (premiered by Comus Music Theatre, 1979). R. Murray SCHAFER's *Ra* (premiered by Comus Music Theatre, Toronto, 1983) is probably the longest, most experimental musico-theatrical work of the recent past, taking 11 hours to perform. *See also* MUSIC HISTORY.

GAYNOR G. JONES

Reading: Encyclopedia of Music in Canada (1981); *Opera Canada* magazine.

Ophthalmology is the medical specialty concerned with the eyes and their relationship to the body. An ophthalmologist (also called eye physician and surgeon, oculist, eye doctor) is a medical doctor who has studied eye conditions and diseases for 3 to 5 years beyond medical internship before taking examinations set by the Royal College of Physicians and Surgeons of Canada or by the College of Physicians and Surgeons of Québec. Once qualified, an ophthalmologist becomes part of the general medical team not only treating diseases and conditions of the eye, but also helping to diagnose many general medical problems, including circulatory disorders (eg, high blood pressure and atherosclerosis), neurological disorders (eg, multiple sclerosis and stroke) and endocrine problems (eg, diabetes and thyroid disease). These conditions can be associated with blurred vision and other symptoms and it is the ophthalmologist who often initiates not only vision-saving but also life-saving treatments.

The modern study of the eye as a medical specialty gradually evolved during the 1800s. Henry Howard of The Montréal Eye and Ear Institution was likely one of the first doctors in Canada to limit his practice to eye problems. His 1850 book, *The Anatomy, Physiology and Pathology of the Eye*, based on his 4 years of practice in Montréal, was published before the invention of the ophthalmoscope in 1851. The ophthalmoscope, a small hand-held telescope for looking through the pupil of the eye, allows doctors to see inside the eye and to examine the retina and optic nerve, which are extensions of the brain. In 1864 Toronto doctors pioneered retinal photography by connecting an ophthalmoscope to a camera to photograph the retina of a cat, a first step in photographing the inside of the living human eye and a technique that today is essential all over the world in evaluating and treating patients with eye diseases. In 1922 Dr Walter Wright pioneered the use of fascia lata (leg tissue) for repair of ptosis (droopy lids) in a manner that is still in use. The Canadian Ophthalmological Society was formed in Oct 1937, but it was not until the early 1940s that Dr Walter Wright at U of T set up the first in-Canada training program for ophthalmologists. Soon afterwards, Dr Harold Ridley, an Englishman, replaced an opacified lens (cataract) with a new clear plastic one (intraocular lens). Canadian ophthalmologists were among the pioneers to use these lenses.

As part of any complete eye examination, ophthalmologists determine the refractive error for each eye, and inspect the retina, cornea, iris and lens. Ophthalmologists can reconstruct many parts of the diseased eye. The diseased cornea can be replaced by a clear donor cornea in a corneal transplant operation; a clouded lens can be replaced by a clear plastic one in a cataract extraction and lens implantation operation; and glaucoma can be treated with newer medications, laser surgery and glaucoma surgery. Retinal disease can be treated with various lasers and with scleral buckling and vitreous cutting operations. Specialists and subspecialists in all new areas of treatment practise in most major centres across Canada. Training centres at medical schools for ophthalmologists are located in Halifax, Québec City, Sherbrooke, Montréal, Ottawa, Kingston, Toronto, London, Winnipeg, Saskatoon, Edmonton and Vancouver.

Operating microscopes now allow functional magnification; tissue can be repaired with stitches finer than a human hair; and membranes more delicate than tissue paper can be cut, left, or picked clean of scar tissue. LASERS that are capable of evaporating cloudy tissues are manufactured in Canada for international use. Technical advances and clinical data about contact lens technology emanate from Canada to around the world. Techniques for surgically modifying the shape of the eye, to reduce or eliminate the need for glasses in certain patients, are evolving and may find their way to Canada even as technology for these techniques is being developed here. Newer techniques for detection and treatment of glaucoma are also being tested in Canada, and computerized visual field testing machines are already used.

MICHAEL M. HENRY

Opossum, common name for about 8 genera and 65 species of omnivorous MAMMALS comprising the family Didelphidae, one of 2 families of MARSUPIALS found outside of Australia. The N American opossum (*Didelphis virginiana*) is the only marsupial native to Canada. An easily recognized, cat-sized animal, it has a long, pointed nose, naked ears, coarse black to white fur; scaly, prehensile (grasping) tail; and a hindfoot with a clawless, opposable first toe. This species probably evolved from the very similar tropical species *D. marsupialis* during the Pleistocene (2.5 million to 10 000 years ago). Young are born in an underdeveloped state after a gestation of less than 13 days; development is completed in a pouch on the mother's belly. Two litters of up to 13 young each may be produced annually. The opossum, poorly adapted to severe cold, reaches the northern limit of its range in Canada and is found in extreme southern Ontario and the lower Fraser Valley, BC.

C.G. VAN ZYLL DE JONG

Opting-Out, a device by which one or more provinces do not participate in a federal-provincial shared cost program; instead the province receives direct payment (in cash or tax room) of funds which would have been spent there. Under pressure from Québec, the Established Programmes (Interim Arrangements) Act was passed in 1965, permitting opting-out of major programs, including hospital insurance, vocational training, public health and aid to

the old and disabled. Only Québec opted-out. Defended as an example of the ability of the federal system to respond to Québec's needs, the legislation was also attacked for allowing a measure of "special status." The Act set the stage for later developments in fiscal federalism, notably Established Programmes Financing (1977). The CONSTITUTION ACT, 1982, provides for some opting-out in its constitutional amendment provisions, which permit provinces to remove themselves from any amendment that derogates from their existing powers, property or rights. RICHARD SIMEON

Optometry [Gk *optos*, "visible" and *metron*, "measure"], the profession of examining eyes for faults of refraction and motility and of the treatment of abnormal conditions with correctional lenses and orthoptics. The royal charter signed by Charles I of England (1629), which conferred the responsibility for the quality of spectacles and the training of apprentices upon "The Worshipful Company of Spectacle Makers," has been continually renewed by successive monarchs to the present time. The word "optometrist," however, originated in the US in the mid-19th century and has been in general and legal use since about 1880.

Optometrists were first trained through apprenticeships. Later they attended proprietary schools that provided theoretical education, while practising optometrists provided clinical training. Neither the quality nor the quantity of the programs of such schools or of the clinical training were controlled. University programs, which included didactic, laboratory and clinical education, first became available in 1925. Recently, optometric education has been increasingly integrated with other health-science programs, particularly at the clinical training stage. In N America all programs of optometric education are accredited by the Council on Optometric Education of the American Optometric Association.

Two Canadian universities, Montréal and Waterloo, have schools of optometry. Some 40 students graduate from U de M annually, about 60 from Waterloo. Both Canadian schools are accredited by the council. Entry to these programs requires a minimum of 2 years basic science education at a university. The professional programs are 4 years in length. Graduates may enter practice after graduation without serving an internship, but all Canadian provinces require that they pass a provincially administered licensing examination. Graduate education in visual science (Physiological Optics) to the level of the master of science degree is available at both U de M and Waterloo. In addition, Waterloo offers a doctoral program in optometry.

In each province, optometry Acts or healthcare legislation confer a self-governing status on the profession. Optometric associations in each province are organized to promote ethical practice and the continuing education of members, to provide for the welfare of the profession's membership and to negotiate fees with governments under the medicare legislation. Continuing education of optometrists is required by law in a majority of Canadian provinces. The Canadian Association of Optometrists, a national body, is a confederation of the 10 provincial associations.

Optometry graduates may establish their own practices, but there is a trend toward group practice. There is also a trend toward specialization in areas such as contact-lens care, low-vision care, pediatrics, geriatrics, electrodiagnosis, ultrasound diagnosis, and orthoptics and visual training.

Optometrists concerned with occupational health are trained to assess work environments to identify hazards to eyes and vision. They may plan, implement and administrate eye-protection programs, establish vision standards for various types of work, and assist in planning visually efficient work and recreation environments. M.E. WOODRUFF

Oral History, accounts of the past transmitted by word of mouth. Since the beginnings of its modern form, oral history has made important contributions to the ways in which we understand and interpret the past; it has become a "subprofession" and has resulted in some valuable books. Allan Nevins of Columbia University, New York, generally considered to have started the modern oral-history movement, began his interviewing in 1948 accompanied by a graduate student who "took notes in long hand as Nevins evoked a stream of reminiscences from his subject." This method has a long history: Herodotus got information for his account of the Persian Wars in the 5th century BC by writing down what the survivors remembered. Much later, Walter Scott's interviews with the Jacobite remnants of 1745 became the basis for his Waverley novels.

In the early 1950s recording on tape came into general use in N America. The first really portable recording equipment was the Webcor tape machine, which was the size of a suitcase and weighed over 11 kg. By the 1970s the cassette recorder was small enough to be carried over the shoulder or in a pocket. Oral history in the 1980s is a child of the electronic age and, as an organized activity, popular movement or pastime, has expanded as recording equipment has grown smaller.

Although oral history includes FOLKLORE and even folk songs (*see* FOLK MUSIC), at its centre is the interview. Much of the oral history course offered at Simon Fraser University, Burnaby, BC, is devoted to study of the interview, of which there are various types. Columbia U favours recording the memoirs of important people, or what British oral historian Paul Thompson calls "the great man project." There is also the ordinary-person interview which American historian Louis Starr called "history-from-the-bottom-up"; this has proved to be immensely popular when presented in book form, as in Studs Terkel's *Working* (1974), which became a Broadway show, and Barry Broadfoot's best-selling oral history of the GREAT DEPRESSION in Canada, *Ten Lost Years* (1973), which was also highly successful when it was adapted for stage presentation. Interviews with ordinary people form the basis of the social and community histories favoured by Thompson, numerous local and regional ethnic projects, and such large-scale surveys as the one at Duke University (Durham, NC) on how black disenfranchisement came about in the southern US.

The ordinary-person interview, perhaps requiring more skill and empathy than recording the memoirs of the famous, has given a human dimension previously lacking in historical accounts. It can be said that oral history has made the illiterate literate and given the silent masses a voice. Furthermore the experience of hundreds of interviews has shown that the average person is much more frank and forthcoming when speaking, even in the presence of a microphone and recording machine, than when writing. (This fact may be attributed to use of the telephone, which has largely replaced the pen as the instrument of social contact and communication.) Good oral history requires much more than a microphone and a willing subject: during interviews, questions must be presented deftly and fairly. If the results are to be published, the interviews need to be subjected to careful, often difficult and sophisticated editing which allows the subject's story to be told in his or her own words, with a minimum of distortion.

Canada's academic historians tend to be suspicious of oral history; they argue that people's memories are distorted by time, and that oral history is therefore frequently unreliable. They often side with British historian A.J.P. Taylor, who dismissed it contemptuously as "old men drooling about their youth." Some Canadian historians point out that oral history can be no more accurate than AUTOBIOGRAPHY, and urge that a subject's memories must be checked, whenever possible, against documentary sources. In contrast, American historians seem to be much more attuned to the electronic age and, although they may have reservations, many of them make use of interviews in their work. There are oral-history courses in many universities in the US and, in most cases, the history departments run these courses, whereas the history departments of Canadian universities tend to ignore the subject. The movement was first institutionalized in the US: the Oral History Assn (US) was formed in 1967, the British Oral History Assn in 1973 and the Canadian Oral History Assn in 1974.

Universities took the lead in the US, and their projects have been funded by private sources such as the Rockefeller Foundation (*see* "Soundings of the Sony Age" in *RF Illustrated*, 3 May 1977). In Canada the government archives and agencies are the main proponents of oral history, while the universities, with the exception of Simon Fraser, have taken little interest. The PUBLIC ARCHIVES OF CANADA, under the direction of W.I. Smith, a creative archivist, has actively assisted in oral-history projects. The CANADIAN BROADCASTING CORPORATION was the first institution to collect interviews. The NATIONAL MUSEUMS and provincial archives have continuing projects, the most remarkable of which is the BC government's Sound Heritage Series, published in Victoria since 1973.

But oral history is not the domain of institutions alone. Many individuals and amateur groups have taken up oral history as a hobby. In Canada it received a special impetus with the preparations for the Centennial of 1967: many groups, often assisted by government grants, collected and published local histories, and the trend has continued with such projects being tied to special anniversaries of towns, cities and provinces. *See* ORAL LITERATURE. PETER STURSBERG

Reading: Allan Anderson, *Remembering the Farm* (1977), *Salt Water, Fresh Water* (1979) and *Roughnecks and Wildcatters* (1981); Barry Broadfoot, *Six War Years 1939-1945* (1975), *The Pioneer Years 1895-1914* (1976) and *Years of Sorrow, Years of Shame* (1977); Peter Stursberg, *Diefenbaker. Leadership Gained* (1975), *Diefenbaker. Leadership Lost* (1976), *Lester Pearson and the Dream of Unity* (1978) and *Lester Pearson and the American Dilemma* (1980).

Oral Literature in English The term "oral literature" is sometimes used interchangeably with "folklore," but it usually has a broader focus. The expression is self-contradictory: literature, strictly speaking, is that which is written down; but the word is used here to emphasize the imaginative creativity and conventional structures that mark this form of discourse. Oral literature shares with written literature the use of heightened language in various genres (narrative, lyric, epic, etc), but it is set apart by being actualized only in performance and by the fact that the performer can (and sometimes is obliged to) improvise. Oral literature may be composed in performance; transmitted orally over generations, like many Scottish and Irish ballads that have been brought to Canada; or written down specifically for oral performance. The process of transmission itself (often, in recent years, to collecting folklorists and oral historians) shows that oral literature has not been driven out of existence by the ubiquitousness of books and the electronic media. Indeed, whenever a ghost story is told around a campfire, whenever a protest song or a lullabye is sung, whenever a riddle, tongue twister, counting

rhyme, shaggy dog story or knock-knock joke is shared, or fables and proverbs told, oral literature lives in performance.

The attitudes of scholars and the literate public toward oral literature were largely shaped by the 19th-century romantic movement. William Wordsworth, in his *Preface to Lyrical Ballads* (1798), claimed to have found in the oral discourse of unlettered rustic people the source of literary spontaneity, sincerity and integral unity. At about the same time a rise in nationalism, with its emphasis on local origins, encouraged the study of "popular antiquities" — ie, the oral tradition of history and narrative. Writers in Canada adopted the trend, transforming tales, legends, proverbs and anecdotes into written form, and sometimes incorporating tale-tellers such as T.C. HALIBURTON's Sam Slick, into their written work. The techniques were borrowed by Susanna MOODIE, who, in ROUGHING IT IN THE BUSH (1852), tells a life history that is also a "liar's tale": a hyperbolic account of the hellish life in the new land to counter the land company's lie that Canada was a new Eden. Other examples of borrowing — of techniques or of actual tales (canoe songs, tales of encounters with the devil, etc) — appear in 19th-century Canadian written literature, and the use of dialect further emphasizes their oral underpinnings. At the end of the century the so-called Confederation poets (Mair, Roberts, Crawford, Johnson, Carman, Lampman) extensively reworked such sources as traditional ghost stories and Indian mythology.

Oral literature has been studied principally by folklorists, who emphasize its ability to act as the voice of a tradition; they collect oral literature in order to preserve something of the culture of ethnic groups facing assimilation into the mainstream. But there are problems associated with gathering and preserving such materials. The communicative act is distorted to a greater or lesser extent by recording methods (eg, gestures are lost when recording is done shorthand or on tape; even on video tapes the ambience of an occasion is lost, although the speaker is recorded both aurally and visually). More significant is the "freezing" of the oral moment into an artefact, when part of the essence of oral literature is its capacity to be changed through generations, and even from occasion to occasion, by storytellers and bards.

Folklorists in Canada, using the classification system devised by Antti Aarne (*The Types of the Folktale*, translated and enlarged by Stith Thompson, 1961), which was designed primarily for narrative, have placed most items they have collected in the broad categories of legend, joke and anecdote. Political oratory and sermons have seldom been studied in Canada as oral literature. Myths and *märchen* are rare, though they are found among the Indians and as archaic elements in areas of Celtic settlement or with close connections to French speakers (eg, New Brunswick). Legends represent the localizing of the marvellous; for example, Captain Kidd's treasure is located in many a Nova Scotia town, the devil is known to have danced at Kensington, PEI, and the burning ship of Chaleur Bay makes periodic appearances elsewhere on the coast.

The heroes of cycles of tall tales, yarns and anecdotes include the Wizard of Miramichi and Paul Bunyan. Sometimes folk heroes tell whoppers about themselves, especially in front of tenderfeet from other regions. Tall tales are often used, as are the Joe MUFFERAW tales of the Ottawa Valley, to promote a locality or "prove" its superiority over others. Sometimes these yarns provide the mainstay of local radio programs, as the electronic media disseminate oral culture.

The performance of oral literature is readily experienced in the form of children's playground rhymes and songs, such as those recorded by Sharon, Lois and Bram, Raffi and others. Although the performance, once recorded, is in a fixed form, the variants in such things as skipping rhymes show that the oral tradition — typically mutable — is alive; and one seldom hears 2 identical recordings of such tall-tale songs as "The Cat Came Back." Less accessible to most Canadians is the living oral tradition of the Newfoundland Mummers' plays (*see* MUMMING). The ritual aspect of their performance is common to much of oral literature performed in its proper context.

No other extended poetic forms are found in Canada's oral literature. The lyric predominates in ballads, laments and work songs (eg, sea chanties, lumbering songs and milling songs). Whereas many of these songs are traditional ones from Europe, others embrace new themes reflecting the social and political realities of Canada (eg, Gaelic elegies, songs of emigration, satires and humorous songs). Themes from Canadian history are celebrated in ballads such as "General Wolfe." Newfoundlanders have contributed a rich treasure of sea chanties and ballads of shipwrecks, and have also produced well-known dance songs such as "I's the B'y that Builds the Boat." From Ukrainians in the West have been collected a variety of carols, wedding songs, dance ditties, cumulative songs and drinking songs. Much oral poetry is chanted rather than sung, as are children's counting rhymes and the charms, spells and alliterative rhymes collected from German speakers in Ontario.

Many songs and chants of the native peoples have been recorded, but more attention has been paid to their narratives. Two broad groups of myths involving tales of when the world was young and of the beginning of Indian ways of living may be found across the continent: stories of the great flood are related by the Cowichan in the West and the Iroquois in the East, and the discovery of fire is variously attributed to heroes such as NANABOZO of the Ojibwa and Coyote of the Salish.

This native literature, as well as that of the medieval troubadours and the Yugoslav composers of oral epic, has inspired numerous contemporary writers in N America to adopt an oral poetics. Charles Olson's idea of a "poetry of utterance" and Jack Kerouac's "spontaneous prose" have found extensions in the work of Canadian sound poets such as bp NICHOL, the Four Horsemen, Re:Sounding and Owen Sound, as they attempt to make literature from the ephemeral and improvise before audiences. As he tries to create for himself and his audience a sacred ritual, bill BISSETT's composition in performance draws heavily on Indian chants.

Writers of narrative have been as attracted to the concept of orality as have the poets. Robert KROETSCH, for example, tells liars' tales through his characters. In *The Diviners* Margaret LAURENCE provides a genealogy and history of oral narrative in Canada, from improvised Scottish heroic narratives and legends and Métis songs through novels to the new orality of modern popular ballads. Although Laurence does not use material from traditional folklore, but creates anew from the formula and conventions they employ (a practice folklorists consider "fakelore"), and her material is neither composed in performance nor written specifically for performance, her novel, like those of other contemporary novelists, places the text in a context of performance, and analyses the nature and function of its own telling.

The role of the theatre in keeping alive oral literature in Canada is exemplified by James REANEY's dramatic versions of 2 Ontario legends, the Baldoon mystery of poltergeists and the legend of the folkheroes, the DONNELLYS. In these plays Reaney uses traditional jokes, songs, stories and proverbs. The range of his creative freedom is greater than that of the traditional performer, but his materials are similar. Contemporary developments suggest that the growth of a written literature does not mean the death of an oral one, but announces change and displacement. While the oral literature of rural Canada may be fading, a new one is being created in the city, where supernatural happenings, numbskull stories and yarns continue. *See* ETHNIC LITERATURE; FOLKLORE; ORAL HISTORY.

BARBARA GODARD

Reading: R. Finnegan, *Oral Poetry* (1977); Edith Fowke, *Folkore of Canada* (1976); N. Rosenberg, *Folklore and Oral History* (1978).

Oral Literature in French, including tales, songs, sayings, legends, superstitions, proverbs and other forms, is part of the heritage left by the first French settlers in N America. Transmitted orally through the centuries, these anonymous traditional forms have enjoyed an excellent environment (an immense, predominantly rural region) for their preservation and transmission. By the 19th century, Ernest GAGNON and others first felt the need to preserve them in written form, but they still circulate orally today, despite the pervasive presence of the mass media. French Canadian oral literature remains faithful to its origins although, after 3 centuries in the new land, it has evolved, adapted and acquired both autonomy and originality. Since it is not formalized in writing, oral FOLKLORE is in a state of perpetual change. Popular tales have been handed down from the earliest days of French civilization. Most of the legends deal with universal themes but some, concerning historical events and characters, began in Québec. Innumerable different versions of songs have resulted from exchanges between immigrants from different French provinces; as with legends, the repertoire of folksongs grew in the new land to include songs about the COUREURS DE BOIS, the VOYAGEURS of the PAYS D'EN HAUT, and life in the forest.

The 19th century was still the golden age of the traditional tale, and storytellers were very popular (*see* SHORT FICTION IN FRENCH). Crowds spontaneously formed around tramps and peddlers to hear the stories of La Grand'Margaude, La Bête à Sept-Têtes, La Canarde and L'Eau de la Fontaine de Paris, and the incredible adventures of Ti-Jean. In rural areas, people liked to organize entire evenings of storytelling. Forest life was important in preserving and spreading tales, as lumberjacks and raftsmen fought the boredom of long isolation by gathering to tell each other tales in the camps.

Although formal study of folklore in America began relatively recently, each of the major oral genres — tales, legends and songs — is the subject of study and research. Until the early 20th century, popular tales had such vitality that few felt the need to collect them. Their scientific collection and study really began in 1914 with Marius BARBEAU, an anthropologist with the NATIONAL MUSEUM OF CANADA. Although his field was native peoples, his attention was drawn to francophone folklore by Franz BOAS, an American colleague interested in European influences on Canadian Indians. Barbeau's research very quickly extended to all Québec. Barbeau and his collaborators, Adélard Lambert, Gustave Lanctôt, Édouard-Zotique MASSICOTTE and others, presented their rich find to the general public. Since that time, general interest has continued to grow. Among the major publications on the subject, the *Journal of American Folklore* contains more than 200 tales in the francophone repertoire. The most important collections are that of Father Germain Lemieux of Sudbury, *Les vieux m'ont conté* (18 vols, 1973 ff), Carmen Roy's *Contes populaires gaspésiens* (1952) and the other volumes of the *Mémoires d'homme*

collection, *Contes de bûcherons* by Jean-Claude Dupont (1976) and Conrad Laforte's *Menteries drôles et merveilleuses* (1978).

After working with Barbeau, Luc Lacourcière, a teacher of Canadian literature at UNIVERSITÉ LAVAL, made the popular tale his preferred field of research; in 1944 he founded the Folklore Archives at Laval. Thirty years later, his inventory and analysis of several thousand tales from various sources provided him with material for the first *Catalogue raisonné du conte populaire français en Amérique*. This exceptional work will help complete the international catalogue of tales prepared by Stith Thompson on the basis of work by Antti Aarne (*Motif Index of Folk Literature*, 6 vols, 1955-58) and the catalogue developed in France by Paul Delarue and Marie-Louise Ténèze (*Le Conte populaire français*, 1957-64).

Popular tales are composed in a particular style. First, they are marvellous recitations whose sole purpose is to amuse. They often begin and end with well-known sayings. Usually the action is not located in any particular place or time and the characters are not seen as individuals. They are animals, magical beings (kings, princes, princesses or fairies) or fantastic beings (ogres, monsters, giants) who change form, use charms, potions and talismans, and dominate the elements of nature. The tale is therefore not intended to be believed, but to be enjoyed as pure fiction. Unlike tales, legends appear to have historical bases that appeal to the listener's credulity. The site of the action is often indicated with great precision and the characters are carefully developed in space and time. In French Canada, legends have come down in a manner different from that of the tale because the 19th century has left many legends in print. The work of Aurélien Boivin, *Le Conte littéraire québécois au XIXe siècle* (1975), provides an exhaustive treatment of them. Québec writers in the 19th century used "conte" to mean legend rather than the traditional tale, although the forms have been distinct in the eyes of both modern folklorists and the original illiterate audiences. By their nature, legends lend themselves more easily to written presentation, and Canadian authors have drawn abundant material from them. Philippe AUBERT DE GASPÉ (father and son), N.H.É. Faucher de Saint-Maurice, Honoré Beaugrand, Henri-Raymond CASGRAIN and many others have used werewolves, sirens, ghosts, the legend of LA CORRIVEAU or Alexis-le-Trotteur and a host of others. As Lacourcière notes, the many categories of legends include those dealing with the fantastic and the supernatural, those attempting to explain the origins and causes of natural phenomena and those more directly related to history and to real persons; and this is not a complete classification.

The third major genre in oral literature is song (*see* FOLK MUSIC). It has been said that song gives full expression to the French spirit and, consequently, that it is the richest, most vibrant and most pleasant of French Canadian traditions. The reason is perhaps that song is suited to all life's circumstances and to all ages. Religious at times, ribald at others, its themes encompass the full range of human feelings. Its form, rhythm and assonances have preserved it from the ravages of time. In a rigorous classification, more than 3000 titles of folksongs contained in Laforte's *Le Catalogue de la chanson folklorique française* (1958) reveal all the themes treated in this form of popular poetry, which is often mixed with uniquely Canadian variations.

In the many French Canadian regions, folklorists, ethnomusicologists, researchers in various disciplines and lovers of the oral traditions continue gathering this important part of French Canada's cultural heritage. The documents they produce are the subject of study and research and are preserved and scientifically treated in archives in Québec, Moncton, Ottawa, Sudbury and elsewhere. MADELEINE BÉLAND

Orange Order, Protestant fraternal society, fd 1795 in Ireland to commemorate the victory of William of Orange at the Battle of the Boyne in 1690. During the Irish insurrection of 1798 it became the principal link between the British government and the Protestants in Ireland, with Orangemen filling the ranks of the volunteer militia and gaining control of most of the civil service. Although it remains a powerful movement in Ulster, the order lost much of its influence in Ireland after passage of the Catholic Emancipation Act of 1829. The lodges adopted a Masonic-type ritual and organization, providing for mutual aid and organizing social events. Orangemen who migrated to Britain and the colonies found the lodges useful in their adjustment to new environments.

The Grand Lodge of British North America was founded 1 Jan 1830 in Brockville, UC, by Ogle R. Gowan. He sought to use the lodges as a base for a political career, bringing Catholics and Orangemen together in 1836 to support the Conservative cause. By 1844 the power of the Orange vote induced John A. MACDONALD to become an Orangeman. There was a schism in 1853 over the Conservatives' alliance with the French Canadian Parti bleu. This was healed in 1856, but henceforth the Orange vote was divided. The lodges reached the peak of their importance in Canada, both politically and socially, in the last quarter of the 19th century. However, they remained a force until the 1950s, and still retain some influence in rural communities. HEREWARD SENIOR

Orchestral Music Composers of orchestral music, though they often use a piano as a point of reference in the composing process, conceive their work in terms of the musical colours, timbres and textures available only in an orchestra, which is an ensemble that may vary in size from about 30 musicians to over 100.

Orchestras are divided into 4 families of instruments: strings, woodwinds, brass and percussion. Orchestral music is scored by the composer so that the various instrumental parts are arranged in a particular manner. Each bar of music consists of as many staves as there are instrumental parts. A standard orchestral full score indicates the instrumental parts in the following order, from top to bottom: piccolo, flutes, oboes, English horn, clarinets; bass clarinet, bassoons, double bassoon, horns, trumpets, trombones, tuba, timpani (and other percussion instruments), harp (if any), violins I, violins II, violas, solo voice(s) and chorus (if any), keyboard (if any), cellos and double bass. In concertos the solo instrument's music is usually placed immediately above the strings' music. Conductors read the full score while individual players are provided with their respective parts.

Orchestral music is composed in a variety of forms, the most common being symphony, concerto, overture, suite and tone poem, and its styles change from age to age and from composer to composer. However, many orchestral works, especially contemporary compositions, defy neat labels.

Although the history of European-style music in Canada dates back to the time of the explorers, orchestral compositions by Canadians have been produced mainly in the 20th century. The 19th-century French Canadian composer Calixa LAVALLÉE wrote a number of orchestral works, including 2 suites, one of which was performed in Paris in 1874. But these manuscripts, as well as those of some of his other works, are lost, and he is remembered primarily as the composer of "O Canada." The only Canadian orchestral work to be published before the turn of the century was Guillaume COUTURE's *Rêverie*, which was published by Girod soon after its performance in Paris in 1875.

A significant problem facing Canadian composers before the turn of the century was the lack of orchestras in this country. There were few permanent orchestras before the early years of the 20th century. In 1898 a Montreal Symphony Orchestra was formed that flourished for 20 consecutive seasons. A Halifax Symphony Orchestra, formed in 1897, lasted for several seasons. Vancouver, Regina, Winnipeg, Edmonton, Saskatoon, Moose Jaw and other cities had amateur orchestras before WWI. An orchestra was formed in Toronto in 1906, becoming in 1908 the first Toronto Symphony Orchestra, which performed regularly until 1918. The oldest orchestra in Canada is the Société symphonique de Québec (1903), which changed its name in 1942 to Orchestre symphonique de Québec.

Ontario-born Clarence Lucas, one of the most prolific Canadian composers of orchestral music during this period, is credited with writing symphonies, symphonic poems, overtures, cantatas and several operas. Other orchestral composers of the early 20th century include Alexis Contant, C.A.E. HARRISS, Donald Heins and Rodolphe MATHIEU.



Parade of Orangemen, led by "King Billy" on horseback, near Metcalfe, Ont, 12 July c1900 (*courtesy Public Archives Canada/Francis M. Iveson Coll/PA-122938*).

The period between the wars saw a greater number of Canadian orchestral works being composed, but they were usually short because Canadian orchestras, when they could be persuaded to perform Canadian works at all, placed them at the beginning of a program as "warm-up" pieces. Particularly notable are Claude CHAMPAGNE's *Hercule et Omphale* (1918), Ernest MACMILLAN's *Concert Overture* (1924), Healey WILLAN's *Symphony No 1 in D minor* (1936) and works by Colin McPhee and Percival PRICE. A few longer works were also composed, often as doctoral exercises.

The establishment of the CANADIAN BROADCASTING CORPORATION in 1936 and the NATIONAL FILM BOARD in 1939 provided Canadian composers with new opportunities and outlets for orchestral music. Both organizations were keen to use original Canadian music and began to commission composers to write music for radio and film. John WEINZWEIG, Louis APPLEBAUM and Eldon Rathburn were among the first of many composers to have works commissioned by these organizations. Similarly, dance companies were being established during the 1940s, and they too began to commission works by Canadian composers. Walter Kaufmann's *Visages* and Robert FLEMING's *Chapter 13* were both commissioned by the Winnipeg Ballet in 1947. In 1949, 2 important works were commissioned: Jean PAPINEAU-COUTURE'S *Papotages/Tittle-Tattle* for the Ballets Ruth Sorel of Montréal, and Weinzweig's *Red Ear of Corn* for the Boris Volkoff Canadian Ballet.

The CANADIAN LEAGUE OF COMPOSERS was formed in 1951 to promote the music and advance the professional interests of Canadian composers. Its 1957 *Catalogue of Orchestral Music* listed 233 works composed by Canadians between 1918 and 1957. The league was instrumental in setting up the CANADIAN MUSIC CENTRE in 1959. A nonprofit agency for the distribution and promotion of Canadian music in Canada and abroad, the CMC provides, among other services, a lending library of Canadian music. Though most Canadian orchestral works remain unpublished, copies are available through the CMC.

The commissioning of Canadian composers was given a major boost in 1957 with the establishment of the CANADA COUNCIL, a granting agency that provides funds to cover the composing and copying costs of commissions. Of 90 orchestral works sampled for the period 1968 to 1978, two-thirds were composed on commission and most of these were commissioned through the assistance of the Canada Council. Furthermore, all orchestras that receive operating grants from the council are urged to devote at least 10% of their programming to the performance of Canadian music. Provincial arts councils also make funds available for the commissioning of Canadian compositions.

With well-established orchestras throughout the country and organizations and agencies existing to assist the arts in general and composers specifically, the number of works composed for orchestras increased dramatically. The CMC's 1976 *Catalogue of Canadian Music for Orchestra* together with its 1979 *Supplement* list more than 1000 works by 145 composers.

Postwar composition in Canada has best been described as eclectic. One of the most influential composers is John Weinzweig. Born in Toronto in 1913, Weinzweig is credited with bringing the 12-tone technique to Canada. Among his students at U of T were Harry SOMERS, R. Murray SCHAFER, John BECKWITH, Samuel Dolin, Murray ADASKIN, Norma BEECROFT, Harry FREEDMAN and John Fodi, all of whom became well-respected composers. The avant-garde in Canadian orchestral music is associated with the names of composers such as Pierre MERCURE, Serge GARANT, Bruce MATHER, Gilles TREMBLAY, Robert AITKEN, Barbara PENTLAND, István Anhalt, Otto Joachim and, in particular, R. Murray Schafer. Alexander BROTT has written more performed orchestral works than any other Canadian composer, and Roger Matton, Clermont PÉPIN and André Prévost are also important.

An examination of the 1981-82 season brochures of 15 major Canadian orchestras revealed that 70 different works by 39 Canadian composers were programmed. The 5 most frequently performed Canadian composers in that season were Oskar MORAWETZ, Jacques Hétu, Godfrey RIDOUT, François MOREL and Violet ARCHER. *See also* MUSIC BROADCASTING; MUSIC HISTORY; and individual entries for the Edmonton, Montréal, Toronto, Vancouver and Winnipeg symphony orchestras. BARBARA NOVAK

Reading: Canadian Music Centre, *1976 Catalogue of Canadian Music for Orchestra* and *Supplement* (1979); *Encyclopedia of Music in Canada* (1981); C. Ford, *Canada's Music: An Historical Survey* (1982); H. Kallmann, *A History of Music in Canada, 1534-1914* (1960); R. Markow, "The Puzzle of Orchestral Programs," *Music Magazine* (Jan/Feb 1983).

Orchestre symphonique de Montréal, founded in 1934 as the Montreal Symphony Orchestra, was the fourth orchestra established in Montréal. In 1979 it became the Orchestre symphonique de Montréal (OSM). Wilfrid PELLETIER was its first artistic director, 1935-40, followed by Désiré Defauw, 1940-52. Distinguished guest conductors led the orchestra until the appointment of Igor Markevitch, 1957-61. Under Zubin Mehta, 1961-67, the orchestra embarked in 1962 on the first European tour ever undertaken by a Canadian symphony orchestra. In 1963 it moved to new quarters in Place des Arts. The OSM toured Japan in 1970 under the direction of Franz-Paul Decker, 1967-75. In 1976 it made its US debut in Carnegie Hall under Rafael Frühbeck de Burgos, who succeeded Decker. Charles Dutoit (b in Lausanne, Swit) took over as artistic director in 1978.

Markevitch instituted the annual commissioning of a Canadian composition, and since 1965 the orchestra has sponsored an annual competition; winners of the Concours OSM are featured as soloists with the orchestra in concert. The OSM has received 3 Performing Rights Organization of Canada awards for the exceptional quality of its contemporary music programming. Its recording of Ravel and Berlioz have led some critics to call the OSM the finest French orchestra today. Under Dutoit, the OSM's recordings, made in the church of St-Eustache, have been greeted with acclaim and have won many prizes. BARBARA NOVAK



The sound quality of the highly regarded recordings of the Orchestre symphonique de Montréal under conductor Charles Dutoit have been greatly enhanced by the marvellous acoustics of the church at St-Eustache, Qué (*courtesy Charles Dutoit/Orchestre symphonique de Montréal*).

Orchid, perennial herbaceous PLANT of family Orchidaceae. The family is one of the largest among flowering plants, represented by 735 genera and 20 000 species worldwide. The genera hybridize readily. Most orchids are tropical and epiphytic (ie, grow in moss and debris on tree branches), but the 17 genera and 63 species native to Canada are terrestrial. Orchids are found throughout Canada. Some are arctic, eg, *Habenaria albida* and *H. hyperborea;* most grow in moist, wooded areas, eg, *Cypripedium,* LADY'S SLIPPER, which has large, striking flowers varying from white through yellow to pink. *Calypso bulbosa* has similar but smaller, delicate pink flowers. Some *Spiranthes* and *Habenaria* species have small, whitish, fragrant flowers in a spike. Two genera, *Eburophyton* (plant is white) and *Corallorhiza* (plant is yellow to purple), live on decaying vegetable matter. Attempts to transplant orchids from the wild usually result in the plant's death. Orchids are recognized internationally as endangered species, and trade in wild orchids is prohibited. PATRICK SEYMOUR

Order-in-council, at the federal level, is an order of the GOVERNOR GENERAL by and with the advice and consent of the Queen's PRIVY COUNCIL for Canada. In fact, it is formulated by CABINET or a committee of Cabinet and formally approved by the governor general. Some orders simply make appointments. About a third are legislative, forming part of the law and enforceable by the courts. Most legislative orders are made under authority expressly conferred by ACT of Parliament. With the expansion of state activity in recent decades (public ownership, state regulation of industry, social security), it has become impossible for Parliament to legislate directly and in detail to meet complex and varying problems, and more and more Acts are cast in general terms and empower the governor-in-council to make regulations to carry out the intent of the legislation. Such regulations on, for example, unemployment insurance, fisheries and aeronautics, now form an enormous part of our law (*see* REGULATORY PROCESS). They are called "subordinate legislation" because they are made by the governor-in-council, subordinate to Parliament, and are subordinate to, and limited by, the Act which authorizes them. A few legislative orders are based on royal prerogative (the relatively small remainder of the SOVEREIGN's ancient law-making power), but these are limited by the content of the particular prerogative which confers the power to make them (*see* ADMINISTRATIVE LAW). Provincial orders-in-council — orders of the lieutenant-governor-in-councils — are similar to federal ones. EUGENE A. FORSEY

Order of Canada, centrepiece of the Canadian system of HONOURS, was instituted on 1 July 1967, the 100th anniversary of Confederation. Every Canadian is eligible for the order, which is conferred in recognition of exemplary merit and achievement in all major fields of endeavour. Appointments are made by the governor general, based on the recommendations of the Advisory Council of the Order, which meets twice a year under the chairmanship of the chief justice of Canada to consider nominations submitted by members of the public.

There are 3 levels of membership, in which the number of appointments is limited: Companion (not to exceed 150 in all); Officer (46 appointments maximum in any year); Member (92 appointments maximum in any year). In-



Order of Canada, centrepiece of the Canadian system of honours, est 1 July 1967, on the 100th anniversary of Confederation. It is conferred in recognition of exemplary merit and achievement (*courtesy Public Archives of Canada/4386/photo by John Evans*).

vestitures take place each spring and autumn at the governor general's official residence, RIDEAU HALL, Ottawa. The order's badge is in the form of a stylized snowflake of 6 points and is worn at the neck by Companions and Officers and on the left breast by Members. Recipients are entitled to have placed after their names the letters representing the category in which each is appointed: CC, OC or CM, and all may wear a small replica of the badge on street clothes. CARL LOCHNAN

Order of Military Merit In 1972 the Canadian HONOURS system was extended to include the Order of Military Merit in recognition of exceptional service. All regular and reserve



Order of Military Merit, est 1972 and awarded to regular and reserve personnel of the Armed Forces in recognition of exceptional service (*courtesy Public Archives of Canada/4389/photo by John Evans*).

personnel of the ARMED FORCES are eligible. There are 3 grades of membership: Commander, Officer and Member. The total number of appointments made yearly may not exceed 0.1% of the strength of the Armed Forces; of that number 6% may be made Commanders, 30% Officers and the remainder Members. Appointments are made by the governor general on recommendation by the minister of national defence. A list of current members is available from the Chancellery of Canadian Orders and Decorations, Government House, Ottawa.

The badge is a blue enameled cross patée (ie, a cross with expanding arms) with a dark blue ribbon edged in gold. The badge of Commander is worn at the neck, those of Officer and Member on the left breast. Recipients are entitled to place after their names the initials corresponding to their grades: CMM, OMM or MMM.

CARL LOCHNAN

Ordre de Bon Temps ("Order of Good Cheer") After a disastrous experience at Ste Croix I, Samuel de CHAMPLAIN and his French compatriots resettled in the more salubrious climate at PORT-ROYAL. Several perished from scurvy in the winter of 1605-06, but the following winter was more congenial. Champlain founded the order — modelled loosely on a European order of chivalry — to maintain the spirits of the colonists. Members took turns providing fresh game and, as chief steward of the day, leading a ceremonial procession to the table. The Ordre de Bon Temps de Québec was established in 1946 to honour the original association and to promote adult education and recreation. JAMES MARSH

Ordre de Jacques-Cartier (familiarly La Patente), fd 1926, a French Canadian secret, hierarchically structured society. It spread through French Canada during the 1930s, but never had many more than 10 000 members, recruited primarily among the bourgeois elite. The society championed various religious and national causes, infiltrated scores of existing organizations and promoted public-opinion campaigns on themes linked to morality, anticommunism, education and the French language. Its actual influence, however, remains debatable. After it officially disbanded in 1965, it unsuccessfully attempted to reconstitute itself regionally. RICHARD JONES

Oregon Treaty, 15 June 1846 between Britain and the US, describing the boundary between BNA and the US W of the Rocky (or Stony) Mts. A compromise between the American desire for a boundary with Russian Alaska at 54°40′ N lat to the Columbia R mouth, the treaty set the boundary at 49° to the middle of the channel between the mainland and Vancouver I, thence through the middle of the channel and Juan de Fuca Str to the Pacific. But there were 2 channels through the strait and between them lay San Juan I, which was claimed by both Britain and the US and on which the US landed troops in 1859. The boundary through the strait thus remained in doubt until 1872, when arbitration by the German emperor decided in favour of the US. N.L. NICHOLSON

O'Reilly, Gerald, physician (b at Ballinlough, Ire 11 Aug 1806; d at Hamilton, Canada W 26 Feb 1861). After medical studies in Dublin, Ire, and London, Eng, he immigrated in 1833 to Hamilton, where he was a prominent practitioner for the rest of his life. In addition to his wide private practice, he served publicly as surgeon to the Hamilton jail, to the 3rd Gore Militia and to Wentworth and Halton counties. He was a founder, original shareholder and medical officer to the Canada Life Assurance Co, as well as one of the first to hold a policy. Presumably his widow collected on it at his early death, from blood poisoning, after a minor operation. CHARLES G ROLAND

Orford String Quartet was formed in 1965 at the JEUNESSES MUSICALES DU CANADA Orford Art Centre at Mt Orford, Qué, and consisted of Andrew Dawes and Kenneth Perkins, violinists, Terence Helmer, violist, and Marcel St. Cyr, cellist. The quartet remained the same until 1980 when Denis Brott replaced St. Cyr. After its initial concert, the quartet embarked on a series of JMC Canadian tours, which in turn were followed by JMC engagements abroad. The 1967 Carnegie Hall debut brought great praise and signalled a very successful international touring career which was assisted financially by the CANADA COUNCIL and the Dept of External Affairs. Based in Toronto since 1965, and in great demand as concert performers throughout Canada, the group became U of T quartet in residence in 1968. Subsequently, its master classes, individual recitals and performances of complete cycles, such as the 16 Beethoven quartets at Walter Hall in Toronto in 1977, and repeated at Festival Ottawa, have made the Orford Quartet one of the best known and most highly regarded string quartets in the world. It has received many awards, including the valuable MOLSON PRIZE in 1975, and Canadian Music Council medals in 1978 for its performances in concert and its many recordings. Its repertoire includes virtually all of the quartet literature as well as works requiring additional performers. It has also served Canadian composers well and has encouraged many aspiring young string players. Frequently the guest performers at festivals across Canada, the "Orfords," as they are affectionately known, are also featured performers at festivals abroad. Their list of recordings is a clear indication of the breadth of their musicianship. MABEL H. LAINE

Organized Crime has been officially defined by the Canadian police as "two or more persons consorting together on a continuing basis to participate in illegal activities, either directly or indirectly, for gain"; it has been defined by a former US organized crime boss as "just a bunch of people getting together to take all the money they can from all the suckers they can. Organized crime is a chain of command all the way from London to Canada, the US, Mexico, Italy, France, everywhere."

There is much more to organized crime in Canada and the US than the Italian criminal association, known as the Mafia, Cosa Nostra or Honoured Society. In N America, just about every major national or ethnic group and every segment of society has been involved in organized crime. American criminologist Dr Francis Ianni has developed a theory explaining how organized criminal activity is developed and passed on in N America from one ethnic group to another based on the length of time the group has been in N America, the language and cultural knots that bind the group and the degree to which the group's members have been assimilated into the prevailing society.

For a long time many scholars and academics did not believe organized crime was highly structured or capable of sophisticated operations. Their skepticism derived partly from a reaction to the Hollywood portrayal of the Mafia from the 1930s to 1950s, typified in its treatment of Al Capone ("Scarface"), and partly from the fact that documented, scholarly studies and books on organized crime did not exist.

All this changed because of the revelations at the US Senate "Valachi" hearings in the early 1960s; because of the documentary evidence from police wiretaps and bugs in the 1970s, which allowed police to listen to Mafia leaders discussing their hierarchy and operations in both the US and Canada; and partly because of the establishment of the American Witness Protection Program, by which Mafia defectors and informers could build a new life.

Through various court cases and royal commissions and television and newspaper exposés, the existence of a highly organized criminal network in Canada became known to the Canadian public in the late 1970s. In 1984 a joint federal-provincial committee of justice officials estimated that organized crime in Canada took in about $20 billion annually, almost $10 billion of which was from the sales of narcotics. (There is no way of estimating, however, the amount of dirty funds that are "laundered" in Canada by members of organized crime in the US and other foreign countries. *See* UNDERGROUND ECONOMY). The committee was formed in response to a 1980 report on organized crime by the BC attorney general's office, which claimed that organized crime figures in Canada have interests in the textile industry, cheese industry, building industry, disposal industry, vending-machine companies, meat companies, home-insulation companies, autobody shops and car dealerships, among others. The joint committee calculated that the sources of organized crime revenues could be broken down as follows: PORNOGRAPHY, PROSTITUTION, bookmaking, gaming houses, illegal LOTTERIES, other GAMBLING offences, loansharking and extortion, which together brought in an estimated $567.3 million. Other activities, such as white-collar crimes (eg, insurance and construction frauds and illegal bankruptcies), arson, bank robberies and motor vehicle thefts, raised the estimate to $10 billion; drugs accounted for the rest.

Mafia Of all the organized-crime groups operating in Canada, the Mafia is perhaps the best known. This is because the Québec crime probe report of 1976 (which was based primarily on the information gathered by the "bug" planted in the milk cooler of the Montréal mobster Paulo Violi's headquarters) revealed the structure of the Montréal Mafia and its interrelationship with and dependency on the US Mafia family of Joe Bonanno. Public knowledge of the Mafia is also the result of media attention, eg, the "Connections" series broadcast by CBC Television in the late 1970s.

Scholars do not agree on the origin of the term "Mafia," referring to the original organization in Sicily. According to the Québec Organized Crime Commission's report of 1977, it describes "a state of mind, a feeling of pride, a philosophy of life and a style of behaviour. The mark of a known and respected man, it derives from the Sicilian adjective *mafiusu*, used since the 18th century to describe magnificent or perfect people." While originally a Sicilian society, the Mafia was exported and adapted to N America by a small group of Italian immigrants. Joe Bonanno, a self-described Mafia don, describes it thus in his memoirs: "Mafia is a process, not a thing. Mafia is a form of clan co-operation to which its individual members pledge lifelong loyalty. Friendship connections, family ties, trust, loyalty, obedience — this was the 'glue' that held us together." In Sicily, and later in the US and in Canada, Mafia came to refer to an organized international body of criminals of Sicilian origin, but it is now applied to the present dominant force in organized crime — the predominately Sicilian and Calabrian organized-crime groupings or "families." These families are held together by a code emphasizing respect for senior family members; by "Omerta," ie, a vow of silence about the family's activities; by the structure or hierarchy of the family; and by an initiation rite or ceremony.

Many of the Canadian Mafia families immigrated in the 1940s and 1950s, settling in Montréal, Toronto, Hamilton and Vancouver. Though located mainly in the major cities, family members tend to gravitate to where wealth moves; thus in the past few years some moved westward following the movement of business to BC and Alberta.

Structure of the Mafia in Canada In Toronto at least 4 major Mafia-style criminal organizations are run by Canadians of Sicilian or Calabrian origin, 2 of whom were named as members of the Mafia during the Valachi hearings. A third group, also active in Hamilton, is connected with the Magaddino organized-crime family in Buffalo. The most recently established of the 4 is a family known as the Siderno group, so called because many of the members are immigrants from the town of Siderno and its environs in Calabria.

In Montréal the major Mafia family is known as the Cotroni family. Led by the late Vincenzo "Vic" Cotroni (the "godfather") and his brother Frank, it constituted the first significant crime family in Canada. The Québec crime probe exposed the membership and activities of this highly structured group in a number of its reports. Established in the 1940s by Vic Cotroni, the family evolved in the 1950s into an important branch of the powerful New York City Mafia family of Joe Bonanno. It has extensive ties with Mafia families in Italy and throughout the US, as well as with the Toronto, Hamilton and Vancouver organizations.

A serious challenge to the supremacy of the Cotroni family in Québec came from the Dubois family, an indigenous French Canadian gang comprising 9 brothers, which dominated crime in the west end of Montréal until the early 1980s.

Serious internal problems between Sicilians and Calabrians in the Montréal organization led to the violent deaths of Paulo Violi (the chief lieutenant of Vic Cotroni) and his brothers in the late 1970s. The Cotroni family has primarily been involved in illegal gambling, loansharking, drug importation (utilizing the famous French Connection), extortion and the murder and corruption of public officials.

Other Groups Recently, motorcycle gangs such as the Hell's Angels, the Outlaws, Satan's Choice, and the Grim Reapers have become significantly involved in organized crime. Their initiation rights have made it difficult for law enforcement officers to penetrate the groups, which have become major suppliers of illegal drugs. They have also been involved in prostitution, and contract killing. It is now not unusual to find them working with other organized crime groups.

Various Chinese organized-crime groups have become more prominent over the past 20 years in Vancouver and Toronto, following a wave of immigration from Hong Kong in the 1960s and 1970s. Chinese youth gangs in Toronto and Vancouver are involved in protection rackets and extortion, but the more sophisticated groups are organized by senior "Triad" members from Hong Kong to import heroin from Southeast Asia through Vancouver. The Triads are ancient Chinese organizations that have evolved into organized-crime groupings.

The organized-crime structure changes quickly in Canada, and usually exists for some years before it is detected in cities or locations; therefore, there are undoubtedly other groups that have not yet been identified.

Activities of Organized Crime Organized crime in Canada provides some illegal services which certain sectors of the general public want, eg, gambling, prostitution, loansharking and the sale of soft drugs such as hashish, marijuana, speed and cocaine. In every large Canadian city, local bookmakers are involved in organized crime through an elaborate layoff system established to protect the individual bookie from large losses. Other organized-crime activities are not so readily desired by society at large. They involve the importation and distribution of hard drugs such as heroin (many drugs of the famous "French Connection" came into the US through Montréal with local Mafia involvement), the fencing of stolen goods, and murder and extortion. Other activities that aid and abet organized crime include the ongoing corruption of public officials and the "laundering" of the proceeds of criminal activities.

One of the simplest ways to "launder" money is to use activities in which there is a constant flow of cash, eg, slot machines and gambling. If the owner of a gambling casino claims to have taken in $1 million when he has actually taken in only $100 000, to which has been added $900 000 of illegally obtained money, it is almost impossible to demonstrate that the $1 million was not procured in the normal course of business.

Corruption Without corruption, organized crime would find it very difficult to exist, and the efforts of organized crime to corrupt police, judges, politicians, lawyers and government and civilian officials are probably more deleterious to society than any other activity in which it engages.

WILLIAM I. MACADAM AND JAMES R. DUBRO

Reading: J.-P. Charbonneau, *The Canadian Connection* (1976); D.R. Cressey, *Theft of the Nation: The Structure and Operations of Organized Crime in America* (1969); J. Kwitny, *Vicious Circles: The Mafia in the Marketplace* (1979); W. Rowland, *Making Connections* (1979).

Orienteering is a sport in which individuals or teams navigate on foot through unknown terrain with the aid of a map and special compass (called a silva), to complete a prescribed course in the fastest possible time, reporting to control points along the way. The sport combines athletic ability and mental exercise in a unique way — competitors are repeatedly put in positions of having to choose among possible routes. Orienteering racing was started in 1918 in Sweden as an attempt to attract young men to competitive track racing. It soon became a sport in its own right, and spread throughout the world after WWII. Introduced in Canada in 1948, the sport was actively promoted in school programs in the 1960s. By 1967, there was sufficient support to justify forming the Canadian Orienteering Federation, and the first Canadian championships were held the following year. In 1972, a Canadian team first attended the world championships. There are now orienteering associations in all 10 provinces and both territories.

BARBARA SCHRODT

Orillia, Ont, City, pop 23 995 (1981c), inc 1867 (village), 1875 (town), 1969 (city), located at the narrows between lakes SIMCOE and Couchiching in central Ontario. The site was originally used by a band of Ojibwa Indians led by Chief William Yellowhead. White settlement forced the Indians to move in 1838-39 to nearby Rama. The name may derive from an Indian word for red berry or from a Spanish word for riverbank applied by Sir Peregrine Maitland, lieutenant-governor of UC 1818-28, who had served in Spain. Originally logging and farming were the bases of the economy; later in the 19th century Orillia developed into a summer resort area. In 1902 Orillia established the first municipally owned hydroelectric generating station in Canada, on the nearby Severn R. Orillia served as the model for "Mariposa" in humorist Stephen LEACOCK's satire on small-town Ontario life, *Sunshine Sketches of a Little Town* (1912). The manuscript of *Sunshine Sketches* and a collection of Leacock's papers are held in the summer home, at nearby Old Brewery Bay, where he wrote many of his books.

DANIEL FRANCIS



Oriole, common name for members of 2 families of BIRDS. The Old World family Oriolidae occurs from Europe through Africa and Asia to Australia. In the Western Hemisphere, the name refers to brightly coloured, black and yellow or orange birds of genus *Icterus,* family Emberizidae. Thirty species of these melodious songbirds are known, with greatest diversity found in Mexico and Central America. In most species males are larger and more brightly coloured than females. Yearling males often resemble females, perhaps reducing predation or aggression from older males. Two species breed in Canada. The orchard oriole (*I. spurius*) breeds locally in southern Ontario and recently in Manitoba. Northern orioles (*I. galbula*), common throughout southern Canada, breed in scattered trees and open woodland, weaving pendulous nests of plant fibres and hair. The female lays 4-5 greyish white eggs marked with brown or black scrawls. Northern orioles consume insects and small fruits. They winter from southern Mexico to Colombia and Venezuela. The term "northern oriole" is a recent taxonomic revision and includes the Baltimore (*I. galbula*) and Bullock's orioles (*I. bullocki*). R.J. ROBERTSON

Orléans, Ile d', 190 km², 33.3 km long by 8 km wide, is situated just downstream from QUÉBEC C in the ST LAWRENCE R. The largest island in the river after the island of Montréal, it is a relatively level plateau, 137 m at its highest point and steep sided. It is surrounded by wide sandbanks on the N and a narrow bank on the S. The plateau is the vestige of an old eroded Appalachian surface, progressively isolated from the mainland by 2 river channels until it formed an island. The central part is wooded; the island is very fertile and drained by the Maheu, la Fleur, Dauphine and du Moulin rivers. Jacques CARTIER called it Île de Bacchus in 1535 because of the vines growing there, and rebaptized it Ile d'Orléans in 1536 to honour the duc d'Orléans.

In 1542 Jean-François de La Roque de ROBERVAL tried to start a settlement here. It was granted to 8 associates in 1636 by the COMPAGNIE DE LA NOUVELLE FRANCE. It became Île Ste-Marie during the HURON settlement of 1650 to 1657. These first farmers, installed on land belonging to Eléonore de Grandmaison at the far upstream end, were massacred in 1656 by the Iroquois. Land clearing began again in 1660. The parish of Ste-Famille was founded in 1661 and the first church built in 1669 (*see* RELIGIOUS BUILDING). Jean des LAUSON, seneschal of New France, fell victim to the Iroquois in 1661. The island became the property of Mgr de LAVAL, first bishop of Québec, in 1668 (it had 471 inhabitants, as many as Québec). It was ceded as a fiefdom to François Berthelot in 1675, under the name of Isle de St-Laurent. The parishes of St-Pierre, St-François and St-Jean were founded in 1679. St-Paul parish became St-Laurent parish in 1698. A precise map of the island was made in 1689 by Robert de Villeneuve.

By 1725, again under the name of Ile d'Orléans, it was very prosperous. In 1759 it was used as a base for British operations against Québec and was ransacked by the troops of WOLFE and Guy CARLETON. In 1824 and 1825 a short-lived naval yard at the upstream end of the island built the *Columbus* and the *Baron Renfrew.* A seaport developed at this site and became the Ste-Pétronille parish in 1870. Agriculture still thrives. The island's beauty, historical buildings, handicraft and horticultural products draw many tourists. SERGE OCCHIETTI

Ornamentals, in horticulture, are woody and herbaceous PLANTS used primarily as amenities. Woody ornamentals are perennial (ie, persist for more than 2 years) and include TREES, shrubs and vines; herbaceous ornamentals are annual, biennial or perennial (persist for one, 2 or more years) and make up the vast array of things that provide colour in flower beds and borders. In Canada, winter hardiness is very important to growers of woody ornamentals. The ability of a woody plant to survive a Canadian winter of moderate severity depends largely on the annual stage of maturity reached and the cold resistance achieved by the end of the growing season. Plants that require a long season in which to mature seldom achieve this state when grown in regions with short growing seasons.

Winter hardiness does not present the same problem with herbaceous ornamentals. Annuals do not overwinter. When the normal growing season is not long enough for them to grow and produce FLOWERS, the grower simply starts them indoors (eg, in a GREENHOUSE), and transplants them outside when the risk of frost is over. The common snapdragon, for example, is generally seeded in the greenhouse in Feb and planted outside in late May or early June. If such plants were seeded directly outdoors in May, in regions where the frost-free period was 90 days or less, they could blossom for only a few weeks before being killed by frost. Herbaceous biennials and perennials are allowed to remain in the soil all year; their winter survival is generally assured if they receive adequate snow cover to protect them from severe temperatures and prevent alternate freezing and thawing of the soil around the roots.

Generally, ornamentals are either selected forms of specific plants (ie, cultivars or commercial varieties) or hybrids between species. Because of the winter-hardiness problem, many woody ornamental cultivars and hybrids have been derived from plants indigenous to Canada and the northern US. However, plants from NW China, Manchuria, Siberia and Korea, regions with CLIMATES similar to many of our own, have provided good parent material for new hybrids, as well as making a valuable contribution on their own. Herbaceous ornamentals are also made up of cultivars and hybrids. Improvement programs involving hybridization, both within and between species, are commonplace. Hardy perennials and biennials are chiefly temperate-region plants; annuals derive mainly from South African and Californian natives.

The Canadian Ornamental Plant Foundation was chartered by the federal government in 1964 to promote selection, testing and distribution of better ornamental plant varieties. The procedures have provided breeders of new cultivars with the means of getting worthwhile new introductions into the trade and, thence, to the general public. Much research into the development of cold-hardy plants takes place at Agriculture Canada RESEARCH STATIONS across the country. Recent successes include a cultivar of *Alstroemeria,* a member of the amaryllis family, developed at the Saanichton Research and Plant Quarantine Station, BC; Northline (a silver maple), Autumn Blaze (a white ash), Wascana (a hybrid linden) and Baron (a box elder), all developed at the Morden Research Station, Man, for prairie use; and 2 new winter-hardy rose cultivars (Charles Albanel and Champlain), developed at the Ottawa Research Station. R.H. KNOWLES

Oromocto, NB, Town, pop 9064 (1981c), inc 1955, is located at the junction of the Oromocto and Saint John rivers, 22 km SE of FREDERICTON. The Malecite called the Oromocto *Wel-a-mook'took* ("deep water") because of its good canoeing. The French had a small settlement there in the late 1600s and after 1763 New England traders used the location during their speculations on the SAINT JOHN R. About 1776 the British army built Fort Hughes to protect the new settlements, the overland route to Québec City and the rich harvest of pine masts for the Royal Navy. Prosperity continued after the arrival of the LOYALISTS after 1783. Timber remained the economic mainstay well into the 20th century with shipyards, sawmills and the business of the local merchants supplying the hinterland settlers. The most far-reaching changes occurred in the 1950s when CFB GAGETOWN — the largest land-manoeuvres training area in the Commonwealth — was established on Oromocto's borders. When the town expanded to provide for the military influx, a comprehensive plan was adopted and Oromocto became "Canada's Model Town." Its economy has fared well, servicing and supplying the base, and the town has also attracted several nonpolluting manufacturers to its 34 ha industrial park. DALE R. COGSWELL

Oronhyatekha ("burning cloud"), or **Peter Martin,** medical doctor (b on the Six Nations Reserve near Brantford, Canada W 10 Aug 1841; d at Savannah, Ga 3 Mar 1907). Oronhyatekha paid for his own education at the Wesleyan Academy at Wilbraham, Mass, and later at Kenyon Coll in Ohio. The Prince of Wales on his 1860 visit to Canada became sufficiently interested in him to invite him to study in England. Oronhyatekha spent 3 years at Oxford, and later completed his medical degree at U of T, the first Canadian Indian to receive a degree from a Canadian university. In Ontario he practised at Frankford (near Belleville), Stratford, Neepanee and London. He joined, and rose rapidly to become supreme chief ranger (1881) of, the Independent Order of Foresters. For 26 years he guided the IOF's growth from a struggling bankrupt fraternal organization of 400 members, to a membership of more than 250 000, and a fund of over $11 million. Oronhyatekha wrote *History of the Independent Order of Foresters* (1894). DONALD B. SMITH

Orr, Robert Gordon, "Bobby," hockey player (b at Parry Sound, Ont 20 Mar 1948). He was an outstanding junior player with Oshawa Generals and joined Boston Bruins in 1967 at the age of 18, winning the CALDER TROPHY. He revolutionized the role of the defenceman with his end-to-end rushes, playmaking and incredible scoring feats — he is the only defenceman ever to win the ART ROSS TROPHY as leading scorer, and accomplished it twice. He dominated the flow of play, surging forward and skating with an intensity exemplified in the photograph of him soaring through the air after scoring the Stanley Cup winning goal. He was voted the greatest athlete in the history of Boston, ahead of the great baseball and basketball stars. His list of awards is to date unmatched by any player in NHL history: HART TROPHY 1970, 1971 and 1972; CONN SMYTHE TROPHY 1970 and 1972; and JAMES NORRIS TROPHY 8 years 1968-75 — the greatest domination of an award by any player. He suffered his first knee injury in his rookie season, and by the time he left Boston to sign a $3-million contract with Chicago Black Hawks (1976-77), he had had 6 knee operations. His legs destroyed, he played only 26 more games before retiring. JAMES MARSH

Orthodox Church, also commonly known as the Eastern, Greek or Byzantine Church, a family of Christian churches historically found in eastern Europe, the Near East, Africa and Asia. The 1981 census indicates that it now serves some 362 000 Canadians, although the total constituency claimed by the churches is higher. The ancient patriarchal provinces of Rome, Constantinople, Alexandria, Antioch and Jerusalem were all established by the 5th century AD, but thereafter theological, liturgical and canonical divergence, as well as political differences, came between Rome and the other provinces. The great schism of 1054 formally separated Rome (the Roman Catholic Church) from Constantinople and most of the population of the remaining 3 jurisdictions (the Orthodox Church). The issues leading to the

schism, which still separate the Roman and Orthodox churches, include differences in trinitarian theology and church organization: the Orthodox churches dispute the Roman church's teachings on the Holy Spirit and the nature of authority in the church, specifically the primacy of the pope. The juridical ethos of Roman CATHOLICISM and Protestantism is perceived by the Orthodox as the central problem in Western Christian thought and institutions.

The present-day Orthodox Church includes the ancient patriarchates of Constantinople, Alexandria, Antioch and Jerusalem; the "national" Orthodox churches of Russia, Serbia, Romania, Bulgaria, Cyprus, Greece, Albania, Poland and Czechoslovakia; daughter churches of these, formed recently in Europe and N America; and the autonomous churches of Sinai, Finland and Japan. The unity of these "Byzantine" churches is theoretically found in their mutual recognition of a common faith and worship, rather than in any external authority or administrative structure. In practice, however, patriarchs of the various branches, though independent, tend to recognize the primacy of the Ecumenical Patriarch of Constantinople. A second group, the Oriental Orthodox (non-Chalcedonian) churches, includes the Armenian, Coptic, Syrian, Ethiopian and South Indian Orthodox churches. Members of this family, regarded by the Byzantine churches as uncanonical, since they do not formally subscribe to the doctrine defining the dual nature of Christ as adopted by the Council of Chalcedon (451 AD), are nevertheless within the larger Orthodox family.

Orthodox Church buildings are laid out to reveal the experience of God dwelling among men, and are patterned after the image of heaven in the Book of Revelation. The focal point is the Holy Table. An icon screen unites the sanctuary and the place of assembly. Everything which is in and of the church is considered "sacramental," ie, manifesting the mystery of salvation and integrating the faithful into the life of the Kingdom of God. Among numerous rites and acts the Holy Mysteries are central: initiation through baptism (by triple immersion) and chrismation (anointing), the Eucharistic liturgy, marriage, monastic tonsure, reconciliation, anointing of the sick or dying, holy orders and burial. Icons (religious images) are held to be necessary spiritual witnesses to the unity of the church through time and space, making present the Kingdom of God in the persons and presence of the saints. There are daily, weekly and yearly cycles of prayer and worship. The primary focus of the church year, which begins Sept 1, is Pascha (Easter); each Lord's Day (Sunday) is seen as the extension of Pascha.

Most Orthodox Christians in Canada are affiliated with churches of the Byzantine tradition: Russian, Greek, Antiochian, Ukrainian, Byelorussian, Estonian, Bulgarian, Serbian, Macedonian and Romanian. Although an earlier attempt was made to settle Orthodox Christians in Florida, the coming of Russian missionary monks among the Aleut peoples of Alaska in 1794 marked the real advent of Orthodoxy in N America. (The first Orthodox church in Canada may have been that at Wostok, Alta, est 1898.) A diocese centered on Sitka, established 1799, expanded into other parts of N America. In 1905 it became an archdiocese with headquarters in New York, amid successive waves of immigration from Russia, Byelorussia, Carpatho-Russia and Ukraine. After the 1917 Russian Revolution, the Russian church came into conflict with the new communist government. In 1924 most Russian and associated parishes in N America declared their administrative independence, and a new metropolia, the Russian Church in America, was established. Its irregular and tense relationship with the mother church was resolved in 1970 when the Patriarch of Moscow and All Russia granted it autocephalous (self-governing) status. Now called the Orthodox Church in America, it affirmed the patriarch as its spiritual father, though remaining administratively independent. OCA's Canadian diocese serves some 20 000 adherents with 52 parishes and about 30 clergy. The Liturgy of St John Chrysostom is celebrated in Church Slavonic, Romanian, English or French. Some communities use the Julian (old style) calendar, others the Gregorian (new style). The church operates vigorous catechetical and mission programs.

Some Russian parishes chose to remain under the authority Parishes of the Russian Orthodox Church in Canada. Seventeen parishes in Alberta and Saskatchewan are served by 7 clergy, whose bishop is based in Edmonton. English has been introduced, but Church Slavonic remains the liturgical language. The remaining Russian Orthodox believers are part of the Russian Orthodox Church Outside Russia, formed 1920 in Yugoslavia by refugees of the Russian Revolution. Its headquarters is now in New York. Conservative and monarchist, it has broken communion with canonical churches and supported other ethnic traditionalist groups. Its Canadian Diocese is administered from Montréal, with 25 parishes and several monastic *sketes*. Church Slavonic is the customary language of worship and the Julian calendar is observed.

The Greek Orthodox Archdiocese of N and S America, the major daughter church of the church of Constantinople, has 62 Canadian parishes with a Toronto-based diocese which is a member of the CANADIAN COUNCIL OF CHURCHES (CCC). Substantial Greek immigration in the 1960s and 1970s has caused the membership to rise to over 200 000, served by 48 clergy. The principal language is Greek, and the church maintains strong links with Greek culture. The Gregorian calendar has been used since 1923, although 5 "Old Calendarist" parishes in Montréal and Toronto broke with the Greek church over its adoption of the revised calendar.

The majority of Canadian Christians with Syrian, Lebanese and Palestinian ancestry are part of the Antiochian Orthodox Christian Archdiocese of N America, daughter of the patriarchate of Antioch (Damascus, Syria). A mission established 1892 by the Russian Orthodox Church, and another established 1914 by the Antiochian patriarchate for the Syrian immigration, were its seeds. They merged in 1936, and the present name was adopted in 1969. The Antiochian church, which maintains close links with OCA, has made a concerted effort to use English, which is now the principal liturgical language. Eleven parishes are scattered from PEI to Alberta.

The Ukrainian Orthodox Church in Canada, formerly the Ukrainian Greek Orthodox Church, comprises 278 communities with about 140 000 parishioners. These are largely descendants of immigrants from Galicia, Ukraine, who settled on the Prairies from the turn of the century to 1929, and other Ukrainians who settled in Ontario cities after WWII. In 1932 the church established St Andrew's College, which affiliated with University of Manitoba in 1962. St Michael's parish at Gardenton, Man, the first Ukrainian church in Canada, is the site of an annual PILGRIMAGE.

Historically, Galicia was under the Ruthenian Rite of the Roman Catholic Church. Tension developed between the Canadian community and the Catholic hierarchy over the Galicians' historic right to have married clergy and to use the vernacular language in the liturgy. Oblate priests, sent into various parishes, raised fears among Galicians that they were being "westernized." In response the Ukrainian Greek Orthodox Brotherhood was formed in 1918, and led many Ukrainian Catholics into the Orthodox Church. A Syrian Antiochian Orthodox bishop assumed spiritual responsibility and ordained 3 priests. In 1951 the election of Ilarion Ohienko as metropolitan confirmed the church's autonomy. Metropolitan Ilarion, a noted Slavic linguist, translated the Bible into Ukrainian under the sponsorship of the British and Foreign Bible Society. The church's government is by consistory, a council of laymen and clergy, which is its highest authority. The liturgy is conducted mostly in vernacular Ukrainian. Consistent with its vision of itself as the bearer of Ukrainian culture, the church supports schools and folk groups, which form an integral part of community life.

The Ukrainian Orthodox Church of America (Ecumenical Patriarchate), organized 1928, has 4 parishes in Canada. It became a metropolia in 1983. The (Holy) Ukrainian Autocephalic Orthodox Church in Exile, with 2 Canadian parishes, is a body formed 1954 by clergy and laymen who fled Ukraine following its return to the Soviet sphere in 1944. The church traces its ecclesial origins to the Orthodox Church of Poland, which in 1924 received autocephalous status.

The Bulgarian Eastern Orthodox Church (Diocese of N and S America and Australia), begun as a mission of the Holy Synod of Sofia to Bulgarian and Macedonian immigrants in N America, became a metropolia following WWII. Ties with the Holy Synod were broken 1947-62 as the community debated its relationship to the mother church, which was under the communist umbrella. In 1962 some Bulgarians rejoined the mother church, but others condemned that action. At first organized under the Russian Church in Exile as the Bulgarian Orthodox Church, Diocese of the USA and Canada, the dissidents merged with the OCA, with a diocese centered in Toledo, Ohio. The Patriarchal Church and the Russian Church in Exile each have one Bulgarian community in Canada. Complicating this situation is the Macedonian Orthodox Church, Diocese of America, Canada and Australia, administered from Toronto. Comprising Macedonians and Bulgarians, it is the result of the re-establishment of the ancient Macedonian see of Ohrid as an independent church along national lines.

Created in the 14th century, the Orthodox Church in Byelorussia has almost constantly struggled for autonomy from the patriarch at Moscow. Following the local government's 1946 alignment with Moscow, Byelorussians established churches in exile. In 1968 the diocese of the Byelorussian Autocephalic Orthodox Church based in Toronto received its first archbishop. There one church serves several missions in mid-Canada's industrial belt. A translation of the Divine Liturgy into Byelorussian has been prepared in Canada. In 1951 a Byelorussian church in Toronto became part of the canonical Byelorussian Orthodox Parishes under the jurisdiction of the Ecumenical Patriarch, who exercises his authority through the Greek archbishop of Toronto.

A similar struggle for autonomy has marked the history of the Estonian Orthodox Church, a national church since 1920. At various times it was under the Ecumenical Patriarch or the Patriarch of Moscow. When the USSR occupied Estonia in 1944, Archbishop Aleksander of Tallinn fled to Sweden and established the church in exile under the Patriarch of Constantinople. It was brought to Canada by Estonian immigrants after WWII. Parishes in Toronto, Montréal and Vancouver serve 1500 Estonians.

Serbian immigration began in the 1850s with settlements in BC. Communities on the Prairies developed following the turn of the century and in the 1920s others were established around

Hamilton, Ont. Initially these were served by a Serbian Mission of the Russian Orthodox Church. With the re-establishment of the Holy Synod in Belgrade in 1921, N American churches were transferred to its jurisdiction and became the Serbian Orthodox Church in the USA and Canada. Attempts to establish N America as a metropolia failed, and in 1963 the Holy Synod in Belgrade created 3 dioceses for the continent. The 17 Canadian churches are served by 12 clergymen. Church Slavonic is used and the Julian calendar observed. The Serbian Orthodox Free Diocese in the USA and Canada resulted from a schism in 1963, when the Church-National Assembly voted to retain a bishop suspended by the Holy Synod. The assembly declared its autonomy from the Yugoslavian church, arguing that it was dominated by the communist government. The Serbian communities maintain ties with several autocephalous churches, although some canonical bodies do not recognize them. There are 7 Canadian communities, and a monastery at Chilliwack, BC.

The Romanians adopted Christianity in the 4th century, but a national church was not established until 1859; it became a Holy Synod in 1885. The first Romanian parishes in Canada were established about 1909 on the Prairies, among immigrants from the provinces of Bukovina and Transylvania. In 1930 the patriarchate established the Romanian Orthodox Missionary Episcopate in America, which became an archdiocese in 1950. Though autonomous, it maintains ties with the mother church in Bucharest. Canada's 20 parishes, located largely in the Prairie provinces, follow the Gregorian calendar and use Romanian in the liturgy. In 1951 many Romanians in N America rejected the bishop appointed by the church in Romania. The resulting schism led to the Romanian Orthodox Episcopate of America. Through the Ukrainian Orthodox Church of the USA a bishop was consecrated, and in 1960 he placed the jurisdiction under the Russian Metropolia (later OCA). The episcopate's 13 Canadian churches in Ontario and the Prairie provinces use Romanian and English in their liturgy and follow the Gregorian calendar.

Oriental Orthodox Christians in Canada (non-Chalcedonians) are of Armenian, Coptic, Ethiopian, S Indian and Syrian origin. The Canadian diocese of the Armenian Church of N America (est 1898) is governed by an assembly of laymen and clergy who elect a primate for a 4-year term, and is a member of CCC. The church is under the patriarch of Etchmiadzin (USSR), head of the Armenian Church, and historically linked to the patriarchates at Jerusalem and Constantinople. The Armenian community in Canada was established following WWI, and in the 1950s and 1960s a second immigration largely from Turkey, Egypt, Syria, Lebanon and Iran occurred. Eight Canadian parishes now serve 50 000 Armenians. The first parishes were established in St Catharines and Hamilton, Ont, followed by those in Toronto, Montréal, Ottawa, Edmonton and Vancouver. The Liturgy of St Basil is customarily celebrated in classical Armenian. The use of unleavened bread at communion reflects the influence of a brief union with the Roman church in the 13th and 14th centuries. Though the Armenians follow the Julian calendar, they continue the ancient form of celebrating the Christ's nativity as part of the feast of Epiphany.



Bishop Ioasaph blessing the waters on White Fish Lake, Alberta, *c*1949 (*courtesy Folk Life Program/Provincial Museum of Alberta*).

The Coptic Orthodox Church, Diocese of N America, was established 1961 to serve recent Egyptian immigrants, who settled principally in Montréal, Toronto, Kitchener and Ottawa. Followers of the Coptic Church of Ethiopia and the St Thomas Church of S India have joined in their liturgy. The Coptic Church traces its origin to the apostle Mark who, tradition claims, evangelized Egypt. The patriarchate of Alexandria was of great significance in the early church, ranking in importance with Rome and Jerusalem. The N American diocese functions directly under the Coptic patriarch. The Liturgy of St Mark is regularly celebrated using the ancient Coptic chant and modern Arabic with occasional English and French. The Canadian church has recently translated this liturgy. It also sponsors a quarterly publication, *Coptologia Studia Coptica Orthodoxa*, and holds membership in the CCC.

The Syrian Orthodox Church of Antioch in the US and Canada (frequently termed "Jacobite" after 6th-century organizer Jacob Baradaeus) is part of the ancient Antiochian patriarchate in Damascus. Along with the Syrian Liturgy of St James, a distinctive aspect of piety is a rigorous private prayer life. The 2 churches in Canada, in Montréal and Toronto, serve Syrians who immigrated in the 1950s.

Two additional bodies which regard themselves as Orthodox exist in Canada. The Evangelical Orthodox Church, Saskatoon Diocese, separated from an Evangelical Mennonite Brethren church and identified with similar movements in the US, initially as the New Covenant Apostolic Order. Members developed a PRESBYTERIAN form of government, adopted apostolic forms of ministry and developed liturgical worship. This movement formed the Evangelical Orthodox Church of America in 1976 and is now seeking canonical status. The African Orthodox Church, of which the single Canadian parish was established in Sydney, NS, in 1921, developed as part of the movement of black self-consciousness early in the century. It accepts the teaching of the 7 ecumenical councils and conforms to standard Orthodox practice.

Orthodox churches in Canada, while reflecting world Orthodoxy, have been affected by political activities and ethnic divisions in their regions of national origin. Some jurisdictions argue that such divisions contravene the canonical principle that the church be united, with all the faithful gathered around a common episcopate. Efforts are being made in N America to realize this principle. Although the churches in Canada continue to serve their historic constituency, the initial immigrants, they now face new generations whose linguistic and cultural formation has taken place entirely in Canada. Questions about liturgical language and practice and about the mission of the church in Canadian society form the agenda of today's church.

See also CHRISTIANITY. DAVID J. GOA

Reading: T. Ware, *The Orthodox Church* (1963); T. Hopko, *The Orthodox Faith* (1976); A.C. Piepkorn, *Greek Orthodox Church of Canada, 1918-1951* (1981).



Church of the Russian Orthodox Synod near Holden, Alberta (*photo by V. Claerhout*).

Orton, George W., runner (b at Strathroy, Ont 10 Jan 1873; d at Meredith, NH 26 June 1958). Canada's first Olympic champion, Orton was one of N America's premier track competitors in the 1890s. Regarded as the most scientific student of middle-distance running, he won the Canadian and American mile championships in 1892 and 1893. By 1900 he had accumulated 121 victories, including 15 American championships. Since Canada sent no team to the 1900 Paris Olympics, he competed for the US, winning the 2500 m steeplechase and finishing 3rd in the 400 m hurdles. He was a prolific writer on sport and running. J. THOMAS WEST

Osgoode, William, judge (b at London, Eng 1754; d there 17 Jan 1824). Educated at Christ Church, Oxford, he was admitted to Lincoln's Inn in 1779. After some years of chancery practice, he took office in 1792 as the first chief justice of UPPER CANADA and 2 years later took up a similar post in LOWER CANADA. In 1801 he returned to England and lived the rest of his life as a country gentleman. He was a man of tranquil temperament who played an important mediating role during his time in Canada. He did not

leave a strong judicial legacy but drafted much of the pioneering legislation. The law courts in Toronto and Canada's best-known law school are named after him. GRAHAM E. PARKER

Osgoode Hall, named after William OSGOODE, was built 1829-32 as the headquarters of the Law Society of Upper Canada. It was later expanded to house law courts and the Osgoode Hall Law School. As originally designed by John Ewart and W.W. Baldwin, Osgoode Hall was a modest 2-and-one-half-storey brick building. In 1844 and again in 1855-57 it was extensively refurbished and enlarged, first by the Toronto architect, Henry Bower Lane, and then by the local firm of Cumberland and Storm. The 1829 building became the east wing of a larger composition defined by a long central pavilion surmounted by a dome and flanked by 2 projecting wings fronted by a classical portico. Despite this gradual evolution, the building presents a unified appearance, and the design, with its classical porticos set on rusticated arcades, provides one of Canada's most important examples of public architecture in a late Palladian style. JANET WRIGHT



Oshawa, Ont, City, pop 117 519 (1981c), inc 1924, is located 52 km E of Toronto on Lk Ontario. Originally called Skae's Corners, its present name is an Indian term whose exact meaning is disputed, though "portage" is a common choice. In 1970 Oshawa became administrative centre of the newly formed Durham region. Its initial function as a transportation centre was because of an excellent harbour, good road connections and the GRAND TRUNK RY (1856). Manufacturing soon took precedence. Especially notable was Joseph Hall Iron Works, manufacturer of the Champion plough and other farm implements, and A.S. Whiting Co, manufacturer of smaller farm tools. The dominant manufacturer became McLaughlin Carriage Works, developer of the Buick automobile. In 1918 the newly formed GENERAL MOTORS Corp bought the business from local entrepreneur Robert S. "Colonel Sam" MCLAUGHLIN. In the years that followed, GM became not only the dominant employer, but after several years of poor labour relations, the target of a strike. GM workers certified the United Automobile Workers, an industrial union affiliated with the Congress of Industrial Organization. Much to the chagrin of Ontario Premier Mitchell HEPBURN, who hoped the UAW would lose the strike, the union, despite the use of special police, established itself as a force in Canadian labour (*see* OSHAWA STRIKE).

Prominent Oshawans have included Michael Starr, cabinet minister in the Diefenbaker government; Edward BROADBENT, federal leader of the New Democratic Party; and Donald JACKSON, world figure-skating champion.

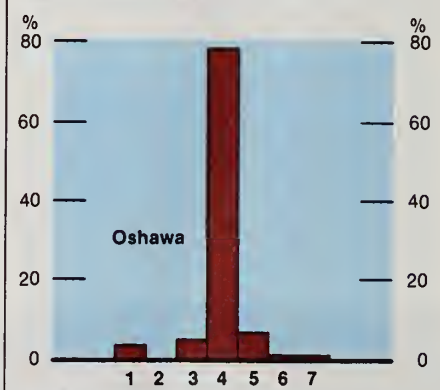
GERALD STORTZ

Population: 117 519 (1981c); 154 217 (CMA)
Rate of Increase (1971-81): (City) 28.3%; (CMA) 28.1%
Rank in Canada: Eighteenth (by CMA)
Date of Incorporation: City 1924
Land Area: 142 km²
Elevation: 255 m
Climate: Average daily temp, July 20.3°C, Jan -5.6°C; Yearly precip 863.5 mm; Hours of sunshine 2045 per year

Oshawa Strike, 8-23 Apr 1937, when more than 4000 workers of the huge General Motors plant in Oshawa, Ont, struck. Their requests were simple: an 8-hour day, better wages and working conditions, a seniority system and recognition of their union, the new United Automobile Workers. This last demand had caused the strike: the UAW was an affiliate of the recently created Committee for Industrial Organizations (CIO), which was organizing industrial workers throughout the US. Vigorously supported by Ontario Premier Mitchell HEPBURN, GM management strove to keep the CIO out of Ontario. Both the company and the premier wanted a pliant labour force — unorganized, impotent and cheap. To break the strike, Hepburn even created his own police force, known irreverently as Hepburn's Hussars and Sons-of-Mitches. Two of Hepburn's cabinet colleagues who opposed his actions, Labour Minister David Croll and Attorney General Arthur Roebuck, were persuaded to resign. Supported by fellow unionists, neighbours, and CCF and communist activists, but significantly not by the CIO which had little money to spare for Canada, the workers held out for 2 weeks.

Eventually GM, afraid of losing markets to its competitors, capitulated. In the Apr 23 agreement GM accepted many of the union's demands, without recognizing the union. To gain recognition, the union leadership publicly repudiated the CIO connection. Nevertheless everyone knew it was a great CIO victory — the first major one in Canada. According to some, the strike marked the birth of INDUSTRIAL UNIONISM in Canada. IRVING ABELLA

Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



Industry groupings
1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figure II, Catalogue 31-209, Statistics Canada.



Outstanding physician and educator Sir William Osler (*courtesy Public Archives of Canada/C-7105*).

Osler, Sir William, physician, writer, educator (b at Bond Head, Canada W 12 July 1849; d at Oxford, Eng 29 Dec 1919). His importance stems from his contributions to knowledge in a wide spectrum of clinical fields, his educational activities both in person and through his writings, his stimulation of students who later became leaders of the medical profession, his enthusiastic support of scientific libraries, and his example as a person of integrity, equanimity and sincere humanity.

Osler was raised in Dundas, Canada W, and educated at U of T and McGill, where he graduated MD in 1872. After postgraduate training in England and Europe, he began his teaching career at McGill, lecturing in medicine and pathology, publishing extensively and building an international reputation as an astute and humane clinician. In 1884 he accepted an invitation to join the faculty of U of Pennsylvania, and 5 years later he became the first professor of medicine at Johns Hopkins U in Baltimore.

By the turn of the century, Osler was probably the best-known physician in the English-speaking world. He achieved this position with a combination of superb practice, excellent and innovative teaching, wide-ranging publication, and association with outstanding colleagues in the most advanced school of its time. His professional interests were unusually wide, but he was particularly expert in diagnosis of diseases of the heart, lungs and blood. His textbook, *The Principles and Practice of Medicine,* first published in 1892 and frequently revised, was considered authoritative for more than 30 years. His description of the inadequacy of treatment methods for most disorders was a major factor leading to the creation of the Rockefeller Institute for Medical Research in New York City.

Osler was an outgoing, vivacious man, given to practical jokes and pranks. He knew how to dispel gloom in the sickroom and how to inspire his patients with hope. He advocated changes in the medical curriculum to decrease the amount of lecturing and increase the time students spent with patients. He was one of those who formalized the methods of postgraduate training for physicians, helping to create the system followed today.

Osler married at age 42, his wife being a direct descendant of Paul Revere. One of their 2 chil-

dren died at birth, the other in WWI. In 1905 the family left N America for Great Britain, where Osler became Regius professor of medicine at Oxford. The recipient of many honorary degrees, he was created a baronet in 1911. His last years were spent carrying on a busy consultant's practice, writing, teaching and building up his extensive library in the history of medicine, which eventually was bequeathed to McGill. In 1919 Osler died of pneumonia developed after a lengthy trip of consultation. His ashes rest in the Osler Library, Montréal. His name is still much quoted and his life remains an exemplar for students and physicians. CHARLES G. ROLAND

Osoyoos, BC, Village, pop 2738 (1981c), inc 1946, is located on Osoyoos Lk, 60 km S of Penticton. *Soyoos* ("where two lakes meet") was a local Indian name. HBC brigades passed here 1812-48. The BC gold rushes helped open the area. A customs house was placed at the narrows in 1865. Customs collector John Carmichael Haynes, justice of the peace for Osoyoos and Kootenay districts, was a pioneer settler at Osoyoos and accumulated 8900 ha of land for a cattle and horse ranch. The first commercial orchard was established nearby in 1890. The South Okanagan Irrigation Project brought an irrigation canal to the area by 1919. Agriculture is now the largest sector and gives rise to some manufacturing. Less important are cattle raising and forestry. Warm lakes attract many tourists. Osoyoos has been picked as the site for the 1985 BC Winter Games, which will further development of Mt Baldy, a ski area E of the village. WILLIAM A. SLOAN

Osprey (*Pandion haliaetus*), large, cosmopolitan BIRD OF PREY characterized by a crested head and contrasting black, white and grey plumage. It feeds exclusively on fish and is commonly called fish hawk. Adaptations for fishing include nostrils that close, feet designed for catching and holding quarry with sharp spicules (small spines) on the underside, and a reversible outer toe. Although frequently accused of feeding on sport fish, ospreys feed mainly on non-game fish found near the surface or in shallow water. Ospreys breed across Canada, building large, stick nests near or over water. Early each fall they migrate to S America. R.W. FYFE

Ostell, John, architect, surveyor (b at London, Eng 7 Aug 1813; d at Montréal 6 Apr 1892). The most important architect in Montréal between 1836 and 1859, Ostell designed the Custom House, Place Royale, the McGill arts building, the Episcopal Palace, the Grand Seminary of St Sulpice, the Court House and the Church of St Jacques. Appointed city surveyor in 1842, he was also the provincial surveyor in the late 1840s and early 1850s. In 1859 he gave up his practice to concentrate on lumber manufacturing. Ostell became a director of the New City Gas Company in 1850, president of the Montréal and Champlain Railroad in 1860, and helped to found the Montreal City Passenger Railway in 1861. ELLEN S JAMES

Ostry, Bernard (b at Wadena, Sask 10 Jun 1927), public servant. After studying history at U of Man, Ostry launched an academic career at the universities of London and Birmingham in England. There, in collaboration with H.S. Ferns, he published *The Age of Mackenzie King: The Rise of the Leader* (1955; 2nd ed 1976), a critical and controversial study of the former prime minister. Ostry returned to Canada in the late 1950s, working for the CBC 1960-68 as a broadcaster and subsequently as an administrator in the public affairs department. He was then a commissioner on a prime-ministerial task force regarding government information, and one of the authors of its report, *To Know and Be Known* (1969); this provided a transition for the ambitious and now well-connected Ostry to the top level of the federal government cultural bureaucracy. He was assistant undersecretary of state 1970-73; secretary general, National Museums of Canada, 1974-78; and finally deputy minister of communications 1978-80. His strong views on the importance of the arts and the government's role in cultural life are contained in his *The Cultural Connection* (1978). In 1981, after a brief sojurn in France, he moved to the Ontario government, where he served in a series of deputy minister appointments. NORMAN HILLMER

Ostry, Sylvia, née Knelman, economist, public servant (b at Winnipeg 3 June 1927). Ostry was educated in Winnipeg and at McGill and Cambridge. She began her career in university teaching at McGill and Oxford. In 1964 she joined the federal public service as assistant director and then director, special Manpower Studies, Dominion Bureau of Statistics (1964-69). She was director, Economic Council of Canada (1969-72); chief statistician of Canada (1972-75); deputy minister, Consumer and Corporate Affairs (1975-78); chairman, Economic Council of Canada (1978-79). In 1980 she was appointed head, Dept of Economics and Statistics, Organization for Economic Cooperation and Development, Paris. In 1983 she returned to Ottawa as special adviser to the Privy Council Office on loan to the Inst of Research on Public Policy. In Jan 1984 she became a deputy minister, internal trade, Dept of External Affairs. Called the "ultimate public servant," she has contributed especially in the areas of labour economics, manpower studies and productivity. She is co-author of *Labour Economics in Canada* (3rd ed, 1979) and has also published on demography, productivity and competition policy.

Ottawa (or Odawa) were an Algonquian-speaking group living north of the HURON at the time of French penetration to the Upper Great Lakes. A tradition of the Ottawa, shared by the Ojibwa and Potawatomi, states that these 3 groups were once one people. The division of the Upper Great Lake Algonquians apparently took place at Michilimackinac, the meeting point of Lakes Huron and Michigan. The Ottawa, or "traders," remained near Michilimackinac, while the Potawatomi, "Those-who-make-or-keep-a-fire," moved S, up Lk Michigan. The Ojibwa, or "To-roast-till-puckered-up," went NW to Sault Ste Marie.

The farming, fishing, hunting and trading economy of the Ottawa resembled that of other Great Lakes people. The Ottawa were closely tied to their Huron neighbours and, in fact, were a vital part of the so-called "Huron Trading Empire." When HURONIA was destroyed by the IROQUOIS in the mid-17th century, the Ottawa fled west. After 2 decades they were back on MANITOULIN I, but they continued to occupy settlements elsewhere on the shores of the Great Lakes. They located their principal settlements near the French fort at Michilimackinac, though many migrated to the Detroit area when the French built a fort there in 1701. During the final struggle for northeastern N America, the Ottawa supported the French.

After the French defeat, the Ottawa, under PONTIAC of the Detroit region, organized a pan-Indian uprising against the English who threatened to encroach on Indian lands. Though unsuccessful, the uprising led the British to issue the royal PROCLAMATION OF 1763, which recognized the legal right of Indian tribes to claim title to the lands they occupied. The proclamation is the Magna Carta of Indian land rights in Canada, and still applies today (*see* LAND CLAIMS).

During the American Revolution and the War of 1812, the Ottawa (or Odawa as they prefer to be called) sided with the British, Chief Jean-Baptiste Assikinack being one of their leaders in the War of 1812. After signing treaties in the 1820s and 1830s with the Americans, many Ottawa in Michigan moved to Manitoulin I. Assikinack, who had become a Roman Catholic catechist, convinced many of his people on the island to become Christians. Although Assikinack supported the surrender of Manitoulin I to the government of the Province of Canada in 1862, many Ottawa refused and the eastern section of the island, at Wikwemikong, remains unceded land.

Because the Ottawa tended to settle in mixed communities, it is difficult to state population figures. Many Ottawa descendants are identified as Ojibwa or Potawatomi. It has been estimated that in the 1970s there were 3000 Ottawa in Ontario and some 5000 in the US, on reservations in Michigan, Wisconsin and Oklahoma.

In the 19th century many Ottawa operated their own farms, or worked as farm labourers and lumbermen. Since 1945 a number of Ottawa have moved from Wikwemikong to Sudbury and Toronto to find employment. Daphne ODJIG, a well-known Indian artist, is the great-great-great-granddaughter of Assikinack. *See also* NATIVE PEOPLE: EASTERN WOODLANDS and general articles under NATIVE PEOPLE. DONALD B. SMITH

Reading: H.H. Peckham, *Pontiac and the Indian Uprising* (1961); B.G. Trigger, ed, *Handbook of North American Indians*, vol 15: *Northeast* (1978).

Ottawa, Ont, capital of Canada and seat of Carleton County, is located on the OTTAWA R on Ontario's eastern boundary with Québec, about 160 km W of Montréal.

Settlement Evidence of Algonquian settlements has been found throughout the Ottawa Valley. "Ottawa" is thought to derive from a tribe of the same name, probably from a word meaning "to trade." As the Ottawa and its tributaries form the most direct water route between the St Lawrence and the continental interior, it was part of aboriginal trading systems and, from the 17th to 19th centuries, the chief artery of the Montréal FUR TRADE. Minor fur outports were established in the valley before 1800, when the first permanent settlement, an agricultural community at the site of HULL, was established by New Englander Philemon WRIGHT. Itinerant lumberers were drawn by the trade in square timber begun in 1806 by Wright. An unnamed campsite, established 1826 by Royal Engineers under Lt-Col John BY as construction base for the RIDEAU CANAL, was situated on a 30 m bluff flanking the headlocks, near Chaudière Falls and the mouths of the Rideau and Gatineau rivers. It immediately attracted contractors, labourers, and a small community of merchants, tradesmen and professionals. By 1827 a considerable town named Bytown had sprung up. In the 1830s the TIMBER TRADE to Britain became the focus of economic activity. Bytown eclipsed "Wrightstown" (later Hull) as the principal valley town. A new industry emerged in the 1850s when the power of Chaudière and Rideau falls was employed to saw logs into lumber for the American market.

Development By the 1860s, in addition to a large trade in square timber, Ottawa contained one of the largest milling operations in the world, accompanied by huge cutting, (driving)

Population: 717 978 (1981c); (CMA*)

Rate of Increase (1971-81): (City) -2.37%; (CMA) 15.8%

Rank in Canada: City Twelfth; Fourth (by CMA)

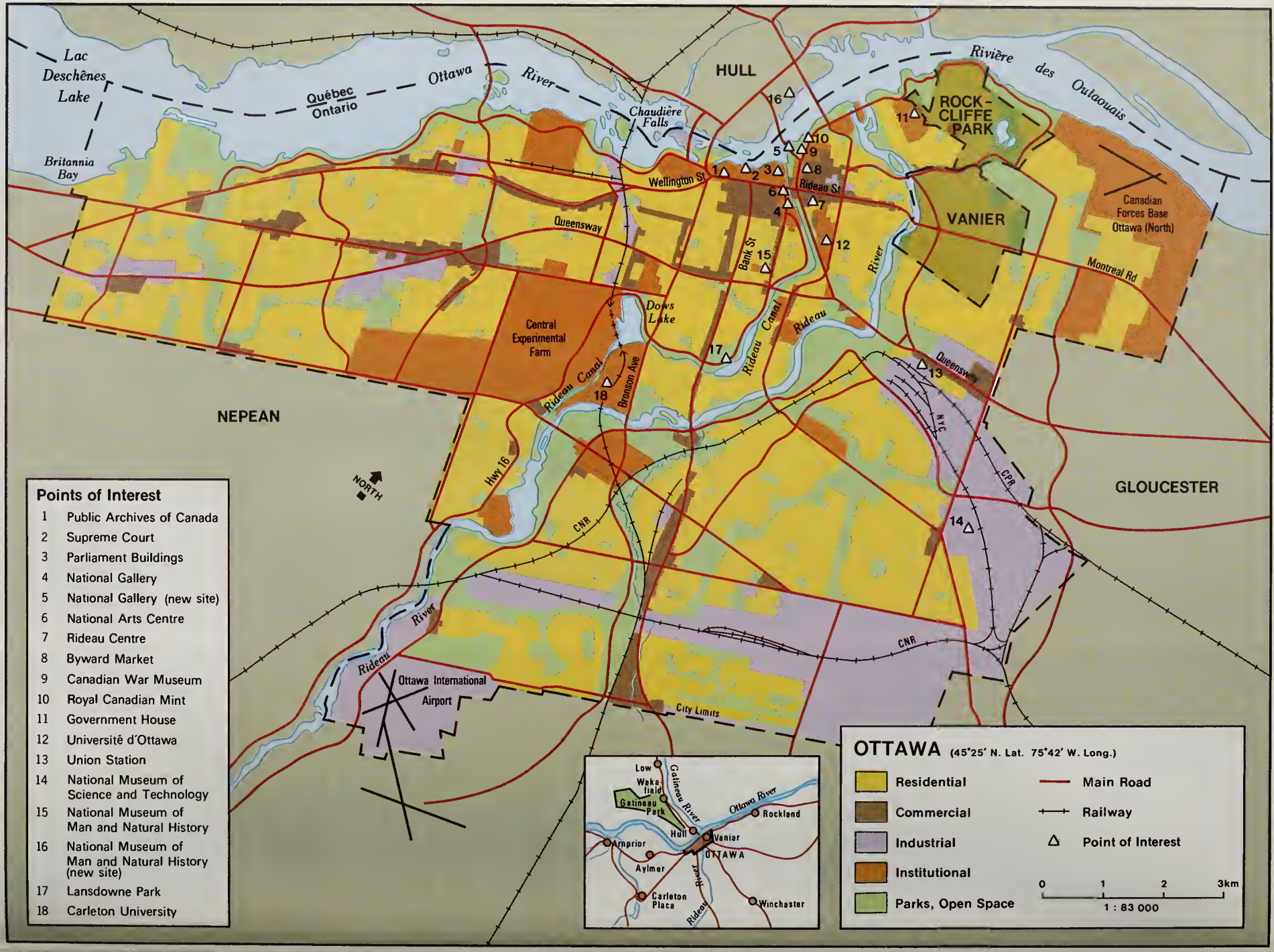
Date of Incorporation: Town of Bytown (1st), 1847
Town of Bytown (2nd), 1850
City of Ottawa, 1855

Land Area: 110.15 km²; 3998.9 km² (CMA)

Elevation: 114 m

Climate: Average daily temp, July 21°C, Jan -11°C; Yearly precip 851 mm; Hours of sunshine 1995 per year

* Includes Hull, Québec


Lac Deschênes
Lake
Québec
Ontario
Ottawa River
Britannia Bay
Chaudière Falls
HULL
Rivière des Outaouais
ROCK-CLIFFE PARK
VANIER
Canadian Forces Base Ottawa (North)
Montreal Rd
Wellington St
Rideau St
Queensway
Bank St
Rideau River
Dows Lake
Central Experimental Farm
Rideau Canal
Bronson Ave
NEPEAN
GLOUCESTER
Hwy 16
NORTH
CNR
CPR
NYC
Ottawa International Airport
City Limits
Low
Wakefield
Gatineau Park
Gatineau River
Ottawa River
Rockland
Hull
Vanier
OTTAWA
Arnprior
Aylmer
Carleton Place
Winchester
Rideau River
Points of Interest
1 Public Archives of Canada
2 Supreme Court
3 Parliament Buildings
4 National Gallery
5 National Gallery (new site)
6 National Arts Centre
7 Rideau Centre
8 Byward Market
9 Canadian War Museum
10 Royal Canadian Mint
11 Government House
12 Université d'Ottawa
13 Union Station
14 National Museum of Science and Technology
15 National Museum of Man and Natural History
16 National Museum of Man and Natural History (new site)
17 Lansdowne Park
18 Carleton University
OTTAWA (45°25' N. Lat. 75°42' W. Long.)
Residential
Commercial
Industrial
Institutional
Parks, Open Space
Main Road
Railway
Point of Interest
0 1 2 3km
1 : 83 000

and barging operations, and was connected to the GRAND TRUNK RY and American rail networks. The railway made Ottawa a serious candidate as permanent capital of the Province of Canada, but urban rivalries made any choice politically dangerous and the matter was thrust upon Queen Victoria. Colonial officials ensured her only possible choice would be Ottawa, as announced the last day of 1857. Construction of PARLIAMENT BUILDINGS began 1859, and they were in use by 1866. In 1867 the city was made capital of the new Dominion of Canada. About 1890, the hydroelectric potential of Ottawa's rivers was exploited, the chief industrial application being in pulp and paper production, using the inferior logs of depleted valley forests. The sawn lumber industry declined significantly in the 20th century.

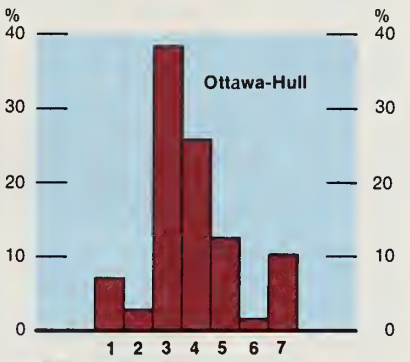
By 1940, the federal government had emerged as the dominant employer. For 30 years it has generated almost unparalleled growth. Government jobs until recently were mainly in Ottawa proper, which also developed as a centre for tourism, the city's second-largest industry. It now caters to an estimated 2.5 million visitors annually.

Cityscape Ottawa has an outstanding physical endowment. Rapids and falls punctuate river courses, which are protected by parks and driveways. Lower Town, E of the canal, was the first growth pole, and much of the mid-19th-century city is found here, including the restored "Mile of History" along Sussex Dr and the Byward Market. It was outstripped in the 1860s by Upper Town, which was entrenched by a government economy as the chief retail and office locus of the city. The large Central Experimental Farm located in the SW part of the city, and a federal "greenbelt" girdling the built-up region are treasured amenities though they have completely girdled recent suburban expansion.

Since the 1920s, much of the core area has been appropriated and redeveloped with parks (Confederation Square) or major national buildings (National Arts Centre, National Defence Building, Bank of Canada Building) by the federal authority. It also collaborated on construction of the Rideau Centre, a downtown convention, hotel and shopping complex opened in 1983. Office towers, which from the 1960s began to overwhelm the Parliament Buildings, are the dominant feature of the downtown landscape. The NATIONAL CAPITAL COMMISSION and its predecessors have carried out much of the beautification of the city, removing rail lines and yards from the city core and preserving the scenic canal. Today the NCC maintains the extensive system of driveways in the city, lined with millions of tulip bulbs and other flowering plants, operates a number of parks and in winter maintains the world's longest skating rink on the frozen Rideau Canal. City planning is conducted by the Ottawa Planning Board.

Population With 295 163 inhabitants Ottawa is Canada's twelfth-largest city. (The CMA ranks fourth.) The contours of this population have persisted for 150 years: about one-quarter French Roman Catholics, one-quarter Irish Roman Catholics, and most of the remainder Protestants of British origin. Small communities — chiefly Jewish, German and Italian — arrived at the turn of the century and now comprise about 10% of the population. Recently, an Arabic-speaking (mainly Lebanese) community has struck roots in Ottawa. In general, the Protestant and English community has favoured Upper Town, the Roman Catholic and French community, Lower Town. Religious institutions (churches, schools, hospitals), ethnic associations, and even political organizations have solidified this pattern. Nineteenth-century Ottawa became a focal point of Catholic and Protestant-Orange militance, and also emerged as the capital of Franco-Ontario, and centre of conflicts over language. In the 1850s, sawmilling firms at Chaudière generated a working-class community, broadly French and Irish Catholic. The growing public service tended to diffuse into the pre-existing communities. Recent renewal and renovation in older areas has altered the pattern, attracting professionals to all core areas.

Distribution of Industrial Activity* by Industry Grouping within Census Metropolitan Areas, 1980



Industry groupings

1. Food and beverage and tobacco products industries
2. Leather, textile, knitting mills and clothing industries
3. Wood, furniture and fixtures, paper and allied and printing, publishing and allied industries
4. Machinery, transportation equipment and electrical products industries
5. Primary metal and metal fabricating industries
6. Rubber and plastic products, petroleum and coal products and chemical products industries
7. Non-metallic mineral products and miscellaneous manufacturing industries.

* Industry activity based on the average of percentage shares of the value shipments of goods of own manufacture, total value added and total number of employees for each of the selected metropolitan areas.

Source: Figure II, Catalogue 31-209, Statistics Canada.

Economy and Labour Force Though patterns in the Ottawa work force have undergone dramatic change, "service" to a dominant industry has been a continuing motif. Original settlers serviced the needs of canal construction, the squared timber trade and agriculture. In 1861 "industrial" jobs, most associated with saw milling, comprised about 48% of the labour force. Government employment, only 10% in 1871, grew by 1971 to about one-third, including large numbers of women, while manufacturing fell to about 6%. Few corporate head offices have been established in Ottawa, with the exception of Metropolitan Life Insurance and a number of burgeoning computer firms. Aerial surveying has also developed, contracting about 40% of the world's business outside the Soviet Bloc, and a major chip technology industry has developed since 1970.

Transportation Rivers formed the city's original transportation corridors and were the basis of its claim to be the economic capital of central Canada: the Rideau to Kingston; the Gatineau into the Québec Laurentians; and the Ottawa E to Montréal and W to Lk Huron. However, transportation is now largely by road and rail; the city is on both transcontinental rail lines and the Trans-Canada Highway. It has one of Canada's busiest air terminals, largely owing to its location on the Montréal-Toronto-Ottawa air triangle, and is the centre for the federal government's air fleet and a large Armed Forces base. Uplands and Rockcliffe are the airports in the Ottawa-Carleton region. Public transportation is provided by quasi-autonomous OC Transpo, based on the Ottawa-Carleton region.

Government and Politics Ottawa's jurisdictional divisions, its location in a population-poor region (shared with its sister city, Hull) and its distance from provincial capitals, coupled with the predominating economic influence of nearby Montréal, make for a complex, but weak metropolitan system. In addition, the municipal regions of Ottawa (Ottawa-Carleton) and Hull (the Outaouais Regional Community), covering together about 5200 km^2, overlap the 4700 km^2 federal district run by the National Capital Commission, which wields considerable influence as autonomous landowner and developer of public works.

From the outset, Ottawa had a ward system sensitive to the Upper Town/Lower Town division. Administration was a council-committee system until 1908, when a council-board of control system (the mayor and 4 controllers elected at large), was adopted. In 1980, the city returned to the original pattern. Reform politics emerged in the 1970s and has changed the traditional small-business configuration at City Hall. The federal authority, though the city's largest landowner, is constitutionally exempt from city by-laws and taxes, and the extent of its responsibility to respect laws and provide grants in lieu of taxes has for more than 100 years been a chronic, controversial and unresolved issue between the Crown and the Town. Since 1841 Ottawa's Irish-French Catholic communities have mainly voted reform or Liberal; the Anglo-Protestant communities, Conservative. An NDP presence, and shifting social patterns, has recently altered this tendency. A complex school system, overseen by the nondenominational Ottawa Board of Education and Ottawa Roman Catholic Separate School Board, parallels the political one. The separate board has traditionally educated in English and French about equally. The federal bilingual thrust has generated a large immersion program in the nondenominational system and the program now runs one school entirely in French.

Cultural Life CARLETON UNIVERSITY is located in the SW. The UNIVERSITY OF OTTAWA offers programs in both English and French and, though formally secular, embodies much of the tradition of the Oblate Order that ran it for many years. St Paul's is denominational. Through Algonquin College, Ottawa is also the centre of the region's community college system.

Much of the city's cultural life and most of its facilities are dominated by the federal government. Almost all federal cultural agencies have showcases in Ottawa, including the NATIONAL MUSEUMS, NATIONAL GALLERY, PUBLIC ARCHIVES and National Library. The NATIONAL ARTS CENTRE, with its National Symphony Orchestra and theatres in French and English, also attracts international and N American performers. The city also has a small symphony orchestra and supports several theatre companies, including Ottawa Little Theatre and Great Canada Theatre Co. The Bytown Museum operates in one of Col By's original buildings and the city operates a municipal archives. Landsdowne Park is the site of the annual Central Canada Exhibition, home of the OTTAWA ROUGH RIDERS professional football team and the amateur Junior A hockey team, the '67s. Rowing, canoeing, track and gymnastics clubs also operate in the city. Ottawa is served by 2 private TV networks, the CBC's French and English services and the public networks of Ontario and Québec. Its daily newspapers are *Le Droit* (French) and *The Citizen* (English). The weekly *Herald* was begun in 1983.

JOHN TAYLOR

Reading: David B. Knight, *A Capital for Canada* (1977) and *Choosing Canada's Capital* (1977).

Ottawa Agreements, 12 bilateral trade agreements providing for mutual tariff concessions and certain other commitments, negotiated 20 July-20 Aug 1932 at Ottawa by Britain, Canada and other COMMONWEALTH Dominions and territories. They may be seen as the culmination of a trend towards IMPERIAL PREFERENCE, which began with Canada's unilateral grant of such preferences in 1897. Among the Canadian industries that may have benefited from the agreements were wheat growing, lumbering and milling, apple growing, automobile manufacturing and the nonferrous metals industry. Canada's negotiators, anxious to gain a lot and to give a little, nevertheless promised to admit British manufactures on terms that would give them a fair chance in the Canadian market. Canada also lowered some tariffs on British goods while raising them on some non-British goods, widening the margin between ordinary and preferential rates and thereby annoying the US. Similar arrangements were made by Britain with South Africa, Australia and New Zealand. Britain promised to impose no duties on empire foodstuffs, to raise duties and to impose quotas on many non-empire foodstuffs, and to continue duty-free or low-tariff arrangements for empire manufactures, such as Canadian automobiles. Thus there were new duties on "foreign" dairy products, quotas for certain meats, and many other realignments of British and Dominion duties. The agreements succeeded in giving the Dominions a larger share of the British market, but they did not arrest the decline in Britain's share of the imperial market. The Anglo-Canadian Agreement was modified in 1937, again in 1938 and many times since 1945. In 1982 mutual concessions still existed, most of which can be traced to the Ottawa Agreements.

IAN M. DRUMMOND

Reading: Ian M. Drummond, *Imperial Economic Policy 1917-1939* (1974).

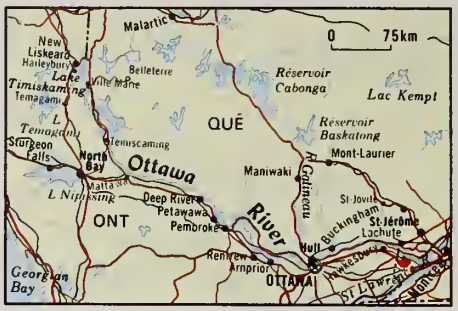
Ottawa Journal was founded in 1885 by A.S. Woodburn, who briefly employed J.W. DAFOE as the paper's editor. In 1886 the paper was bought by P.D. Ross, who ran it for many years as Ottawa's Conservative evening newspaper. The *Journal* merged in 1917 with E. Norman Smith's *Ottawa Free Press,* and thereafter ran a morning edition, until 1949. Ross controlled the paper until his death, also in 1949. Smith then became the paper's president, until his death in 1957. Under Ross and Smith, M. Grattan O'LEARY dominated the *Journal*'s editorial page, and he was Smith's natural successor as *Journal* president, a post he held until 1966. The *Journal* succeeded, within the limits of its finances, in maintaining a highly literate editorial page while specializing in parliamentary reporting. Although Conservative, the paper kept its partisanship within bounds, between elections.

The *Journal*'s finances were never strong. O'Leary brought about the sale of the paper to the Free Press newspaper chain in 1959, while retaining editorial control. During the 1970s the *Journal* began to experience financial difficulties and considerable labour trouble. In 1980 it was sold to the THOMSON GROUP, and some months later closed down. *See also* JOURNALISM; NEWSPAPERS.

ROBERT BOTHWELL

Reading: I.N. Smith, *The Journal Men* (1974).

Ottawa River, 1271 km long, chief tributary of the ST LAWRENCE R, rises in a chain of lakes in the LAURENTIAN HIGHLANDS, at the height of land which marks the commencement of the slope northward to Hudson Bay. It continues with Dazois Reservoir, Grand-Lac-Victoria, Lac Granet, Decelles Reservoir, Lac Simard and Lk Timiskaming, entering each slowly and discharging with a heavy rush. South from Lk Timiskaming, it grows broad and forceful, widening into marshy lakes, then constricting into turbulent rapids. At St-André-Est, the Ottawa expands to form Lac des Deux Montagnes, from which it enters the St Lawrence through Rivière des Prairies and Rivière des Mille-Îles to the E, and by a channel to Lac St-Louis to the S. Tributaries from the N-side highlands are often wild and swift: DUMOINE R (129 km), Coulonge R (217 km), Gatineau R (386 km), du Lièvre R (330 km), Petite Nation R (97 km) and Rouge R (185 km). From the S, the Petawawa R (187 km) and Madawaska R (230 km) also flow through rugged terrain, but the Mississippi R (169 km), Rideau R (146 km) and South Nation R (161 km) drain gentler land. After the last glacier melted, it was the Ottawa that drained the Great Lakes until the land rose and a new channel was found via the St Lawrence. The fine clay soil of the southern valley was deposited by the Ottawa in its journey to the sea, forming a long fertile intrusion into the otherwise implacable Canadian SHIELD. From Lk Timiskaming to Montréal, the river forms the border between Ontario and Québec, but the division is more than political — to the S are rich farms and gentle hills, to the N the forests of the Laurentians.



For several hundred years, the Ottawa was the primary transportation route to the western interior. The Algonquin controlled it in early times and one group exacted tolls from a strategic base on Allumette I, where they also grew corn and tobacco. Jacques CARTIER probably saw the river from atop Mont Royal, but Etienne BRÛLÉ was likely the first European to travel it (1610). In 1613 via the Mattawa and FRENCH rivers to Georgian Bay, CHAMPLAIN travelled the route, which was used to carry furs for the next 200 years. The river was a tough challenge for the voyageurs, requiring 18 portages, some of the most difficult being at Long Sault Deschênes, Lac des Chats, Chenaux, Portage-du-Fort, Chaudière Falls, Roche Fendue, Des Joachims, La Cave and Des Erables.

The French made small impact on the river valley, though they built a few posts and even drove some timber in the 1740s. L'ORIGNAL, granted in 1674, was the first seigneury in present-day Ontario, but was not developed for 100 years. HAWKESBURY was founded in 1798, and there Thomas Mears built the first gristmill, sawmill and later the first steamer, the *Union,* on the Ottawa. The first paper mill in Canada was built 1803-05 at St-André-Est, and the American Philemon WRIGHT founded Wrightsville (later HULL) in 1800 with American settlers. Loyalists, led by Sir John JOHNSON, moved into the valley in 1814, and French settlers onto Petite Nation seigneury. In 1817 land along the Rideau R was granted to 1000 British veterans, and in 1825 Archibald MCNAB led a group of Scots to the mouth of the Madawaska R.

Log rafts descended the Ottawa even before it ceased to be the prime route of the fur trade after 1821. Wright showed that the route was feasible in 1807, and the British demand for pine grew until, by 1830, the valley timber trade dominated the Canadian economy. After 1850 the British demand for square timber fell, but in 1854 RECIPROCITY gained free access for Canadian lumber into the US market. The timber trade pervaded the social life of the valley. Armies of men lived in crude shanties during winter and descended on civilization with their rafts come spring. Competition among shanties and between French and Irish led to feuds and violent clashes. After the completion of the RIDEAU CANAL (1832), Bytown (later OTTAWA) grew to be the largest lumber centre on the river. Though a few timber barons, such as E.B. EDDY and J.R. BOOTH, made fortunes, many lumbermen and Irish labourers lived in poverty and disease. The ravages of the axe swept up the river and its tributaries. By 1828 there was a sawmill at the future site of PEMBROKE; after 1850 cutting reached the Madawaska R, and by the 1870s Lk Timiskaming. Railways challenged the river by the 1850s, carrying lumber S to BROCKVILLE and Ogdensburg, NY. By the 1870s rail lines reached CARLETON PLACE, RENFREW, ALMONTE and Pembroke. Steamers plied the river with goods and passengers, aided by a canal at Carillon, which permitted uninterrupted travel from Montréal to Ottawa. This river transport ceased by 1900.

Most of the valley's stands of pine had been decimated by 1910. Where land was fertile, farmers settled; elsewhere there remained a wasteland of stumps and debris vulnerable to fire. Part of the wilderness was saved from the axe when ALGONQUIN PROVINCIAL PARK was created (1893), and in 1918 Canada's first forestry research station was established at Petawawa to study the effects of logging, disease and fire. With the loss of the larger trees, most mills converted to pulp and paper, still an important industry along the river. But except for the farming area of the lower valley, the heritage of the timber trade is a depressed economy, with little industry and high unemployment. Much of the hydroelectric power gained by harnessing the Ottawa is transmitted to Toronto and elsewhere. Ottawa, which was chosen as Canada's capital in 1857, is clearly the dominant urban centre, but its prosperity is based on the federal government, not valley resources or its riverine connections. First called the Grand Rivière des Algonquins, the river took its name from a later group of middlemen in the fur trade, the Ottawa.

JAMES MARSH

Ottawa Rough Riders, football team. Ottawa has had FOOTBALL teams since the 1870s, including the Canadian Rugby Union Champions in 1898, 1900 and 1902 and the Ottawa Senators (a combination of the Rough Riders and Ottawa St Brigid's), which won the GREY CUP in 1925 and 1926. The Rough Riders returned to the Dominion final in 1939, 1940, 1948 and 1951, defeating Toronto Balmy Beach and Saskatchewan respectively in 1940 and 1951. Coach Frank Clair and quarterback Russ JACKSON, probably the greatest Canadian ever to play that position, took Ottawa to Grey Cups in 1960, 1966, 1968 and 1969, losing only to Saskatchewan in 1966. In 1973 Jack Gotta coached the Riders to another Cup victory and his successor George Brancato won the championship in 1976 and lost to Edmonton in 1981. Their present stadium at Lansdowne Park was opened in 1967 (and now seats 34 838) although the site has been their home since the early 1900s.

DEREK DRAGER

Ottenbrite, Anne, swimmer (b at Whitby, Ont 12 May 1966). She won gold medals in the 200 m breaststroke and 4 x 100 m medley relay and silver in the 100 m breaststroke at the 1982 COMMONWEALTH GAMES in Brisbane, Australia, and a gold medal in the 100 m breaststroke and silver in the 4 x 100 m relay at the 1983 Pan-American Games, where she was disqualified in the 200 m breaststroke for using a dolphin kick. At the 1984 Los Angeles Olympics she won a gold medal in the 200 m breaststroke, silver in the 100 m breaststroke and bronze in the 4 x 100 m relay. She was still a high-school student at the time of the Olympic Games.

JAMES MARSH

Otter The river otter (*Lutra canadensis*) occurs throughout N America except in desert and arid tundra regions. In Canada, it is scarce, except along the BC coast, where it is abundant and often wrongly identified as a SEA OTTER. The otter is a large WEASEL, males reaching 1.3 m in length and weighing 8 kg; females, slightly smaller. Its colour is dark brown, paler below. It is amphibious, its streamlined body and tail, short legs, webbed feet and dense waterproof fur equipping it to hunt in water. The otter's food is 90% fish but crustaceans, amphibians, mammals and birds are also important. It has a lengthy mating period in late winter and spring; gestation lasts 9½-12½ months. Young (1-4) are born in a nest under a rock pile or in a burrow or similar shelter. The pelage is dense with an underfur of several fine hairs per follicle, protected by long guard hairs. It is valued as a beautiful and durable fur and several thousand otters are trapped each year. Where not harassed, otters tame easily. They are abundant even in such busy harbours as Vancouver. *See* FUR TRAPPING.
IAN MCTAGGART-COWAN

Otter, Sir William Dillon, soldier (b at Clinton, Ont 3 Dec 1843; d at Toronto 6 May 1929). A veteran of the battle at Ridgeway in 1866 and a part-time soldier, Otter joined the permanent force in 1883. He commanded the Battleford column in the North-West Campaign of 1885 and was the first commanding officer of the Royal Canadian Regiment of Infantry in 1893. In 1899 Otter was the obvious choice to lead the first Canadian contingent in the SOUTH AFRICAN WAR. His austere professionalism was unpopular with subordinates but contributed to Canadian prestige. In 1908 he was the first Canadian-born chief of the general staff and was inspector general of the Canadian Militia 1910-12, when he retired. He commanded INTERNMENT operations during WWI. Otter was knighted in 1913 and in 1922 became the second Canadian soldier to reach the rank of general. DESMOND MORTON

Reading: Desmond Morton, *Ministers and Generals,* (1970) and *The Canadian General, Sir William Otter* (1974).

Ouellette, Fernand, writer (b at Montréal 1930). He is one of the most active intellectuals of his generation. Cofounder of the journal LIBERTÉ in 1959 and a member of its editorial board, he established with Jean-Guy Pilon the Rencontre québécoise internationale des écrivains. He was a member of the commission of inquiry into the teaching of the arts in Québec 1966-68, and has been writer-in-residence or visiting professor at various universities. In addition, he has produced radio programs on cultural topics for Radio-Canada. He published poetry with Editions de l'hexagone, notably *Ces anges de sang* (1955), *Le Soleil sous la mort* (1965), *Dans le sombre* (1967), *Ici, ailleurs, la lumière* (1977), which were collected with others in *Poésie* (1972) and *En la nuit la mer* (1981). Though metaphysical or mystical, his poetry is profoundly physical, taut, erotic, filled with flashes of insight. His quest for the absolute resembles that of the German Romantics — see *Depuis Novalis: errance et gloses* (1973) — while his rigorous demands are like those of Pierre-Jean Jouve. Also a critic and theorizer of his preferred genres, he is an excellent essayist. Shortly after the declaration of the War Measures Act (*see* OCTOBER CRISIS), Ouellette refused the Gov Gen's Award for *Les Actes retrouvés* (1970) on poetry and poetics, power, violence and tolerance. *Écrire en notre temps* (1979) continues the same aesthetic and ethical themes. A friend of a number of painters, including Chagall, and of composer Edgard Varèse, whose biography he wrote (1966; Eng tr 1968), Ouellette is interested in the art that underlies all art. His *Journal dénoué* (prize of journal *Études françaises*, 1974) is an important intellectual biography. Two novels, *Tu regardais intensément Geneviève* (1978) and *La Mort vive* (1980) were controversial. LAURENT MAILHOT

Ouellette, Gerald, marksman (b at Windsor, Ont 14 Aug 1934; d near Leamington, Ont 25 June 1975). Ouellette was introduced to shooting during his high school cadet training. By 1952 he was a veteran of several teams that competed at Bisley, Eng. He became proficient in the small-bore rifle competition and captured the 1956 Olympic gold medal with a perfect score of 600. In 1959 he was Canadian sporting rifle champion and won a Pan-American Games gold medal. He was on Canada's Olympic team in 1968. He died flying his own aircraft.
J. THOMAS WEST

Ouimet, Gédéon, premier of Québec (b at Ste-Rose, 2 June 1823; d at St-Hilaire-le-Dorset, Qué 23 Apr 1905). Conservative premier for 19 months (Feb 1873 to Sept 1874), he was forced to resign by financial scandals. Also minister of public instruction during his premiership, he was superintendent of education for Québec 1876-95. DANIEL LATOUCHE

Ouimet, Joseph-Alphonse, engineer, CBC president (b at Montréal 12 June 1908). After studying electrical engineering at McGill, Ouimet worked for a firm developing television and built a prototype TV receiver in 1932. He joined the Canadian Radio Broadcasting Commission, later the CBC, in 1934; as chief engineer in 1953 he organized the first Canadian TV broadcasts and film coverage of that year's coronation of Queen Elizabeth. He was appointed CBC general manager that same year and president from 1958. New broadcasting legislation was a contentious political issue from 1963 onward, and Ouimet resigned in 1967, after Secretary of State Judy LAMARSH criticized the CBC's "rotten management." He was chairman of the board of Telesat Canada 1969-80 and was awarded the McNaughton Medal for public service in 1972. DONALD J.C. PHILLIPSON

Ouimet, Léo-Ernest, director, producer, distributor, exhibitor (b at St-Martin, Qué 16 Mar 1877; d at Montréal 2 Mar 1972). On 1 Jan 1906, he opened the first permanent cinema in Montréal, the Ouimetoscope, and a year later opened the first large cinema theatre in N America. Ouimet became one of Canada's first film distributors and to add local flavour to his programs also made shorts, some based on his family (*Mes espérances en 1908,* 1908) and some on current affairs (*L'Affaire de la gare Windsor,* 1909 and *L'Incendie du Herald,* 1910). Clashes with the clergy over Sunday opening of cinemas forced him out of the exhibition business. He produced a feature-length drama, *Le Feu qui brûle* (1918), and organized the British Canadian Pathé News. In Hollywood he produced *Why Get Married* (1924), which virtually marked the end of his career in cinema. PIERRE VÉRONNEAU

Ouimet Canyon, situated in southern Ontario (67 km E of THUNDER BAY) at the end of Black Bay (an arm of Lk SUPERIOR), is the main tourist attraction of the 8 km² Ouimet Canyon Provincial Park. The canyon is 150 m wide, 5 km long and has sheer cliffs varying from 90 to 120 m. The rims are tree lined (cedar, birch, jack pine and spruce), and several unusual plant species are found on the canyon floor (arctic wintergreen, northern liverwort, moss and pussy willows) owing to the persistence of winter ice long into summer. DAVID EVANS

Overlanders of 1862, a group of some 150 settlers who travelled from Ontario to the BC interior, led by brothers Thomas and Robert McMicking of Stamford Township, Welland County, Ont. They went in groups by ship and American railway to Ft Garry [Winnipeg]. Leaving there in early June 1862, equipped with red river carts and a few horses, they reached Ft Edmonton on July 21 and traded their carts for pack horses. With the help of Indian guides they crossed the Rockies. All but 6 survived the perilous descent of the Fraser R by raft to Ft George [Prince George]. Most went on to the Cariboo gold fields, and many, including the McMickings, had successful careers in BC. The only woman Overlander, Catherine O'Hare Shubert, took her 3 children with her and gave birth to her fourth only hours after arriving at Kamloops in Oct. BARRY M. GOUGH

Owen, Donald, filmmaker (b at Toronto 19 Sept 1934). Owen studied anthropology at U of T and joined the NFB in 1960. He made a few short films there before directing *Nobody Waved Goodbye* (1964), a feature film dealing with teenage alienation that delineated many of the themes of Canadian cinema. *The Ernie Game* (1967) took up where *Nobody Waved Good-bye* left off, but its detached hero failed to win audience sympathies. In 1969 Owen left the NFB. His third feature, *Partners* (1976), was not successful, and Owen has since concentrated on commercial TV work. PIERS HANDLING

Owen, Lemuel Cambridge, merchant, politician, premier of PEI (b at Charlottetown 1 Nov 1822; d there 26 Nov 1912). Successful in shipbuilding and trade, Owen, a leading colonial merchant, was postmaster general of the colony from 1860 until elected to the Assembly in 1866. As premier 1873-76, Owen supervised the end of the proprietorial landholding system — the cost of which was borne by the federal government as a result of the 1873 Confederation agreement.
H.T. HOLMAN

Owen Sound, Ont, City, pop 19 883 (1981c), inc 1920, is located on an inlet at the S end of GEORGIAN BAY, at the outlet of the Sydenham and Pottawattomi rivers, 190 km NW of Toronto. A preliminary survey was made of the site in 1837 and the first building was erected in 1840. Originally named Sydenham after Lord SYDENHAM, it was renamed 1857 in honour of Sir Edward Campbell Rich Owen, RN, who had charted the bay in 1815. Its fine harbour became a port of call for the steamers plying Georgian Bay and later a transshipment point and a shipbuilding centre. Now the seat of Grey County, it services a mixed-farming hinterland. Major employers are manufacturers of auto accessories, industrial equipment and the printer Richardson, Bond and Wright. In the winter it is a popular skiing area. The painter Tom THOMSON grew up nearby and is honoured by the Tom Thomson Memorial Gallery. DANIEL FRANCIS

Owl (order Strigiformes) efficient, carnivorous, nocturnal BIRD OF PREY. Owls' eerie hoots and calls at night often make them seem mysterious — even birds of ill-omen. Fifteen of the world's 133 species reside in Canada. In most species, the substantially smaller adult male feeds the female incubating on the nest. Incubation begins as each egg is laid and there is often an interval of 2 or more days between eggs. As it can take food away from younger nestlings, the oldest owlet is well fed even when prey populations are low. With severe famine, the parent owl may feed the smaller owlets to the larger nestmates. Owls are downy at hatching and most species remain in or near the nest until able to fly. No owl builds its own nest. Canada's best-known owl, the great horned (*Bubo virginianus*), usually appropriates the discarded nest of a red-tailed hawk. Great horned owls will also use an artificial platform or even a ledge in a barn. The latter is the usual nesting place of the common barn owl (*Tyto alba*), a species restricted to southern parts of Ontario and BC. The large, reclusive great gray owl (*Strix nebulosa*) of the boreal forest prefers a northern goshawk nest in a tamarack swamp. The crow-sized, long-eared owl (*Asio otus*) takes over nests of the common crow or

black-billed magpie. The short-eared owl (*A. flammeus*), present transcontinentally, and the snowy owl (*Nyctea scandiaca*), restricted in summer to the arctic TUNDRA, both nest on the ground. The burrowing owl (*Athene cunicularia*) of the western provinces occupies badger holes underground. The barred owl (*Strix varia*) of the southern boreal forest fringe prefers a broken-off, balsam poplar trunk and the rare spotted owl (*S. occidentalis*) of southern BC uses a large tree cavity or cliff crevice. Smaller owls, such as the northern saw-whet owl (*Aegolius acadicus*) and eastern and western screech owls (*Otus asio* and *O. kennicottii*) of the deciduous woods of southern Canada, the northern pygmy (*Glaucidium gnoma*) and flammulated owls (*O. flammeolus*) of BC, and the boreal (*Aegolius funereus*) and northern hawk owls (*Surnia ulula*) of the boreal forest, all nest in woodpecker's holes in hollow trees.

Owls are generally beneficial. Great gray, long-eared, short-eared, boreal and saw-whet owls eat substantial numbers of mice. Great horned owl numbers rise and fall with the 10-year cycle of its favourite prey, the snowshoe hare. Great horned owls also take Norway rats, American coots and pocket gophers. Occasionally, a young great horned owl learns about poultry and visits a farmyard nightly. Regurgitated, well-formed pellets or casts, containing undigested bones and fur, show what owls have been eating. Two of Canada's largest owls, the great gray and great horned owls, are year-round residents, as are the barred, hawk, both screech, boreal and northern saw-whet owls, although large numbers of the last migrate through S Ontario. When hares are scarce in Saskatchewan and Alberta, great horned owls often move up to 1500 km SE. The snowy owl, Canada's third-largest owl, visits southern Canada in winter, and some of the northern owls occasionally undergo large, eruptive flights to the S.

C. STUART HOUSTON



Snowy owl (*artwork by John Crosby*).



Fifteen species of owl reside in Canada, including the barn owl shown here (*Tyto alba*), whose usual nesting place is a ledge in a barn (*photo by Stephen J. Krasemann/DRK Photo*).

Oyster, common name for bivalve (hinged shell) MOLLUSCS, including true oysters (order Ostreoida) and tropical pearl oysters (order Pterioida), found chiefly in temperate and warm shallow waters. True oysters have been cultivated for centuries and are much used for food; they are the *huîtres* of French cuisine. Their shells are irregular in outline and fixed to a surface by the left (lower) valve or half-shell. They are divided according to whether young are brooded within the shell, or whether development occurs free in the PLANKTON. Incubatory oysters have no commercial significance in Canada, although a substantial fishery for the Olympic oyster (*Ostrea lurida*) existed on the West Coast until its depletion in 1930. An attempt is being made to introduce the European flat oyster (*O. edulis*) to NS. Nonincubatory oysters (eg, eastern oyster, *Crassostrea virginica*, and Pacific oyster, *C. gigas*) support significant AQUACULTURE operations on both coasts.

FRANK R. BERNARD

Oystercatcher, name given to 10 species of large SHOREBIRDS of the family Haematopodidae. Oystercatchers are either black and white or entirely black. Their orange-red bills are elongated and compressed from side to side, allowing the birds to chisel open clams and other molluscs. Two species occur in N America: American oystercatchers (*Haematopus palliatus*) breed from Long I south to Mexico (occasional visitors to Canada); American black oystercatchers (*H. bachmani*) breed from the Aleutians S to Baja, California, where they hybridize with the American oystercatcher.

A.J. BAKER

Pacey, William Cyril Desmond, professor, literary critic (b at Dunedin, NZ 1 May 1917; d at Fredericton 4 July 1975). Educated at U of T and Cambridge he taught English at U Man (1940-44) before moving to UNB, where he remained. Though an accomplished short-story writer, Pacey was best known as a critic and scholar. He produced an anthology of Canadian stories (1947) and editions of Frederick Philip GROVE's stories (1971) and letters (1976). His criticism ranges from Frances BROOKE to Leonard COHEN, and includes books on Grove (1945) and Ethel Wilson (1968). Pacey's balanced judgements have generally endured and his close studies of individual works have been influential. His finest work is found in *Creative Writing in Canada* (1952) and *Ten Canadian Poets* (1958).

TRACY WARE

Reading: D. Pacey, *Essays in Canadian Criticism* (1969).

Pacific Ballet Theatre, BC's only professional ballet company, employs 10 dancers for a 30-week season, with regular performances in Vancouver and throughout BC. Founded by Morley Wiseman, incorporated (1970) as "Ballet Horizons," it changed to its present name (1972) when Maria Lewis became director. Renald Rabu became resident choreographer (1978), artistic director (1980), and received the Clifford E. Lee Award in Choreography (1980). Repertoire includes 10 ballets by Rabu and works by Fernand NAULT and Margo Sappington.

GRANT STRATE

Pacific Fur Company, est 23 June 1810 and headed by New York fur dealer John Jacob Astor. Principal partners included ex-Nor'Westers Alexander McKay, Donald McKenzie and Duncan McDougall. Astor envisaged a string of fur posts and settlements across the US and planned a fort, Ft Astoria, at the mouth of the Columbia R. On 6 Sept 1810 he sent the TONQUIN from New York to the Columbia (arrived 22 Mar 1811) to inaugurate trade with Indians of the NORTHWEST COAST; in June 1811 she was taken by Indians, probably in Clayoquot Sd (Vancouver I). An overland party did not reach Astoria until Feb 1812. Competing with the NORTH WEST COMPANY and unsure of American support in the WAR OF 1812, the partners decided on 25 June 1813 to sell their supplies to the NWC. In July they dissolved the company and on 16 Oct 1813 sold everything to the Nor'Westers; Astoria was later renamed Ft George. The arrival of HMS RACOON in Nov 1813 and the NWC's ship ISAAC TODD in Apr 1814 speeded the decline of the PFC. Astor subsequently put his energies into the American Fur Co.

BARRY M. GOUGH

Pacific Rim National Park (est 1970) stretches for 105 km along the rugged W coast of VANCOUVER I. It comprises 3 sections: Long Beach, a 10.3 km sweep of surf-pounded sand and rock; the Broken Is Group, including more than 100 islands accessible only by boat; and the West Coast Trail, a 72 km hiking trail between Bamfield and Port Renfrew. Each unit is separate, with its own special character. The PARK is unique in that its boundaries extend offshore to the 10-fathom line to protect the marine environment. Heavy rains and mild temperatures year-round have produced a dense coastal rain forest of Sitka spruce, western hemlock, amabilis fir and western red cedar. The forest, framed to the W by the ocean and to the E by rugged mountains, is home for black bear, black-tailed deer, cougar, marten, otter and squirrel. Offshore the dense forest of giant kelp is home to an amazing variety of fish and invertebrates, eg, giant octopus. Marine mammals include grey and killer whales, harbour porpoises, sea lions and sea otters. The mild climate means year-round camping and hiking. Scuba diving is excellent and the West Coast Trail is a wilderness challenge.

LILLIAN STEWART



Pacific Salmon, 7 species of FISH belonging to genus *Oncorhynchus,* family Salmonidae. Two are native to Japan (*O. masou* and *O. rhodurus*); 5 to Canada, pink (*O. gorbuscha*), chum (*O. keta*), sockeye (*O. nerka*), coho (*O. kisutch*) and chinook (*O. tshawytscha*). The genus name refers to the hooked snout characteristic of most spawning males. The native range of Pacific SALMON includes the north Pacific Ocean, Bering Strait, SW Beaufort Sea and surrounding fresh waters. They occur in an estimated 1300-1500 rivers and streams in BC, notably the SKEENA R and NASS R in the N; the FRASER R in the S accounts for about 75% of the total. They have been introduced successfully to New Zealand, parts of Eurasia, the Great Lakes and S America. Pacific salmon are distinguished from other salmonids by their large number of anal fin rays (13-19). In fall, all Canadian species migrate into rivers and streams to spawn; eggs are buried in gravel. The young emerge in spring and stay in fresh water from 1 week to 3 years. Most then go to sea for 1-5 years, although some species have developed landlocked forms (eg, kokanee, a freshwater sockeye). At sea the species attains the following average adult weights: 1-3 kg, pink; 5-7 kg, chum; 3.5-7 kg, coho; 2-4 kg, sockeye; 6-18 kg, chinook (the largest recorded chinook was 56.8 kg). They return to their native stream to spawn and die. Marine adults have dark blue-black or blue-green backs, some species with black spots, and silver sides and belly. Spawning adults become colourful: golden brown (chinook), spotted brown and green (pink), purple (coho and chum) or bright red with green head (sockeye).

All Canadian species are found up the West Coast into Alaska, with pink and chum found as far N as the Mackenzie R. Pink salmon have been introduced to Lk Superior and are spreading through the Great Lakes. In Canada, chum have not been successfully introduced outside their native range. Coho were planted successfully into Lk Michigan in 1966 and have spread throughout the Great Lakes where they support an important sport fishery. Kokanee has been transplanted widely throughout Canada; populations can be found from BC (native and introduced) to Ontario. Attempts to establish chinook outside their range have been made more frequently than for any other species, but success is still questionable. Coho and chinook dominate the BC coastal sport fishery and are fished commercially by hook and line, and, to a lesser extent, by gill and seine nets. Sockeye, pink and chum are harvested primarily by commercial net fishermen. An average of approximately 23.5 million salmon, weighing 70.3 million kg are harvested annually in BC.

E.D. LANE



J.W. Bengough cartoon deploring the political morality during the Pacific Scandal (*courtesy Public Archives of Canada/C-78604*).

Pacific Scandal, the result of solicitation by PM John A. MACDONALD, George-Étienne CARTIER and Hector LANGEVIN of some $360 000 in campaign funds for the Aug 1872 general election, from promoters including Sir Hugh ALLAN. Macdonald and his Conservative colleagues needed money to fight the elections in Ontario and Québec, where a number of seats were in jeopardy. Notwithstanding his bribery of electors, Macdonald did badly, his 1867 majority being substantially reduced. After the election Allan was rewarded with the contract to build the Pacific railway, on the assumption that he would divest himself of American control on his board of directors. Since Allan, unknown to Macdonald, had used American money to bribe the government, this proved difficult, and finally produced blackmail. The Liberals broke the scandal on 2 Apr 1873; a spate of damaging letters and telegrams appeared in Liberal newspapers in July. The government was stunned. It managed to weather a royal commission struck on Aug 14, but it could not survive Parliament. The Commons met on Oct 23; with the threat of new PEI votes against it, and its supporters in disarray, the Macdonald government was obliged to resign. Allan's company never did get started, and a new agreement had to wait until 1880.

P.B. WAITE

Pacific Western Airlines Ltd, with headquarters in Calgary, is Canada's largest regional air carrier. The company began in 1946 as Central British Columbia Airways Limited and grew by purchasing other airlines, including Kamloops Air Services (1950) and Skeena Air Transport (1951). In 1953 it became Pacific Western Airlines Ltd. It now provides passenger, mail and cargo services in western Canada, the NWT and the Yukon and to Toronto and Seattle, Wash. Charter flights to the US, the Caribbean and Mexico are offered. Current subsidiaries include Pacific Western (Alberta) Ltd, Midwest Airlines Ltd, Pacific Western Airlines Leasing Ltd and Pacific Western Holidays Ltd. In 1983 PWA had sales or operating revenue of $328 million, assets of $546 million and 3000 employees. The Alberta government owned 99.5% of the company from 1974 until Dec 1983, when all but 14.9% of the shares were sold to the public.

DEBORAH C. SAWYER

Pacifism, an outlook based upon religious or humanitarian belief that condemns war and social violence as inhuman and irrational, if not absolutely and always morally wrong, and therefore demands personal nonparticipation in war or violent revolution as well as a commit-

ment to nonviolent methods of resolving conflicts.

In Canada pacifism is rooted in 2 traditions. One is sectarian pacifism, the historic non-resistance of pacifist religious sects that have tried to remain separate from the mainstream of Canadian society. By the beginning of the 20th century the QUAKERS, MENNONITES, HUTTERITES and DOUKHOBORS had been guaranteed the right to live according to their pacifist beliefs. They received specific exemptions from military obligations, and thus their immunity became entrenched in Canadian law and custom. Sectarian pacifists have provided the largest and most consistent pacifist witness, particularly as conscientious objectors during both world wars.

The second tradition, which attracted popular support, is the liberal Protestant and humanitarian reform tradition, based upon the pacifist teachings of Jesus and belief in the irrationality of war and the brotherhood of man. The various expressions of liberal pacifism in Canada began with the progressive peace movement at the turn of the century, which emphasized international arbitration and conciliation as the best way to achieve world order. Nearly all political, church, farm, labour and women's groups had endorsed that principle before the outbreak of WWI. During the war, however, the liberal peace movement disintegrated, leaving only a few committed pacifists such as J.S. WOODSWORTH and William Ivens, renegade Methodist ministers who openly broke with their church in opposition to CONSCRIPTION. (Most anticonscription sentiment, particularly in Québec, was not based upon pacifist belief.)

The postwar resurgence of liberal pacifism was fueled by both disillusionment with war and support for the LEAGUE OF NATIONS and DISARMAMENT. While Woodsworth and Agnes MACPHAIL pressed the peace issue in Parliament, and the WOMEN'S INTERNATIONAL LEAGUE FOR PEACE AND FREEDOM led a campaign to abolish cadet training and militarism in schools, an interwar PEACE MOVEMENT gained momentum. By the early 1930s it had expanded into a broad front representing various religious and political persuasions, but united by the Depression in the quest for socioeconomic justice as well as peace. Under Woodsworth's leadership, the CO-OPERATIVE COMMONWEALTH FEDERATION became the major political expression of this pacifist-socialist alignment. At mid-decade, however, social radicals began to abandon pacifism for the fight against fascism in Spain, and by WWII even the CCF altered its traditional neutralist foreign policy, leaving only Woodsworth in Parliament to voice the pacifist position. The movement narrowed to a few Christian pacifists, primarily United Church ministers in the Fellowship of Reconciliation, who publicly reaffirmed their pacifism in the controversial "Witness Against War" manifesto and were repudiated by their own church leaders. Although sectarian pacifists had remained aloof from the interwar peace movement, they co-operated with liberal pacifists during the war in an effort to ensure the exemption of conscientious objectors from military service.

The dawn of the atomic age increased the urgency and popular appeal of pacifism, and the ranks of the postwar peace movement swelled. Since the new "nuclear pacifists" believed it was nuclear weapons that made war unthinkable, they emphasized nuclear disarmament and the easing of tensions between the USSR and the West. The new movement was initially dominated by the leftist Canadian Peace Congress under the leadership of James ENDICOTT, but in the early 1960s the Canadian Campaign for Nuclear Disarmament and the VOICE OF WOMEN generated wider public support. In the 1980s such organizations as the Physicians for Social Responsibility, Project Ploughshares and Operation Dismantle further broadened the base of the peace movement in Canada. Both sectarian and liberal pacifists were swept up in the antinuclear campaign, which remains the focus of pacifists and other peace activists in Canada.

THOMAS P. SOCKNAT



Demonstrators protesting Duplessis's Padlock Act, Montréal, Jan 1939 (*courtesy Public Archives of Canada/PA-129184/Montreal Gazette*).

Padlock Act (Act Respecting Communistic Propaganda), a 1937 Quebec statute empowering the attorney general to close, for one year, any building used for propagating "communism or bolshevism." Anyone convicted of printing or publishing matter propagating communism or bolshevism could be imprisoned for up to a year, without appeal. Under the Act, police raided numerous offices and meetings and harassed suspected communists. Although many English Canadians and the CO-OPERATIVE COMMONWEALTH FEDERATION argued that the Act threatened civil liberties, it was supported by the Quebec electorate. In 1957 the Supreme Court of Canada declared the Act unconstitutional, an invasion of the federal field of criminal law.

EUGENE A. FORSEY

Page, John Percy, educator, basketball coach, politician, lieutenant-governor (b to Canadian parents at Rochester, NY 14 May 1887; d at Edmonton, Alta 2 Mar 1973). He coached the EDMONTON GRADS, the best and most respected women's basketball team in the world, throughout their 25-year history (1915-40). Page was the most important factor in their success, using simple well-executed plays and demanding disciplined behaviour. His feeder-team system maintained the supply of talented players. When the Grads and Page retired from basketball in 1940, he entered provincial politics. He was lieutenant-governor of Alberta 1959-65.

CATHY MACDONALD

Page, Patricia Kathleen, writer, painter (b at Swanage, Dorset, Eng 23 Nov 1916). P.K. Page was raised and educated in Calgary. She studied art in Brazil and NY. When she moved to Montréal in the early 1940s she began to write poetry, being first published in *Unit of Five* (1942), ed by Ronald Hambleton. She was part of the group that founded *Preview* (1942-45). From 1953 to 1964 Page lived with her ambassador husband, W.A. Irwin, in Australia, Brazil and Mexico. She has written 7 books, including *The Sun and the Moon* (novel, 1944); *As Ten as Twenty* (poems, 1946); *The Metal and the Flower* (poems, 1954, Gov Gen's Award); *The Sun and the Moon and Other Fictions* (1973); and *Evening Dance of the Grey Flies* (poems and short story, 1981). As a painter Page has had many one-woman shows in Canada and Mexico.

JEAN WILSON

Paige, Brydon, professional name of Brydone James Duncan, dancer, teacher, choreographer, ballet director (b at Vancouver 13 Jan 1933). As artistic director since 1976 of the Alberta Ballet, Paige has significantly raised the profile and quality of BALLET in western Canada. He was a founding member of Les Ballets Chiriaeff and remained with the company as it evolved into LES GRANDS BALLETS CANADIENS, becoming resident choreographer and ballet master. The creator of many ballets, Paige has also been artistic director of the National Ballet of Guatemala and briefly, of the National Ballet of Portugal, as well as assistant head of the Banff Centre's summer dance program.

MICHAEL CRABB

Paintbrush, herbaceous PLANT of genus *Castilleja,* figwort family, Scrophulariaceae. Most are perennial. Common name, Indian paintbrush, is applied to several species. About 200 species occur worldwide, mostly in western N America; 23 in Canada (one an annual). In Canada paintbrushes are most common in southern BC and Alberta, decreasing eastward to Ontario. One species is found from the YT and Mackenzie Dist to the Atlantic provinces (excluding NS and PEI). Paintbrushes grow on dry or wet soils, from low grassland to alpine meadows, usually in open areas, but also in thickets and forest openings. Stems are clustered and erect, arising from a curved base. Tiny, tubular, usually greenish flowers occur in a terminal spike, and each is concealed by an enfolding, modified, floral leaf (bract). Bracts (red through orange, yellow and purple to greenish white) form the showy, terminal "brush." Flowers and bracts appear June-Aug. The fruits are cylindrical capsules containing many seeds. Few species are botanically well defined, and most are not readily distinguishable because of hybridization. Paintbrushes are somewhat parasitic on roots of other plants and cannot be transplanted from the wild.

Painters Eleven dates from 1953 when a group of artists — Jack BUSH, Oscar CAHÉN, Hortense Gordon, Thomas Hodgson, Alexandra Luke, J.W.G. MACDONALD, Ray Mead, Kazuo NAKAMURA, William RONALD, Harold TOWN and Walter Yarwood — banded together with the purpose of exhibiting abstract art in Toronto. Although by the late 1940s the automatistes in Montréal and the abstract expressionists in New York had developed a new artistic vocabulary, Toronto in 1950 was still dominated by the GROUP OF SEVEN. The first public exhibition of abstract artists in Ontario was organized by Luke in 1952 and included 9 of the future members of Painters Eleven.

The group came together in the fall of 1953 as a result of the "Abstracts at Home" exhibition organized by Ronald at the Robert SIMPSON department store. Assembling for publicity photographs, the 7 artists represented decided to meet again at Luke's studio to discuss their common interests in abstraction. With the addition of 4 more artists to the group, Town proposed the name Painters Eleven. Bush undertook to approach his dealer about an exhibition, and the members agreed to finance group exhibitions. In Feb 1954 the first exhibition of Painters Eleven opened at the Roberts Gallery, drawing large crowds but no sales. Annual exhibitions were held at the Roberts Gallery in 1955 and 1956 and the Park Gallery in 1957 and 1958. A high point came in 1956, when Painters Eleven gained international recognition as guest exhibitors with the American Abstract Artists in New York. Exhibitions organized by regional galleries and the National Gallery of Canada circulated through Canada, 1957-61.

Painters Eleven held no single vision of the nature of abstraction. Although Macdonald had explored abstraction as early as 1934, the majority of the group (many a generation younger) became aware of it more than 10 years later, some of them through his teaching. Their sources were varied: Mead trained in England, Cahén in Europe, and Luke, Gordon, Macdonald and Ronald travelled to the US to study with Hans Hofmann. Though the New York school provided an important example for the

group, they developed their own personal painterly vocabulary and expressive forms. Initially critical response in Toronto ranged from bewilderment to hostility, but gradually, reviews became more favourable. Robert FULFORD gave important press support and international critics such as Sir Herbert Read (Britain) and Clement Greenberg (US) praised their work. The 1958 Park Gallery exhibition was the last annual group show: Cahén died tragically in 1956; in 1957 Mead moved to Montréal and Ronald resigned from the group. In 1960 Painters Eleven voted to disband. Their goals had been achieved, commercial and public galleries exhibited their work, and they had become recognized leaders in the local art scene. The National Gallery, the AGO and the Robert McLaughlin Gallery, Oshawa, hold important collections of their work. *See also* PAINTING. JOYCE ZEMANS

Reading: D. Burnett and M. Schiff, *Contemporary Canadian Art* (1983); J. Russell Harper, *Painting in Canada* (1977); J. Murray, *Painters Eleven Retrospect* (1979); D. Reid, *A Concise History of Canadian Painting* (1973).

Painting The first references to Canadian subjects appeared in the decorated margins and vignettes of maps ("Mappemonde" by Pierre Desceliers) and atlases (Vallard's "Atlas," Guillaume Le Testu's "Atlas") in the mid-16th century. Made in Europe by artists who had never seen Canada but who based their pictorial work on travellers' accounts, these illustrations of the fauna, flora and human population of the newly discovered lands reflected their creators' prejudices as much as they did facts; in 1550 Desceliers placed pygmies near Hochelaga! Indian canoes, however, were frequently portrayed accurately. Later travel chronicles continued the same ambivalence. The map of Hochelaga in *Delle navigationi et viaggi* (1550-59) of Giovanni Battista Ramusio looked more like a utopian Renaissance city than an Iroquois village, whereas the illustrations in Champlain's accounts were reasonably accurate, such as a Huron woman grinding corn in a mortar, or a Huron hunting scene. The most remarkable document of this type is the *Histoire naturelle des Indes occidentales* (*c*1685) by the Jesuit Louis Nicolas. His manuscript was illustrated by pen-and-ink drawings (the *Codex canadensis*) of the vegetation, animals and people of the New World. Certainly his versions of the fauna were inspired by the engravings in the *Historia animalium* of the great Swiss biologist Konrad Gesner and his portraits of Indians by some poor illustrations in *Historiae canadensis, seu Novae Franciae*. . . by François du Creux. But the abundance of detail, the representation of the flora, and the naïve nature of the drawings combined to make this an important work. The engravings in *Moeurs des sauvages amériquains comparées aux moeurs des premiers temps* (1724) by Joseph-François LAFITAU, although they drew heavily on the works of Théodore de Bry, also showed the extensive ethnographic knowledge of this Jesuit. The *Histoire . . . de la Nouvelle France . . .* (1744) by Pierre-François-Xavier de CHARLEVOIX included several plates devoted to flora.

While these first images of Canada were appearing in Europe, the 17th-century French colonists in New France were importing paintings and engravings from France. Catholic missionaries used engravings and paintings to convert Indians and remind the settlers of their faith, as is suggested in the large painting *La France apportant la foi aux Indiens de la Nouvelle-France* (post-1666, Ursuline Convent, Québec), in which France is personified by Anne of Austria, teaching an Indian kneeling before her. We know that some priests (Jean Pierron and Claude CHAUCHETIÈRE) were painters themselves, but their work has been lost, except possibly for the portrait of Kateri TEKAKWITHA (*c*1681) attributed to the latter.



Frère Luc, *Assumption of the Virgin* (1671) located in the Hôtel-Dieu (city hospital) Chapel, Québec City (*photo by John deVisser*).

For the late 17th-century Jesuits, the engraving by Grégoire Huret of 1664, the *Martyre des pères jésuites*. . . was important enough to have a copy painted in France. Painted or engraved portraits of the Sun King (Louis XIV) made in the mother country were seen in New France; one such portrait certainly existed in the Château St Louis, the governor's residence in Québec. Even Frère LUC, who spent 16 months in New France, must be considered an uncommitted transient even though he left behind a fair-sized body of church paintings (*L'Assomption*, 1671, for the Hôpital-Général, Québec) and a *Portrait de Monseigneur. . . Laval* (1671-72). It is less certain whether paintings hung in the more modest homes; however, inventories recorded by notaries of the French regime for estate purposes included paintings and engravings which had probably been imported.

Few paintings were commissioned in the colony itself. Under the mercantile system it was more profitable to sell paintings to the colony than to support local talent (*see* MERCANTILISM). Consequently, the painter as a full-time professional was as yet rare; there were some clerics such as Hugues POMMIER and Jean GUYON; amateurs like Michel DESSAILLIANT, dit Richeterre, and Jean Berger; it is debatable whether they produced all the works attributed to them. It is just as unclear who created the ex-votos (*see* VOTIVE PAINTING) during the French regime now preserved in Ste-Anne-de-Beaupré, Qué. As was customary at the time, sombre, bold and highly simplified posthumous portraits, such as that of *Marguerite Bourgeoys* (1700) by Pierre LE BER, were occasionally painted, but few lifetime representations of the great men of New France were made in Canada. Portrait illustrations in books of Canadian history were, for the most part, mid-19th-century imagination.

The British Conquest (1760) introduced new approaches to subject matter and style. Whereas during the French regime views of Canada continued to be fantasy rather than reality, the early TOPOGRAPHIC PAINTINGS were precise, small in format and often colourful. This new group of artists were members of the British army; they were taught at the Royal Military Academy of Woolwich to make not only strategic maps but also agreeable scenes of the environment with which they came into contact. As products of the Age of Enlightenment they looked for the "picturesque and sublime" in nature, the exotic and awe inspiring; majestic mountains and dramatic waterfalls were among their favourite subjects. The scenes were painted on the spot in watercolour and then often engraved in London — as in works by Richard Short, George HERIOT and Capt Hervey Smyth. One of the earliest and most interesting of these topographic artists was Thomas Davies, who was posted to the garrisons in Halifax, Montréal and Québec between 1757 and 1790, leaving a fine series of views, some of which were later reproduced in a travel book.

The period of stability, prosperity and expansion that followed the Conquest and the American Revolution was marked by a general desire to recreate European culture in Canada and emulate European taste. In the towns a variety of societies and clubs were founded (*see* ARTISTS' ORGANIZATIONS) where art and painting became the occasional focus of attention. French and English theatre flourished and some painters provided stage decorations. A moneyed middle class took over from the church as patron of the arts. A demand for portraits increased; the sitters were no longer only the clergy or government officials, but wealthy merchants and their families as well. Some painters were now able to make a reasonable living as portraitists and decorators. The retired French soldier, Louis Dulongpré, is supposed to have painted more than 3000 portraits between 1785 and 1815. Canadian-born artists such as François Beaucourt and François BAILLAIRGÉ studied in France and returned to Canada with a new stylistic assurance, while a few European artists came to Can-

Thomas Davies, *Otter Creek Falls, Lake Champlain* (*c*1759), watercolour (*courtesy Royal Ontario Museum*).



ada who had learned their trade well. William BERCZY had worked in Europe as a painter and architect and had exhibited with the Royal Academy in London. Soon after his arrival in York in 1794 he painted Joseph BRANT, Loyalist chief of the Mohawks, and in 1808 was commissioned to paint *The Woolsey Family* in Québec City, one of the masterpieces of Canadian art. That same year Robert Field arrived in Halifax where, for the next 8 years, he painted fine portraits of NS society. In contrast to the towns, rural Québec continued to be dominated by tradition, the church remained at the centre of life, and FOLK ART flourished. *Saint Louis tenant la couronne d'épines* (1777), which Jean-Antoine AIDE-CRÉQUY painted for the church of St-Louis on the Île aux COUDRES (in which the patron saint of the parish bears the features of Louis XVI), symbolized the attachment these French Canadians, turned British subjects, still felt for the French Crown.

As a result of the turmoil following the French Revolution, the Abbé Louis-Joseph Desjardins was able to bring to Québec some 200 European paintings from 1816 onwards. Some of these paintings were used to embellish churches in Lower Canada, the remainder were bought by Joseph LÉGARÉ, who then established the first museum open to the public in Canada. Although minor works for the most part, the Desjardins shipments introduced into Lower Canada a new range of subject matter: still lifes, historical subjects, and different approaches to landscape that had not been considered before by Québec painters.

Légaré's own paintings suggest that he was sensitive to stylistic peculiarities in his collection, which led to his greater technical freedom. As well, Légaré collected engravings which must have influenced him and his friends. He was also an art teacher, though his pupils are best remembered as portraitists, such as Antoine PLAMONDON, who studied in Paris after his apprenticeship with Légaré and was famous as a church painter (he decorated his parish church in Neuville). In 1841 Plamondon painted a series of young nuns of the Hôpital-Général, all daughters of prominent Québec merchants. Whereas Légaré's style did occasionally show boldness, Plamondon's was controlled, almost formal. Théophile HAMEL apprenticed to Plamondon, studied in Europe, and on his return to Québec became a most successful portrait painter for the next 20 years. It was often necessary for him to travel in order to receive commissions; these trips took him to Montréal, Kingston and Toronto. Meanwhile, Toronto had welcomed its own able portraitist in 1844; George Theodore BERTHON, a French-trained artist, settled in the city after a sojourn in England.

FRANÇOIS-MARC GAGNON



Antoine Plamondon, *La Chasse aux tourtes* (1853), oil on canvas (*courtesy Art Gallery of Ontario/gift from The Albert H. Robson Memorial Subscription Fund, 1943*).



Cornelius Krieghoff, *Winter Landscape, Laval* (nd), oil on canvas (*courtesy National Gallery of Canada*).

1840 to 1940

Before the 1840s painting in Canada was dominated by European taste and conventions. There was no dramatic change after that date, but increasingly Canadian content came to have a major influence on the form art took in the country. The most popular and prolific of the romantic painters of the Canadian scene was Cornelius KRIEGHOFF who, after 1841, recorded a variety of local scenes along the St Lawrence — some humorous, some anecdotal. Krieghoff had seen genre painting at Düsseldorf Academy and his naturally ebullient temperament transformed his snapshots of everyday life into subjects of immense popular appeal. He had a lifelong interest in Indians and, as his wife was of French birth, he knew the habitant life-style intimately. It is interesting that Krieghoff's support came from English-speaking patrons in the Canadas, for the French bourgeoisie found his work a vulgar caricature of habitant life and an insult to their cultured life-style.

Parallel to Krieghoff's fascination with the everyday life he observed in Québec was a growing preoccupation with the western frontier. Swiss-born Peter RINDISBACHER immigrated to the RED RIVER COLONY in 1821 as a boy of 15. He was so excited by the way of life in Ft Garry that he painted a remarkable series of watercolours of the local scene, of Indians in strange dress and buffalo on the prairies in winter. Two decades later Paul KANE made himself famous by painting this same western scenery and its native people. He had been a minor Ontario portrait painter who aspired to artistic greatness and studied in Europe. Inspired by George Catlin's American Indian portraits then displayed in London, Kane conceived a similar project of picturing Canadian natives. During a celebrated wilderness trip with fur traders from Ontario to Ft Vancouver, 1846-48, he sketched the landscape and tribes he encountered. Subsequently, he painted 100 canvases based on these sketches and published an account of his travels. Kane inspired other artists. In 1872 Frederick VERNER made a similar sketching trip to picture Indians and buffalo. William G.R. HIND spent a season as an expedition artist with his scientist brother, Henry, in exploring Labrador, then joined the 1862 OVERLANDERS, gold-seeking adventurers who travelled by land to the newly discovered BC goldfields.

Prior to Confederation, the documentary tradition had dominated Canadian painting, whether recording the frontier, high society in the garrison towns, or the scenic wonders of a new land. The remaining years of the 19th century were filled with growth and optimism, and saw industrialization, the Riel rebellions and western expansion. Yet little of this development was recorded by contemporary artists. As PHOTOGRAPHY took over the role of documenting society, Victorian artists escaped to an ideal world of the rural landscape. They established professional art societies, where they could exhibit, promote and sell their works, mostly in Montréal and Toronto (*see* ARTISTS' ORGANIZATIONS).

Several talented artists worked in the studios of William NOTMAN, a Montréal photographer who had achieved an international reputation for his portrait photographs by the 1860s, then went on to greater heights with landscape and genre subjects. The company had its own exhibiting space and art collection, and it rapidly became the leading, if unofficial, art school in the country. There was a camaraderie among the staff as they painted in their spare time and made sketching trips to the lakes and hills of the Eastern Townships and beyond. John FRASER, an acknowledged leader, opened a branch in Toronto and was instrumental in organizing the Ontario Society of Artists, providing space in the Notman studio for the society's first annual exhibition in 1873. Associated with him were his brother-in-law, Henry Sandham, who later opened a Notman studio in Saint John, Paris-trained Allan EDSON, and Otto Jacobi, who had enjoyed an earlier career in Germany.

The search for the Canadian landscape by Notman photographers and artists was intimately connected with the railway expansion which was opening up the new Dominion. Painters had travelled from Montréal by train in the earlier years to sketch through Québec and the Matapedia Valley. Now they broadened their vision as the transcontinental line of the Canadian Pacific edged its way across the Prairies and through the Rockies. Sir William VAN HORNE, president of the railway and himself an art collector, gave artists free passes to produce



John A. Fraser, *Laurentian Splendour* (1880), oil on canvas (*courtesy National Gallery of Canada*).

promotional pictures for the CPR. Notman sent a camera crew with the work trains to detail progress through the mountains. Fraser and other artists associated with Notman went to the West to make an oil and watercolour record of the magnificent scenery. Their paintings of the West, technically brilliant and marked by photographic realism, dominated many art exhibitions until the end of the century.

Canadian art achieved new prestige with the founding of the Royal Canadian Academy in 1880, primarily through the efforts of Governor General the marquis of LORNE and his wife Princess Louise. Lucius O'BRIEN, first president of the RCA, was swept up in this new search for the face of Canada. He visited NS and NB, then, as the railway reached the Pacific, he travelled west to paint the mountains and the Vancouver area. Some of his finest paintings, such as his majestic views of Québec or *Sunrise on the Saguenay*, introduced a glowing quality which incorporated the luminism found in contemporary American painting of the Hudson River School.

During the 1880s and 1890s Europe once again became the model for artists in Canada, and painters aspired to study in Paris academies and exhibit at the Salon. It was the conservative French and English masters, not the avant-garde, who attracted the young Canadians, men who painted heroic images in a highly finished naturalistic style. William BRYMNER and Robert HARRIS followed this path and on their return taught "in the French manner" in Montréal and Toronto. In 1883 Harris was commissioned by the federal government to paint *The Fathers of Confederation*. Paul PEEL was acclaimed in Paris and at home for his studies of bathers and children, but demonstrated little Canadianism. George REID used the same monumental figure tradition in his scenes of rural Ontario, such as *Mortgaging the Homestead*.

Two young painters who derived their inspiration from their rural Canadian surroundings and who visited Europe only after they were established were Homer WATSON and Ozias LEDUC. Watson early became a celebrity when *The Pioneer Mill* was purchased for Queen Victoria's royal collection. Leduc lived in virtual seclusion in St Hilaire, Qué, supporting himself from church decoration while painting still lifes and people and landscape close to him for his own satisfaction. Meanwhile in Paris the slick, narrative style of the Salon was increasingly attacked by innovative painters of the impressionist, Barbizon and Hague schools. Horatio WALKER was influenced by this naturalistic depiction of nature and, on his return to Canada, his paintings of rural scenes on Ile d'ORLÉANS rapidly brought him acclaim in N America. In 1910 the National Gallery paid $10 000 for *Oxen Drinking*.

Maurice CULLEN and James Wilson MORRICE were among the first artists to apply the principles of French impressionism to the Canadian landscape. Cullen attracted attention in Paris before returning to spend his mature years in Québec. Criticism was harsh and sales were poor, but he exerted a tremendous influence through his teaching at the Art Assn of Montréal. Morrice, independently wealthy, lived much of his life in Paris, travelled widely, befriended Henri Matisse and was influenced by James Whistler. Through annual exhibitions with the Canadian Art Club in Toronto, 1907-15, Cullen, Morrice and Marc-Aurèle de Foy SUZOR-CÔTÉ served as models for young artists.

The face of Canadian painting changed completely when a new landscape movement emerged in Toronto in the years immediately preceding WWI. Tom THOMSON died in 1917, but the remaining painters — Frank CARMICHAEL, Lawren HARRIS, A.Y. JACKSON, Frank JOHNSTON, Arthur LISMER, J.E.H. MACDONALD and F.H. VARLEY — organized the first exhibition of the GROUP OF SEVEN in 1920. "Group" subject matter and style dominated Canadian art for the next 30 years. It was bold, imaginative painting employing strident colouring and tending to post-impressionist mannerisms. It was also an art movement which aroused bitter controversy and patriotic fervour, which caught the public interest and allowed little room for serious development of divergent art styles. The group disbanded in 1933 to make way for the broader-based Canadian Group of Painters, which included artists from across the country and encouraged figure painting and modernism as well as the landscape.

Two artists working at the same time as the Group of Seven but disregarded until the late 1930s were Emily CARR and David MILNE. They worked in semi-isolation, devoted to the area in which they had grown up and pursuing their own personal vision while struggling with financial privation and lack of recognition. Carr had visited England and France and was moved by the Fauves' vigorous strokes and strident colour. On her return she painted the dense Pacific forests, Indian villages and totems with an exultant celebration of nature and its mysteries. In contrast to Carr, who began painting with renewed vigour after her meeting with the Seven, Milne had none of the national consciousness of the group but was concerned with individual aesthetic expression and painterly problems. He studied in New York and was represented at the famous Armory Show of 1913 which introduced modernism to America. Thereafter, in the Catskills and at various secluded rural locations in southern Ontario, he experimented with evocative shapes, tonal contrasts and unique picture planes, simplifying his technique to the bare minimum.

The Great Depression, combined with the continued hold of the Group on Canadian art, meant that many excellent painters were virtu-



Tom Thomson's *The Drive* (1916-17), oil on canvas, is typical of the bold, imaginative landscape painting that dominated Canadian art after his death in 1917 (*courtesy Macdonald Stewart Art Centre/University of Guelph*).



Frederick Horsman Varley, *Gipsy Head* (1919), oil on canvas (*courtesy National Gallery of Canada/gift of the Hon Norman Paterson, 1947*).



David Milne, *Blue Church* (1926), oil on canvas and masonite (*courtesy The McMichael Canadian Coll/Anonymous donor*).

ally ignored. Opportunities for exhibition were dominated by the academies and societies; collecting of new art was negligible; and institutional and public awareness was resistant or indifferent to change. Lionel LeMoine FITZGERALD painted canvases of intimacy and gentleness centered on his surroundings in Winnipeg, but Charles COMFORT's *Young Canadian*, a haunting portrait of his friend Carl SCHAEFER, best symbolized the era. In Feb 1927 an exhibition of paintings by Bertram BROOKER was held at the Arts and Letters Club in Toronto, the first exhibition of abstract art in Canada. Later that year Lawren Harris helped organize a show of abstract European art at the Art Gallery of Toronto, but it was ridiculed by critics and contemporary artists alike. Developments in Canadian painting would have to await prosperity, another world war, and a new generation of artists working in Québec.

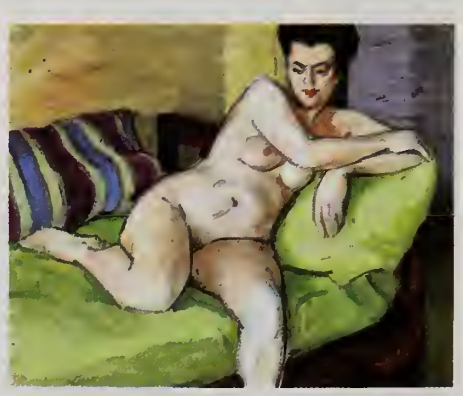
J. RUSSELL HARPER

1940 to the Present

The years since WWII have witnessed an unprecedented expansion in the visual arts throughout Canada, evidenced in the number of professional artists, the proliferation of galleries and exhibitions, and the development of art magazines. The CANADA COUNCIL and the provincial art councils have played crucial roles in this development, as have the expansion of museums, art galleries, alternate and artist-run spaces, and the growth of art departments in colleges and universities. In describing the character of recent painting in Canada it is essential to bear in mind 3 factors: the strength of regional identities, the increased knowledge of developments across the country and internationally, and the differing sizes of the artistic communities. These factors have combined and recombined in complex ways, producing a dynamic which has discouraged the uniformity of "a Canadian painting" and encouraged the strength of painting in Canada.

The breakthrough to modern movements came in Montréal in the 1940s through efforts initiated by artists themselves. The 3 leading figures, John LYMAN, Alfred PELLAN and especially Paul-Emile BORDUAS, had different, often conflicting views from which came an energy in ideas and a dynamic of change. Lyman returned to Montréal in 1931 after almost 24 years abroad, mostly in France. Besides the example of his own work and his advocacy of modern European art, he wrote criticism for the *Montrealer* (1936-40) and initiated the founding of the CONTEMPORARY ARTS SOCIETY in 1939. The society, open to artists who were not members of the Royal Canadian Academy, organized annual exhibitions during its 9-year existence and introduced European modernism to Canada. The founding membership comprised 26 artists, including Prudence HEWARD, Fritz BRANDTNER, Goodridge ROBERTS, Louis MUHLSTOCK, Marian SCOTT and Philip SURREY. Borduas was among only 5 French Canadian members.

A more radical source of inspiration came from Pellan, who returned to Canada in 1940 after 14 years in Paris. An artist of sparkling eclectic talent, his interpretations of cubism and surrealism were a revelation to artists in Montréal. Borduas, initially struck by Pellan's work, determined a still more radical approach related to the ideas of André Breton, the founder of surrealism. Borduas was set not simply on an imitation of French art but an original expression of spiritual revolution. He became the centre of a group of young men and women, including Fernand LEDUC, Pierre GAUVREAU, Jean-Paul RIOPELLE, Marcel BARBEAU, Françoise Sullivan and Jean-Paul MOUSSEAU. A clearly defined group by the mid-1940s, they gained the name AUTOMATISTES from an exhibition in 1947. Direct connections with French surrealism were maintained through Riopelle, the most prodigious of the young painters, who moved to Paris in 1946, and Leduc, who lived there from 1947 to 1953. The climax of the Automatiste action came with the collective signing of Borduas's 1948 manifesto, REFUS GLOBAL. Advocating personal freedom in cultural and spiritual expression, the pamphlet attacked the repressions of the government and the dominant place of the church in Québec culture and education. The document caused an uproar and led to Borduas losing his teaching post at the École du Meuble. After 5 years of personal and professional hardship, Borduas left Canada. He went to New York (1953-55), coming into contact with the work of the abstract expressionists, and then to Paris



John Lyman, *Rose* (*c*1947), oil on canvas. Lyman's works reflect advanced formal concerns and a personal vision (*courtesy Montreal Museum of Fine Arts*).



Fernand Leduc, *Fanfare* (1954), oil on wood (*courtesy Montreal Museum of Fine Arts*).

(1955-60). Both in his painting and his advocacy of cultural change, Borduas represents one of the major achievements in Canadian art.

The Automatistes split the Contemporary Arts Society. The older members could not follow their direction and Pellan led a short-lived "anti-automatiste" group, Prisme d'yeux (1948-50), with Léon Bellefleur, Jacques de TONNANCOUR and Albert DUMOUCHEL. The Automatiste movement gave way in the mid-1950s to a rigorous form of hard-edge abstraction first marked in the work of Leduc and the PLASTICIENS, a group that was formed in 1954 by the critic Rodolphe de Repentigny (who painted under the pseudonym Jauran) and 3 other painters. This group, influenced by the ideas and work of Malevich and Mondrian, was soon absorbed into the Non-Figurative Artists' Assn of Montréal, which was formed in 1956 with Leduc as president, Repentigny as secretary and Guido MOLINARI as treasurer, and which included artists such as Rita LETENDRE and Jean MCEWEN. The direction somewhat hesitantly begun by the Plasticiens was rapidly developed by Leduc, Molinari and Claude TOUSIGNANT. Leduc returned to France in 1959, and it was the work of Molinari and Tousignant, in particular, rigorously hard-edged and abstract and developed on the dynamics of colour, that led Montréal painting in the 1960s. But their concerns were not exclusive, as is evidenced by the work of Yves GAUCHER, first as a printmaker and from the mid-1960s as a painter, and Charles GAGNON, whose work has been in painting, assemblages and photography.

Toronto, in the 1940s, lacked the atmosphere of radical debate found in Montréal. There were only a few artists, such as Paraskeva CLARK, Robert "Scottie" Wilson, Albert FRANCK and Jock MacDonald (a major figure as both painter and teacher), who worked against the dominance of the Group of Seven, their followers in the Canadian Group of Painters and continued academicism. Others, such as Jack BUSH, and younger artists such as Oscar CAHÉN, Walter Yarwood, Harold TOWN and William RONALD, were by the end of the 1940s actively developing more radical solutions, looking to European and, in particular, New York painting. Alexandra Luke organized the touring Canadian Abstract Exhibition in 1952 and in 1953 Ronald initiated an exhibition at Simpsons department store called

Abstracts at Home, including his work and that of 6 other artists, Kazuo NAKAMURA, Luke, Bush, Cahén, Ray Mead and Tom Hodgson. Deciding to continue to exhibit together, the group expanded to include Hortense Gordon, Yarwood, Town and Macdonald, and took the name PAINTERS ELEVEN. They first exhibited together in 1954 and formally dissolved in 1960. Differing widely in approach and style, the best of the group's work was characterized by strong painterly surfaces found in Town, Ronald, Hodgson and Cahén. In 1956 the group exhibited with the American Abstract Artists in New York. Ronald, then working in New York, arranged in 1957 for the critic Clement Greenberg to visit the Toronto artists in their studios, though Town and Yarwood refused to participate. Greenberg's visit had most impact on Bush, whose work from the 1960s brought him into the ambience of American post-painterly abstraction, and who became a major influence on many younger Toronto artists.

Even as Painters Eleven was breaking up, their example was important to a strong and energetic group of young artists centered on Av Isaacs' gallery. The work of this group, reflecting a wide range of interests from dada to abstract expressionism, was characterized by powerfully expressive figurative styles and included Graham COUGHTRY, Joyce WIELAND, John Meredith, Gordon RAYNER, Dennis BURTON, Robert Markle, Nobuo Kubota, Richard Gorman and Robert Hedrick. The most original was Michael SNOW, who began his career as a painter but soon moved into a wide range of media — sculpture, photography and film.

A vital centre of activity also developed through the 1960s in London, in particular with Jack CHAMBERS, Tony URQUHART and Greg CURNOE. Chambers and Curnoe, in different ways, have given forceful definition to regionalism as a vital expression of the reality of living and working in a particular community. It was Chambers who initiated the development of the Canadian Artists Representation in 1967 to set standards in exhibition and copyright fees and to assert the professional status of artists. The community in London, if small, remains a vital and active one in sculpture, installation work and painting; among the painters special mention must be made of Paterson EWEN, who moved there from Montréal in 1968, and Ron MARTIN (since 1983 working in Toronto).

The visual arts in the Atlantic provinces developed radical directions much more slowly than in Québec and Ontario. The first artists in the region seriously to address contemporary issues were Miller BRITTAIN and Jack HUMPHREY in Saint John and, after the war, Bruno BOBAK and Molly Lamb BOBAK in Fredericton. Lawren P. Harris at Mt Allison U in Sackville was essentially alone as an abstract painter. The dominant figure in the Atlantic region since the war has been Alex COLVILLE. His painting has set a new standard for realist art, and through his teaching at Mt Allison (1946-63) he has had an important impact on the development of artists such as Christopher PRATT, Mary PRATT, Tom FORRESTALL, D.P. Brown and Hugh MacKenzie. Since the mid-1960s the Nova Scotia College of Art and Design, with artists such as Garry Neill KENNEDY, Gerald Ferguson and Eric Cameron, has been a gathering point for radical Canadian, American and European artists.

In the West each of the major urban centres has established a distinctive character and sense of community. Vancouver has the largest concentration of artists and the longest history of interest in modern art; Jock Macdonald was working there in the 1930s and Lawren S. Harris settled there in 1940. The 2 principal artists from the 1940s, both as artists and teachers, have been B.C. BINNING and Jack SHADBOLT. Binning is best known as a draftsman and a painter of abstractions of ships and landscape. Shadbolt, deeply affected by the richness of the landscape and NORTHWEST COAST INDIAN ART, has interpreted these themes in a highly personal surrealist manner. The combination of the landscape and lyrical abstraction characterizes the work of Gordon SMITH, Takao TANABE and Don Jarvis, a direction reinforced by Toni ONLEY who went to Vancouver in 1959. A more rigorous form of abstraction, important for a younger group of painters, came from Roy Kiyooka, who moved from Regina to Vancouver in 1959. In the 1960s and 1970s Vancouver experienced the diversification of interests that occurred in Toronto and Montréal, with particular strengths in conceptual and communication art, video and performance, through the work of Iain and Ingrid BAXTER in their N.E. Thing Co (formed in 1966), Michael Morris and Gathie FALK, whose work has encompassed performance, painting and mixed media. Mention must also be made of painters such as Alan Wood, Robert Young and Glen Howarth.



Gordon Rayner, *Justa Juxta* (nd), acrylic on canvas (*courtesy The Isaacs Gallery, Toronto/Ontario Arts Council*).

In Regina the focus of activity in the 1950s was on a small group of artists determined to overcome their sense of isolation from the principal centres, particularly New York. The summer school at Emma Lake, founded by Augustus KENDERDINE in 1936, was extended in 1955 by Kenneth LOCHHEAD and Arthur MCKAY to include a workshop for professional artists, the first of which was led by Jack Shadbolt. Subsequently many of the leaders were Americans, the most significant being Barnett Newman (1959), Clement Greenberg (1962), Kenneth Noland (1963) and Jules Olitski (1964). In 1961 Ronald BLOORE, director of the Norman Mackenzie Art Gallery, organized the "Five Painters from Regina" exhibition with work by himself, Lochhead, McKay, Ted Godwin and Douglas Morton. Later that year this show toured Canada under the auspices of the National Gallery, giving rise to the name the REGINA FIVE.

The Emma Lake workshops also had a major effect on artists in Saskatoon, currently a tight-knit community, uniting artists of different generations and styles of work. The doyen of painting in the city is Ernest LINDNER, who has gained national attention over the past 20 years with his precisely rendered close-ups of trees and plants and figure studies. Landscape painting, for instance that of Reta Cowley, Wynona Mulcaster and Dorothy KNOWLES, has become a major force and has encouraged the work of younger artists such as David Alexander. A sensibility to the landscape has also been a major factor in the development of abstract painting, for instance in the dissimilar work of William PEREHUDOFF and Otto ROGERS. Among younger painters, for instance Robert Christie, there is a substantial interest in colour-field abstraction. Separate from these concerns is the constructivism of Eli BORNSTEIN, founder and editor of the journal *Structurist*.



Michael Snow, *Venus Simultaneous* (1962), oil on canvas and wood (*courtesy Art Gallery of Ontario*).

For artists in Alberta, as in Saskatchewan, the Emma Lake workshops and the BANFF CENTRE SCHOOL OF FINE ARTS have been the most significant centres for development of the visual arts. In Calgary an informal group developed around Maxwell BATES, including Ron Spickett, Marion Nicoll and Roy Kiyooka. Bates, a practising architect, painted in Calgary until 1961 (when he moved to Victoria) in an expressionist style. Subsequently, the modernist direction has been developed by artists such as Bruce O'Neil and Gerald Hushlak. A modernist landscape style is found in artists such as Ken Christopher and in various forms of image painting with John Hall, Derek Michael Besant, Ron Moppett and Gary Olson. In Edmonton the interest in formalism, developed out of the Emma Lake workshops, has made the strongest mark, not only in painting but in sculpture. The substantial group of formalist painters working there, led by

Douglas HAYNES, includes Ann Clark, Robert Scott, Phil Darrah and Terrence Keller.

In Winnipeg in the 1930s the most significant artists were Fritz BRANDTNER and LeMoine FitzGerald. Subsequent developments centered on University of Manitoba with artists and teachers such as George Swinton and Joe Plaskett and, from 1964, Ken Lochhead. In recent years Winnipeg, though somewhat isolated from other centres, has continued to be an active and varied community with such painters as Don Reichert, Ivan EYRE, Esther Warkov, Jack Butler and Sheila Butler, and Suzanne Funnell.

Through the 1970s the place of painting at the leading edge of the visual arts was challenged critically by developments in conceptual art, installation art, sculpture, video and performance (*see* ART: CONTEMPORARY TRENDS; VIDEO ART). For many people, painting, if it survived at all, would do so as an essentially reactionary form. But painting did not come to a standstill, and in recent years activity in the field, internationally as well as in Canada, has developed rapidly, especially among younger artists. What is notable, in Toronto and Montréal in particular, is a concern with what may be called expressive abstraction and with figurative and image painting, although not to the exclusion of geometric abstraction. At a time when the outcome of these developments is impossible to predict, it is important to recognize that such terms are inexact and arbitrary: for we can describe the work of artists such as Christian Knudson, Richard Mill, Leopold Plotek, Christian Kiopini and Jocelyn Jean in Montréal as abstract and geometric, but must distinguish their concerns not only from each other but also from the approaches of, say, Toronto artists such as Ric Evans and Jaan Poldaas, Milton Jewell and Paul Sloggett. The significant factor is to recognize how the matter of painting, in each case, is addressed to the spectator — a point underlined in the work of Ron Martin, whose recent shift from an open and painterly form to a geometric colour structure is a syntactical, not a stylistic change. For many painters, such as Jacques Hurtubise in Montréal, Josef DRAPELL, Milly Ristvedt-Handerek and Harold Feist in Ontario, the character of painting remains abstract, formal and personal. Nor is the distinction between the abstract and figurative exclusive in terms of a concern with painting itself. In the work of David Bolduc, Harold Klunder, Paul Fournier, Alex Cameron, Paul Hutner, Howard Simkins, Eric Gamble and Christopher Broadhurst, among others in Toronto and elsewhere, figurative images are woven into the abstract concerns of the activity of painting.

There can be no question of the importance for many younger painters of an explicit concern with the image as such. It has been a sweeping development spawning terms — new image, neoexpressionism, postmodernism, postcubist representation — in an attempt to identify the manifestations of this energy. We must cope with the precise images of painters such as Tim Zuck, Doug Kirton and Lynn Donoghue in Ontario; David Thauberger in Regina; and the expressive images of painters such as Luc Beland, Michel Jolliffe, Landon Mackenzie, Lynn Hughes and David Elliot in Montréal; and Shirley Wiitasalo, Brian Burnett, John Scott and Oliver Girling among others in Toronto.

What appears now to be a situation of stylistic anarchy arises, in substantial part, from the tendency of criticism since the war to stress a historicist view of current painting. From a wider viewpoint of art in our century it is apparent that it will take many decades to comprehend all that has happened, to realize the potential of the recent past. The revival of interest, for instance, in German expressionism, and in Matisse and de Kooning, is not an aberration from a determinist thrust of progress but the outcome of successive generations of painters responding to their own time and seeking a voice within the complex of possibilities to which they are heir. Such a situation, in its very complexity, speaks not of decline, but of health. DAVID BURNETT

Reading: D. Burnett and M. Schiff, *Contemporary Canadian Art* (1983); J. Russell Harper, *Painting in Canada* (1977); D. Reid, *A Concise History of Canadian Painting* (1973) and *Our Own Country Canada* (1979).

Paleoindian, a loose designation for a cluster of early cultures: the CLOVIS (Llano), Folsom and Plano, and various others of coeval and earlier age which have been proposed by archaeologists but are not fully verified. These 3 cultures are characterized by a subsistence pattern focused on big game — mammoth, big-horned bison, deer and presumably mastodon — and there is evidence of this after 10 000 BC in western N America. Llano, 9500-9000 BC, is characterized by Clovis fluted projectile points. The Folsom culture, 9000-8000 BC, is typified by the Folsom point (finer and smaller than Clovis fluted). Plano, 8000-6000 BC, extends to the early ARCHAIC cultures. All 3 overlap to some extent, depending on geographical area. Paleoindian archaeological sites are generally widespread in Canada, usually in the south with the exception of early material from the Yukon and a late northern variant of Plano. The best-known site is DEBERT (NS). Most of these sites are mass-kill sites where the remains of butchered animals are found in direct association with Paleoindian projectile points. The Paleoindian cultures disappeared with the extinction of the large mammals on which they depended. *See also* PREHISTORY. RENÉ R. GADACZ

Paleontology, the study of FOSSILS, gives us knowledge of past life, helps us understand the nature of ancient organisms and provides information about the composition of the biomass of past times. The organisms now living represent a stage in the succession of life forms and, according to the concept of EVOLUTION, have descended from past life forms. It is difficult to estimate how many species now exist; the number may be in excess of 45 million. Some authorities estimate that 1.5 million living species (monerans, protistans, FUNGI, PLANTS and ANIMALS) have actually been found and described. The fossil record, largely representing the past 600 million years, has been estimated to contain about 250 000 species, a low figure since new species are constantly being described. Nevertheless, the actual number of species represented in the fossil record is low (possibly as low as 5%) compared to the number of species living today because not all organisms have an equal chance of being preserved as fossils, eg, the delicate bodies of INSECTS. In exceptional circumstances, soft-bodied animals may be preserved, eg, the bodies of organisms very quickly buried in sediment. Canada is fortunate in having one of the most famous faunas of this type, British Columbia's Cambrian BURGESS SHALE, first discovered by C.D. Walcott (1909). The Burgess Shale fauna is of great interest to paleontologists because of the unique state of preservation and variety of organisms represented (more than 120 species of soft-bodied marine animals).

By far the greatest proportion of fossils are of animals that had hard skeletal parts. The groups most commonly represented in the fossil record are the protozoans, Archaeocyathids (now extinct), Porifera (SPONGES), Coelenterates (CORALS), Bryozoa, BRACHIOPODS, MOLLUSCS (clams, nautiloids), arthropods (TRILOBITES) and ECHINODERMS (crinoids, echinoids). Various minerals have been and are being used by animals for skeletal construction (eg, chitin, calcium carbonate, silica and calcium phosphate). Once an organism dies, its body is incorporated in the sediment and subjected to GROUNDWATERS percolating through the area. Such solutions can have dramatic effects on the buried organism. In some cases, the skeletal material is removed completely, leaving no trace of the organism. In other instances, new minerals such as silica are precipitated into pore spaces within the skeleton, thereby increasing its weight. TREE material and bones (eg, DINOSAUR bones found around Drumheller, Alta) are commonly preserved in this manner. In another common process, the entire original skeletal material is replaced by a new mineral. Other fossils occur simply as a carbon residue on the surface of rock, the carbon remaining after the more volatile materials have been removed. Fossil plants and graptolites (Paleozoic colonial animals) are commonly preserved in this manner.

The fossil record encompasses a tremendous variety of organisms, ranging from microscopic conodonts to the giants of the fossil world, the dinosaurs. Obviously, there is a need to order the organisms, placing related organisms in groups. This process of classification was initiated by Aristotle, who recognized the differences between major groups, eg, birds and insects. The classification scheme now used by all paleontologists is that proposed by the 18th-century Swedish naturalist Linnaeus. This hierarchical system divides organisms into kingdoms, phyla, classes, orders, families, genera and species. The names attached to each division are associated with a particular group of organisms; therefore, they show relationships among organisms. The most commonly used part of the system is the "binomial designation," eg, the 2-part name *Tyrannosaurus rex* implies that the species name is *rex* and that it belongs to the genus *Tyrannosaurus*. The name *Tyrannosaurus rex* should immediately convey the nature of the beast being described, in this case a large dinosaur — the "king of the terrible lizards."

The study of fossils has many important applications in a wide variety of fields. For example, the study of the fossil record can give insight about when and in what form life first appeared on Earth. The oldest known fossils are thought to be remains of ALGAE, bacteria and possibly fungi, which have been fortuitously preserved in cherts of Precambrian age. For example, the "Fig Tree" chert from South Africa contains algae which are considered to be more than 3.2 billion years old. A famous locality in Canada, the "Gunflint" chert exposed in southern Ontario, has yielded bacteria and algae that are about 1.9 billion years old. Stromatolites, structures formed by algae, are also common in Precambrian rocks dating back to about 2.8 billion years ago. Such stromatolites are quite common in Canadian Precambrian rocks.

The fossil record can also help the paleontologist to pinpoint various important stages in the evolution of life. For example, it shows that life during Precambrian times (before 600 million years ago) was entirely soft bodied. At the beginning of Cambrian times (between 570 and 500 million years ago) organisms developed the ability to secrete hard skeletons. It is through the fossil record that it is known that the Paleozoic era was the time when INVERTEBRATE animals dominated the biomass. Similarly, the fossil record reveals the dominance of the dinosaurs during the Mesozoic era (between 225 and 65 million years ago) and the MAMMALS during the Cenozoic (65 million years ago to the present). From the fossil record, it can also be shown that groups of animals have become extinct. Charles Darwin made extensive studies of fossils in the strata of S America, and used this information along with data from modern species to formulate his theory of evolution. The fossil record also permits the study of the ecology of past times by describing the environment in which an organism lived and the interrelationship of the different groups of organisms present (*see* BIOGEOGRAPHY).

Perhaps the most important use of fossils is for the relative dating of the rocks in which they occur. It was demonstrated in the 19th century that a distinct succession of fossils will be found in any given sequence of sedimentary rock layers (horizons) and that rocks of a particular age will contain particular types of fossil. This discovery led to the development of biostratigraphy, literally, the tying together of rock units on the basis of their biological content. The principle follows from Darwin's concept of evolution: life changes gradually with time, and once a species has become extinct it will not reappear. As a basic tool in deciphering the geological evolution of an area, biostratigraphy has widespread economic application, playing an integral role in the exploration for oil, gas and minerals. In Canada, many of the most important PETROLEUM discoveries have been based on detailed biostratigraphical studies. *See* GEOCHEMISTRY; GEOLOGY; PALYNOLOGY. BRIAN JONES

Paleontology, History in Canada The study of FOSSILS was a relatively new science when the geological exploration of Canada began. The first Canadian geologist, and the first to apply the principles of geochronology (GEOLOGICAL DATING) in Canada, was William LOGAN, a native of Montréal, trained in the geology of England and Wales. In 1842, he was appointed to make a geological survey of the United PROVINCE OF CANADA. He began in 1843 by measuring, mapping and systematically subdividing the Devonian rocks (395-345 million years old) of the Gaspé Peninsula. Within the next few years he extended his surveys to the earlier Paleozoic formations of the Eastern Townships of Québec, as well as to the non-fossil-bearing rocks of the Lk Superior region. Thanks to the progress that had been made in identifying and mapping the Paleozoic rocks (570-225 million years old) of western New York and northern New England, Logan was able to establish the broad correlations of the formations in the St Lawrence region. However, he did not have the time, and probably not the knowledge, to work out the details of the fossil succession. In 1856 he appointed Elkanah BILLINGS of Ottawa to be the full-time paleontologist of the GEOLOGICAL SURVEY OF CANADA (GSC).

Billings, a successful lawyer and journalist, was an enthusiastic collector and student of fossils. In the next 20 years he amassed large collections of Paleozoic fossils, which he described and assigned to their stratigraphic positions. Although concentrating on the Ottawa and St Lawrence river valleys, he extended his collecting and identifying to southwestern Ontario and NS. He was especially interested in fossil ECHINODERMS and BRACHIOPODS.

While Logan and his colleagues were working out the GEOLOGY and fossil sequence for central Canada, J.W. DAWSON was doing the same for the Maritime colonies. In the process, he began the study of FOSSIL PLANTS in Canada, describing the flora of the "Coal Measures" (Pennsylvanian or Upper Carboniferous period, 310-280 million years ago) of NS and the Devonian of Gaspé. He became the first principal of McGill and founded there the Redpath Museum, a centre for paleontological research. Fossil plants from western Canada came to his notice, and he described AMPHIBIANS and MOLLUSCS from the hollow tree stumps associated with the coal seams of NS.

Billings was succeeded (1876) as paleontologist of the GSC by J.F. Whiteaves of Montréal, an all-round naturalist. By this time, the geological exploration of the then North-West Territories and of Manitoba was beginning with the work of G.M. DAWSON and his GSC colleagues. Their fieldwork brought to light a series of new faunas, Ordovician (500-425 million years old), Silurian (425-395 million years old) and Devonian in Manitoba; Cretaceous (140-65 million years old) and Tertiary (65-2.5 million years old) from the future Saskatchewan and Alberta. These were described by Whiteaves, who made correlations with faunas discovered in the western US. Whiteaves also began the study of fossil FISHES in Canada. His detailed accounts of the Devonian fish faunas of the Baie des Chaleurs area (Qué and NB) revealed persistent archaic groups (ostracoderms, antiarchs) contemporary with early lungfish and teleosts and, most exciting, a fringe-finned fish that was on the verge of becoming a limbed VERTEBRATE. Meanwhile, paleontological work was proceeding in the classic fossil fields of central and eastern Canada. The basic work on the Paleozoic faunas of Ontario, begun by Billings, was refined and expanded by W.A. PARKS of University of Toronto, and by E.M. KINDLE, M.Y. Williams and Alice E. WILSON of the GSC. The older (Mississippian or Lower Carboniferous, 345-310 million years old) floras of NB and NS were studied by G.F. Matthew of Saint John and W.A. Bell of the GSC. Their work, added to that of J.W. Dawson, established the sequence of plant life for the late Paleozoic.

The Cretaceous DINOSAUR faunas of Alberta and Saskatchewan are famous. They were first revealed by G.M. Dawson in 1874, and by his successors in the 1880s. L.M. Lambe, assistant to Whiteaves, provided the early descriptions of these fossils, but it was not until Barnum Brown of the American Museum of Natural History came to Alberta with a staff of well-trained collectors (1910) that the wealth and excellence of preservation of Canadian dinosaurs came to be realized. To share in these discoveries the GSC engaged the services of C.H. Sternberg of Kansas and his 3 sons. Their work, and especially that of the second son, C.M. STERNBERG, resulted in the assemblage, at the National Museums of Canada, of a very important dinosaur collection described by Lambe and later by Sternberg. W.A. Parks, assisted by Levi Sternberg, the youngest of the brothers, built up a fine collection of Alberta dinosaurs at the Royal Ontario Museum, and made them known to science. Fossil MAMMALS of Oligocene age (38-26 million years old) were found (1883) in the Cypress Hills, Sask, by R.G. McConnell of the GSC and described by E.D. Cope of Philadelphia. Subsequently, Lambe collected and described additional specimens, correlating them with the White River Group of S Dakota. A late Miocene mammalian fauna (26-12 million years old) was found (1929) in southern Saskatchewan by C.M. Sternberg. L.S. Russell described Paleocene mammals from Alberta and Saskatchewan, a late Eocene mammalian fauna from Saskatchewan and an early Oligocene fauna from southeastern BC. Another famous fossil occurrence in Canada is in the Middle Cambrian BURGESS SHALE in the Rocky Mts near Field, BC. This was discovered (1909) by C.D. Walcott of the Smithsonian Institution, who was a specialist in Cambrian faunas. The remarkable aspect of the Burgess Shale fauna, revealed by Walcott's 5 seasons of excavation and by numerous monographs, was the presence of a rich assemblage of soft-bodied animals, remains of which would ordinarily not be preserved.

Early in the 20th century, commercial companies began drilling for PETROLEUM in the plains and foothills of Alberta. To carry out this activity intelligently, the companies required detailed stratigraphic data, which depended on knowledge of the succession and correlation of fossil faunas. A major step in this direction was provided by the work of F.H. McLearn of the GSC. He revised the Triassic (225-190 million years old), Jurassic (190-140 million years old) and Lower Cretaceous fossil molluscs of the foothills and northern plains of Alberta and those of the Queen Charlotte Is, and established correlations with similar faunas in the US, Europe and Asia. P.S. Warren of University of Alberta also made important contributions in this field, as well as with the late Paleozoic faunas of the Rocky Mts and the Subarctic. Interest in exploration for oil and gas also stimulated the study of "microfossils," mostly Foraminifera, the hard parts of which could be recovered from well cuttings. Although some pioneer observations on such fossils had been made by G.M. Dawson, modern investigations of them in western Canada was begun (1927) by J.A. Cushman of Harvard and continued by one of his students, R.T.D. Wickenden of the Geological Survey. Among more recent workers in this field have been J.H. Wall and C.R. Stelck in Alberta and W.G.E. Caldwell in Saskatchewan and Manitoba.

A similar use has been made in Paleozoic biostratigraphy of the jawlike and toothlike microfossils known as "conodonts." In 1897 G.J. Hinde, then at University of Toronto, described conodonts from local Ordovician rocks. In recent years there has been a revival of interest in them because of their stratigraphic importance; faunas have been described from Alberta, Ontario and farther east. Other Canadian paleontologists have become recognized specialists on particular groups of fossils. W.A. Parks was noted for his numerous papers on stromatoporoids (Paleozoic colonial organisms superficially resembling corals). Madeleine Fritz, of U of T, has contributed much to the knowledge of Paleozoic Bryozoa. G.W. Sinclair, of the GSC, specialized in the Conularida, early Paleozoic organisms possibly related to JELLYFISH. INSECTS are rare as fossils, but numerous specimens do occur in the Eocene tuffaceous shales of interior BC. These were described by S.H. Scudder of Boston and Anton Handlirsch of Vienna, Austria. Scudder also described late Paleozoic insects from NS.

Almost every university in Canada has a collection of fossils, mainly used in teaching; but for size and number of type specimens, the most important collections are those of the GSC and the National Museum of Natural Sciences in Ottawa, the Redpath Museum of McGill University in Montréal, the Royal Ontario Museum in Toronto, University of Alberta in Edmonton and the Saskatchewan Museum of Natural History in Regina. L.S. RUSSELL

Reading: M. Zaslow, *Reading the Rocks* (1975).

Palladium, *see* PLATINUM.

Palliser, Hugh, naval officer, governor of Newfoundland (b at Kirk Deighton, Eng 26 Feb 1722/23; d at Chalfont St Giles, Eng 19 Mar 1796). He was a naval officer at the siege of Québec in 1759, and was appointed governor of Newfoundland 1764. He travelled widely within his jurisdiction policing the French fishery to confine it to the limits set by the TREATY OF PARIS 1763. Palliser's concern was for the English migratory fishery only, but his attempts to discourage settlement failed. Assisted by Moravian missionaries, he was the first official to establish relations with the LABRADOR INUIT and Indians, and he also encouraged Captain James COOK in his hydrographic survey 1763-67. JOHN PARSONS

Palliser, John, sportsman, explorer (b at Dublin, Ire 29 Jan 1817; d at Comeragh House, County Waterford, Ire 18 Aug 1887). He spent nearly 3 years (1857-59) exploring what is now western Canada as instigator and leader of the PALLISER EXPEDITION. His interest in the southern prairies and mountains of western British N America had been aroused on an 1847-48 tour of the US, when he had spent almost 11 months hunting buffalo, elk and grizzly bear in the Missouri country. On his return he wrote a popular book about his adventures, *Solitary Rambles and Adventures of a Hunter in the Prairies* (1853.

Heir to an Irish landowner and descendant of a Protestant archbishop of Cashel, he attended Trinity College, Dublin, and saw intermittent militia service 1839-63. Besides his exploration of what is now western Canada, he made 2 important journeys. One was a confidential, semi-official mission in 1862-63 to the Caribbean and Confederate States, and the other was a voyage in 1869 with his brother Frederick in his own specially reinforced vessel, *Sampson,* to Novaya Zemlya (USSR) and the Kara Sea, exploring and hunting walrus and polar bear. Apart from visits to London (where he discussed possible railway routes with Sandford FLEMING), Rome, Switzerland and France, he spent the rest of his life caring for nieces and nephews, in public duties such as justice of the peace, in administering his heavily mortgaged estates, playing Bach's music and walking in the lovely Comeragh Mountains. IRENE M. SPRY

Reading: Irene M. Spry, ed, "Introduction," *The Papers of the Palliser Expedition* (1968).

Palliser Expedition (British North American Exploring Expedition), 1857-60, initiated by John PALLISER, who submitted to the Royal Geographical Society a plan to travel from RED RIVER COLONY to and through the Rocky Mts along the unsurveyed American boundary. The society expanded the project into a scientific expedition and applied for a grant of £5000 from the imperial government, which was then facing the problem of the future of the HUDSON'S BAY COMPANY's territories and badly needed information about them. To exploration of the plains south of the N Saskatchewan R and southern passes through the Rockies, the COLONIAL OFFICE added an examination of the old NORTH WEST COMPANY canoe route W from Lk Superior. Under Palliser's command, Dr James HECTOR was appointed geologist and naturalist, Eugène BOURGEAU botanical collector and John W. Sullivan secretary and astronomical observer. Magnetical observer Lt Thomas W. Blakiston brought his delicate instruments via Hudson Bay to join them on the prairies.

The explorers amassed astronomical, meteorological, geological and magnetic data, and described the country, its fauna and flora, its inhabitants and its "capabilities" for settlement and transportation. They concluded that to establish a "communication" entirely within British territory from Canada to Red River would be difficult and costly; access through American territory was much easier. Although some semi-arid country (now known as "Palliser's Triangle") stretched across the American border into the prairies of modern Canada, it was surrounded by a "fertile belt" well suited for stock raising and agriculture. There were deposits of coal and other minerals. The party traversed 6 passes in the southern Rockies, some of them feasible for a railway (the CPR was later built through one of them), but found the mountains farther W a formidable obstacle. The expedition's reports (published in 1859, 1860 and 1863) and its comprehensive map (1865) were for some time the major source of information about the sweep of country from Lk Superior to BC's Okanagan Valley, and are still of value today. IRENE M. SPRY

Reading: Irene M. Spry, *The Palliser Expedition* (1963) and, ed, *The Papers of the Palliser Expedition, 1857-1860* (1968).

Palmer, Edward, lawyer, landed proprietor, land agent, politician, judge, premier of PEI (b in Charlottetown, PEI 1 Sept 1809; d there 3 Nov 1889). The son of an Irish-born attorney, he took his schooling in Charlottetown and studied law in his father's office. A Tory, he represented the capital in the legislature 1835-70. Though lacking brilliant abilities, he was a capable political strategist with great force of character, and became premier in 1859, after 10 years as party leader in the assembly. Conflicts within his party led to Palmer's replacement as premier in 1863; he resigned from the Cabinet 2 years later in opposition to union of the colonies. In 1872 he was elected as a Liberal as part of an attempt to prevent the Island from joining CONFEDERATION. When the Island joined the following year, however, Palmer began a new career, as judge of the Queens County Court. He was named provincial chief justice 1874 and held this position until his death. IAN ROSS ROBERTSON

Palmer, Herbert James, lawyer, politician, premier of PEI (b at Charlottetown 26 Aug 1851; d there 22 Dec 1939); son of Edward PALMER. Called to the bar in 1876, appointed Queen's Counsel in 1878, Palmer was elected to the Legislative Assembly in 1900. A Liberal, he became premier in 1911 but was defeated in a by-election 7 months later. He resigned that Dec and returned to his practice. NICOLAS J. DE JONG

Palynology, the study of spores and pollen, has many applications in BOTANY, GEOLOGY and MEDICINE. Spores are primitive reproductive bodies of FUNGI and some plants. Pollen grains are small male reproductive bodies produced and dispersed by seed plants. Spores and pollen are small (5-100 μm), spherical or oblong structures, identifiable under a compound light microscope. Fine details of wall structure and sculpturing can be seen under the scanning electron microscope (20 000 to 40 000 magnification). The detailed structure of the wall (exine layer), and the number and arrangements of pores and furrows in the wall, are the diagnostic characters used in identification. Pollen is a key tool in reconstructing past vegetation and environments (paleoecology), because the outer wall is both extremely resistant to decay and elaborately and beautifully constructed so that identification to species or family level is possible. Pollen of many plants is discharged into the air annually (*see* POLLINATION) and falls into lakes and bogs as a "rain" which represents the surrounding vegetation. Many forest regions in Canada produce a total pollen fallout of 30 000-60 000 grains per cm^2 annually, while tundras produce fewer than 1000. Pollen is preserved in lake or bog sediments that accumulate each year. This preservation results in a sequence of pollen assemblages representing the succession of past vegetation. For example, Tertiary (*see* GEOLOGICAL HISTORY) sediments 10-20 million years old, under the Mackenzie Delta, NWT, contain deposits of spores which indicate that a rich coniferous forest grew there, similar to modern forests in coastal BC and Washington. Analysis of the spore content of such rocks is used in the search for fossil fuels and the petroleum industry employs palynologists as part of this exploratory activity. Pollen analysis of sediments that have accumulated since the end of the latest GLACIATION reveal the vegetation changes and tree migrations that have produced the present vegetation of Canada.

In addition to showing the responses of vegetation to climatic change, pollen data indicate effects of human cultures such as clearing, burning and agriculture. A pollen record from a small lake near Toronto shows evidence of maize cultivation (1380 AD) in an Iroquoian village near the site, and evidence of forest clearance. The same site shows the beginning of European agriculture by the abrupt rise in frequency of ragweed pollen. Palynology is used in quality control tests of honey to identify the source plants used by bees, and it has been used in forensic science to solve crimes (eg, when pollen adhering to clothing can indicate the scene of a crime). J.C. RITCHIE

Reading: P.D. Moore and J.A. Webb, *An Illustrated Guide to Pollen Analysis* (1978).

Pan-American Games are a multi-sport, quadrennial festival for the nations of the Western Hemisphere, conducted in a similar manner to the OLYMPIC GAMES and held one year prior to them. A comparatively recent event, the first Pan-Am Games were held at Buenos Aires (Argentina) in 1951, when 19 nations were officially represented in 18 sports. Since then they have been celebrated at Mexico City (Mexico) 1955 and 1975; Chicago (USA) 1959; São Paulo (Brazil) 1963; Winnipeg (Canada) 1967; Cali (Colombia) 1971; San Juan (Puerto Rico) 1981; and Caracas (Venezuela) 1983. Canada did not officially compete in the 1951 Games (although a small group of Canadian swimmers did give a demonstration in synchronized swimming) but has been a consistent and successful competitor ever since, with Canadian athletes providing many world-class performances in various sports. In fact, an analysis of medal winners in the 4 Pan-Am Games between 1963 and 1975 shows Canada with a total of 329, 2nd only to the US. The 5th Pan-Am Games at Winnipeg proved a fitting celebration for Centennial Year, 1967, when 2451 athletes from 29 countries participated in 29 sports. Canada won 12 gold, 37 silver and 43 bronze medals for its finest Pan-Am performance. GERALD REDMOND

Pan-Indianism, an intertribal movement of native resistance to white domination and assimilation, is characterized primarily by political and religious expression and solidarity. Key historical figures include PONTIAC and HANDSOME LAKE. Leaders since colonial times have advocated that Indians free themselves, even if this meant violence. The Peyote Cult, a reaction to Christian teachings and beliefs, originated in the southern plains area during the later 19th century and gradually symbolized the unity of Indians all over N America. Red Power is pan-Indian sentiment committed to radical political action, as in the National Congress of American Indians (NCAI, 1944) and the American Indian Movement (AIM, 1968). These rights-oriented groups believe that natives must choose between assimilation and being Indian, and that Canadian and American government obligations to Indians are binding. *See also* NATIVE PEOPLE, POLITICAL ORGANIZATION. RENÉ R. GADACZ

Pangman, Bastonnais, Métis buffalo hunter and leader (b at N Saskatchewan R 1778), son of fur trader Peter Pangman and a Cree mother. A skilled hunter, he helped provide the colony founded by Lord SELKIRK with buffalo meat in 1812-13. Angered by the "Pemmican Proclamation" of 1814, Pangman was active in MÉTIS raids upon the new settlement and helped negotiate for the withdrawal of the settlers from Red River in 1815. There is no evidence that he was present at the battle of SEVEN OAKS (1816) and in 1818 he was acquitted of charges of arson. HARRIET GORHAM

Pangnark, John, sculptor (b at Windy Lk, NWT 1920; d at Rankin Inlet, NWT 1980). An Inland CARIBOU INUIT, Pangnark was relocated in the late 1950s to Eskimo Point, where he spent his later years carving. Represented in the *Sculpture/Inuit* exhibition of 1971 to 1973, Pangnark was one of 4 Inuit artists chosen to go to Expo 70 in Osaka, Japan. Because of his preoccupation with resolving formal concerns, often at the expense of easily recognizable subject matter, his sculpture is unlike the narrative and naturalistic work of much contemporary Inuit sculpture. His highly individualized abstractions are most appreciated by the critic who sees, outwardly at least, similarities to 20th-century abstract sculpture. NORMAN ZEPP

Pangnirtung, NWT, Hamlet, pop 839 (1981c), is located on the SE shore of Pangnirtung Fjord on the S shore of BAFFIN I'S CUMBERLAND SOUND, 2330 air km NE of YELLOWKNIFE. The name derives from an Inuit word said to mean "place of the bull caribou." The area was first visited

by Europeans in 1585, and by 1840 it had become one of the arctic points where WHALING ships gathered most often. Some local Angmarlik Inuit became well known as whaleboat skippers. In 1968 the local Inuit formed a co-operative to promote soapstone and whalebone carvings. Today the community is known for its artworks, particularly the world-famous woven tapestries made by local Inuit artists. *See* INUIT ART.

ANNELIES POOL

Panneton, Philippe, pen name Ringuet, physician, professor, diplomat, novelist (b at Trois-Rivières, Qué 30 Apr 1895; d at Lisbon, Portugal 28 Dec 1960). Panneton was a leading figure in French Canadian literature, thanks primarily to his novel, *Trente Arpents* (1938), which is considered a classic of Canadian literature. Panneton was a true man of letters, and combined work as a professor at Université de Montréal with a full literary life. He wrote for many periodicals, was a founding member and chairman of the Académie canadienne-française and published 7 books, including a pastiche, a collection of short stories, and 5 novels dealing with both rural and urban history (eg, *Un Monde était leur empire,* 1943; *Le Poids du jour,* 1949).

He was acclaimed in both French and English Canada for his works, but it was primarily because of *Trente Arpents* that he received awards, including that of the Province of Québec, the Académie française's Prix des Vikings, and a Gov Gen's Award. The novel, first published in Paris, concerns the transition from agrarian to urban life in Québec. It covers the 45 years from the late 19th century to the Depression, and deals with 3 generations of peasants who exhaust themselves cultivating their 30 acres (12 ha) of land. The main character, Eucharist Moisan, prospers on the land and with maturity achieves ease and fame, but in old age he meets a series of difficulties. As a result he turns over his land to his eldest son and goes into exile in New England with a son who, like several of his brothers and sisters, has left the land for the city. The land, mother and wife, is also a hard mistress. Unyielding and unchanging, she rejects the person who cannot meet her challenge. This was a new vision of rural life. Panneton's predecessors, except for Albert LABERGE and Claude-Henri GRIGNON, all presented idyllic and moralizing accounts of no artistic or literary dimension. This novel, the best to appear until the 1940s, was quickly translated into English and German, and after 1940 was published in both languages. Panneton became ambassador to Portugal in 1957.

ANTOINE SIROIS

Papineau, Louis-Joseph, lawyer, seigneur, politician (b at Montréal 7 Oct 1786; d at Montebello, Qué 25 Sept 1871), the son of Joseph Papineau, a seigneur and moderate liberal member of the Assembly. He was educated at the Petit Séminaire de Québec and prepared himself for a career in law, which he carried on intermittently after 1810. Representative of the growing influence of the liberal professions in French Canada he was first elected to the Assembly of LOWER CANADA in 1809, during Craig's "Reign of Terror." With his self assurance, skill as an orator and popular following, he emerged from a group of young nationalists to leadership of the PARTI CANADIEN (later Parti PATRIOTE) and was made Speaker of the Assembly in 1815. He came to see himself as the defender of the national heritage of French Canada and led the fight for control of the political institutions of Lower Canada. Early in his career he was a moderate who admired British parliamentary institutions, but during the 1820s his views became more radical and his parliamentary strategy was obstructionist, using the Assembly's control of revenues and the civil list to combat the policies of the English commercial class, which he considered anathema to the interests of French Canada.

Papineau travelled to England in 1823 in his campaign to defeat the Union Bill of 1822, which had been introduced to circumvent his control of the Assembly. The union was rejected and this victory reinforced his desire to reform Lower Canada's political institutions, particularly the council, which was dominated by the CHÂTEAU CLIQUE. Towards 1830 Papineau stepped up his virulent attacks on the nonelective legislative council and declared himself a republican. He became an advocate of independence for Lower Canada and became increasingly critical of imperial authority. After a sweeping electoral victory in 1834, he increased his efforts to paralyse the political system; goaded by revolutionary elements of his party he intensified his policy of boycott and political obstruction in order to force the British government to grant reforms intended to transfer power to representatives of the French Canadian nation.

Papineau and a small committee put forward their demands for control of revenues by the legislature, responsibility of the executive and election of the council in the "Ninety-Two Resolutions." When the demands were categorically rejected by the British in 1837 the political crisis deepened, popular feeling, inflamed by social and economic crises, was roused and Papineau began to lose control of the events he had been so instrumental in setting in motion. He addressed a rally of 4000 at St-Charles, 23 Oct 1837, at which the patriotes more or less declared the independence of the Six Counties and their willingness to resort to arms if necessary. When after the defeat at St-Charles it became clear that the patriotes would be crushed, he fled to the US and, following the failure of the second insurrection, he sailed for France in 1839.

Papineau's career, particularly his behaviour during the REBELLIONS OF 1837, has been a continuing source of controversy and conjecture. He claimed that he had taken no part in the insurrections, yet evidence shows he acted as supreme commander until the Battle of Saint-Denis, from where he disappeared just before the fight was engaged. Later, many of his fellow patriotes accused him of cowardice, though they continued to support him as the only viable leader of FRENCH CANADIAN NATIONALISM. He professed to be a liberal and republican, yet was a staunch defender of the SEIGNEURIAL SYSTEM, which had a feudal character, as the basis of French Canada's agricultural economy. He himself owned the seigneury of Petit Nation, purchased in 1817 from his father, and by all accounts demanded full measure from his habitants. He was an economic conservative, hostile to the commercial and transportation innovations that the merchants considered essential to progress in Lower Canada. Though a deist and a violent anticleric, he nevertheless feared that a weakening of the Catholic Church would play into the hands of the English-speaking Protestant enemies of French Canada.



Louis-Joseph Papineau, from a photo in *Portraits of British Americans* by F. Taylor and William Notman (1868) *(courtesy Public Archives of Canada/C-21005).*

Papineau was granted amnesty in 1844 and returned from exile to his seigneury in 1845. He profited amply from timber concessions and built himself a grand manor house at Montebello through the help of his indebted censitaires. He re-entered politics in 1848, but was at odds with the new leadership of Louis LAFONTAINE. He vehemently opposed the ACT OF UNION and advocated ANNEXATION to the US. Around him coalesced a new group of young liberal nationalists who later became the PARTI ROUGE; Papineau himself left politics in 1854. Complex and contradictory, Papineau was nevertheless the first effective political leader of his people; if he was not the "national hero" they desired, he was a fitting symbol of their discontent.

JAMES MARSH

Reading: F. Ouellet, *Louis-Joseph Papineau, a divided soul* (1961) and *Lower Canada, 1791-1840* (1980).

Papineau-Couture, Jean, composer, teacher, administrator (b at Montréal 12 Nov 1916), grandson of Guillaume COUTURE. After studying in Montréal and Boston, he worked at Cambridge, Mass, under Nadia Boulanger, concentrating on Stravinsky and the French Impressionist composers. He has taught at Collège Jean-de-Brébeuf, the Conservatoire de musique de Montréal and in the music faculty of U de M, where he was dean 1968-73. He has emphasized acoustics in his teaching and his students include a number of composers, eg, Jacques Hétu, François MOREL, André Prévost and Gilles TREMBLAY. Papineau-Couture has been president of several organizations, including the Académie de musique de Québec, the JEUNESSES MUSICALES DU CANADA (Montréal branch), the Canadian Music Council, the Canadian Music Centre (of which he was a founding member), the Canadian League of Composers, the Société de musique contemporaine du Québec and the Humanities Research Council of Canada. His awards include the 1962 Prix de musique Calixa-Lavallée and the Canadian Music Council Medal (1973). *Psaume CL, Étude in B-flat Minor,* and *Pièce concertante* (Nos 1 to 5) are considered among his major works.

HÉLÈNE PLOUFFE

Paquet, Louis-Adolphe, priest, theologian (b at St Nicolas, Canada E 4 Aug 1859; d at Québec C 24 Feb 1942). Professor at Laval for nearly 60 years, he was French Canada's "national theologian" who guided — some say, created — Québec's archbishops, defining the church's position on public policy and shaping the somewhat defensive "messianic nationalism" of his day. Trained in Rome during the Thomistic revival, Mgr Paquet wrote the 4-volume *Droit public de l'église* (*Public Law of the Church*) (1908-15), a standard text in ultramontanist terms on the relations between church and state. Having grown up during the disappointing period of the NORTH-WEST REBELLION, Paquet moderated the aggressive nationalism of his predecessors BOURGET and LAFLÈCHE in a 1902 public address on the vocation of the French race in America, calling on French Canadian Catholics to guard their faith, language and soil from contamination by materialistic foreigners. He formulated the church's official position on such issues as the MANITOBA SCHOOLS QUESTION 1896, Ontario's Regulation 17 (1915) and overseas CONSCRIPTION 1917. A powerful orator, systematizer and teacher, he shaped the church leaders of his day, but his influence waned in the face of the social problems that arose during urbanization in the 1920s.

TOM SINCLAIR-FAULKNER

Parachuting, Sport, also known as skydiving. The earliest jumps were made from balloons, and the first successful parachute descent was performed in 1797 over Paris. Free-falling jumps were not possible until 1908, when the ripcord was devised, though the ripcord was not used from an airplane until 1912. Contests began in the US in 1926, and the first world championship was held in Yugoslavia in 1951. Competitors normally use light aircraft to carry them to about 3600 m, and parachutes are usually opened at about 760 m. Sport parachutists compete in 2 areas: aerial maneuvers, or "style" events, and accuracy of landing.

The first parachute jump in Canada was made in 1919, when Frank Ellis descended from a Jenny aircraft over Lake Erie; the Frank Ellis Trophy commemorates this event. After WWII, clubs and competitions were organized in Canada. The oldest surviving club is the St Catharines Parachuting Club, formed in 1947. The Canadian Sport Parachuting Assn was founded in 1967. The Canadian National Parachuting Team has ranked among the top 10 countries in international competition since 1960. S.F. Wykeham-Martin became the first Canadian to win a medal in world competition, placing 2nd in individual accuracy in 1966. In 1976 Pierre Forand won the silver medal in the men's absolute overall category, missing the world championship by one-five-hundredth of a second. In 1980, Kathy Cox won the women's world accuracy championship. Canadian teams dominated parachuting in the late 1970s, winning the world overall relative-work (2 parachutists maneuvering together during free-fall) championships in 1977 and 1979 and placing 2nd in 1981. Five licences of proficiency are awarded, and competition jumping is also organized by the CSPA. The G.R. Masterson Trophy is the premier parachuting award in Canada.

BARBARA SCHRODT

Parasitology, branch of BIOLOGY dealing with organisms (ANIMALS or, rarely, PLANTS) which live in or on other species (hosts) from which they derive nourishment. These organisms are called parasites. Some cause disease in humans and domestic and wild animals. Several have complex and fascinating cycles of development in 2 or more hosts. This rather simplistic definition includes some viruses, bacteria and protozoa, various kinds of worms and certain INSECTS, TICKS, MITES and copepod CRUSTACEANS.

Several types of parasites occur in humans, domestic animals and wild animals in Canada, but fortunately they cause less disease than some species in warmer countries. A higher prevalence noted recently results from increased travel to, and immigration from, tropical lands. Canadian researchers have contributed to the knowledge of parasites that occur in Canada and elsewhere. For example, almost 100 years ago the Canadian W.G. MacCallum studied a malarialike parasite in the blood of birds and found a stage of development that provided a clue to a facet of development of the malaria parasite of humans. J.L. Todd, the first professor of parasitology in Canada (at McGill), studied the trypanosomes (parasitic protozoans) that cause sleeping sickness in humans in Africa and discovered the spread of relapsing fever by ticks.

Early explorers related gruesome stories of attacks by MOSQUITOES and BLACK FLIES. Bedbugs in logging camps and boarding houses caused misery. In the middle of the last century, thousands of immigrants died from typhus fever en route to or after landing in Canada. It was not then known that this dreaded disease is transmitted by lice. The significance of ENTOMOLOGY to agriculture and to human and animal health was recognized in 1884 with the appointment of James FLETCHER as the first Dominion Entomologist. In the medical school he established in 1832-34 in Upper Canada, Dr John Rolph gave instruction on malaria. As early as the 1850s Canadians were writing papers on parasites. The private Veterinary College begun by Andrew SMITH in 1862 (later the Ontario Veterinary College) had lectures on parasitology from the beginning. Robert Ramsay WRIGHT at Toronto and William OSLER at McGill were studying parasites in the 1880s. Investigations increased in the early part of the 20th century. Veterinarians such as E.A. WATSON and Seymour Hadwen, associated with the Dominion Health of Animals Branch, were prominent investigators. The former studied the trypanosome that causes dourine in horses. Thanks to his work and that of colleagues, the disease was eradicated from Canada. Hadwen also established the life cycle of the warble fly of cattle.

Parasitology expanded in 1932 with the formation of the Institute of Parasitology at MacDonald College with T.W.M. CAMERON as the first director, and the creation of a Department of Veterinary Science at the Ontario Research Foundation with Hadwen as director. At the same time, E.M. Walker in Zoology and D.T. Fraser in Preventive Medicine at University of Toronto were encouraging research and teaching. With the appointment of Ronald Law as director of the Ontario Experimental Fur Farm, more attention was directed to parasites in wild animals. The Ontario Veterinary College, with its longtime interest in the subject, created a Department of Parasitology with Anthony Kingscote as head. Interest surged during the next 50 years and parasitologists were appointed to each of the larger universities. Several universities offer graduate courses leading to master's and doctoral degrees.

For those engaged in it, research is a challenging, occasionally frustrating, and at times exciting occupation, although it may require years of patient endeavour to make a single significant discovery. The satisfaction of discovery is itself rewarding, especially when the knowledge, along with that produced by others, can be applied to benefit humans. Hadwen's contribution to an understanding of the life cycle of the warble fly of cattle was fundamental to the work in recent years to control and, in places, eradicate the pest. Watson's achievement in eradicating dourine in horses was likewise of immense practical value. Several investigators have worked on ticks and flies affecting livestock and have introduced measures to control these pests more effectively. Tick paralysis in sheep and humans in western Canada is now understood, thanks to intensive research for several years.

Commercial FISHERIES in western Canada were, at one time, adversely affected by a tapeworm, *Triaenophorus crassus*. It was shown that an intermediate stage of the worm in the whitefish developed into a mature worm when an infected fish was eaten by pike. Practical research followed to eliminate the pike and thus prevent transmission. Research by L. Margolis at the Fisheries Research Laboratory, Nanaimo, illustrates a different practical application of the study of parasites. A survey showed that parasites present in fish from different localities vary. The parasites are therefore useful biological tags indicating the origin of the fish.

For decades scientists and laymen were baffled by paralysis observed in moose in certain areas of the country. The cause was elusive until R.C. Anderson observed a species of lungworm on the membranes of the brain. Elucidation of the life cycle, essential to an understanding of the situation, revealed that the worms also occur in white-tailed deer, but are relatively harmless. The worms' eggs are passed in the feces of deer; their larvae penetrate into various snails and undergo development in them. Moose or deer become infected when they eat vegetation to which infected snails are attached. The deer are an important part of the story, for moose paralysis occurs only in places where the ranges of moose and deer overlap. The results are especially important for the management of moose populations (*see* WILDLIFE CONSERVATION AND MANAGEMENT).

Societies and Journals A section of the Canadian Society of Zoologists deals with parasitology and arranges symposia and an annual meeting. The Canadian Society of Tropical Medicine and International Health meets annually to present papers and discuss progress, especially in relation to human parasitology. Research is conducted and diagnostic services are provided by provincial and federal ministries of health and natural resources. Veterinary colleges provide similar services for owners of livestock and pets. The *Canadian Journal of Zoology* allocates space for papers on parasitology. Other papers may appear in the *Canadian Journal of Biochemistry and Microbiology*. Parasitologists also publish in Canadian medical and veterinary journals as well as in specialized journals published in other countries. Articles also appear in lay magazines and in the popular press because the lives and behaviour of many parasites provide material for fascinating stories. A.M. FALLIS

Reading: J.G. Baer, *Animal Parasites* (1971); R.A. Wilson, *An Introduction to Parasitology* (1979).

Parc de Val-Jalbert, Qué, 5 km E of ROBERVAL on the shores of Lac SAINT-JEAN. A ghost town and a very beautiful park, Val-Jalbert since 1960 has become a major attraction in the Saguenay-Lac Saint-Jean region. The village of Val-Jalbert was born at the turn of the century, when a pulp and paper mill was built at the foot of the falls on the Rivière Ouiatchouane (1901). The company village, very modern for its day, grew rapidly and had 1000 inhabitants by the mid-1920s. In 1927, however, Quebec Pulp and Paper Mills, the plant's final owner, closed it down and soon Val-Jalbert was deserted (1930). The Québec government bought the site in 1949 and in 1960 decided to make it a park. The abandoned village and mill, important parts of Canada's industrial and urban heritage, now draw hundreds of thousands of visitors each year. MARC ST-HILAIRE

Parent, Étienne, journalist, lawyer, public servant, essayist (b at Beauport, LC 2 May 1802; d at Ottawa 22 Dec 1874). He was editor of *Le Canadien* 1822-25 and then became editor of the French section of *La Gazette de Québec* in 1825. While working 1825-38 as translator, legal officer and then librarian of the Assembly of Lower Canada, he revived *Le Canadien* in 1831, giving it its famous motto: "Our institutions, our language and our laws." He argued for a national existence for French Canadians, demanding "all the civil and political rights that are the prerogative of an English country." As the REBELLION OF 1837 approached, Louis-Joseph PAPINEAU was becoming more radical; Parent, a clear-headed pragmatist, abandoned him in 1835 and preached moderation for both parties. Denounced as a traitor by many *Patriotes*, he was none the less imprisoned by the English governor in 1838-39 for "seditious schemings." With the establishment of the PROVINCE OF CANADA in 1840, the polemicist resigned himself to fight only for the equality of "the two populations and the two countries." He was elected to the Assembly in 1841 but soon had to withdraw because of his deafness, developed in prison. Appointed clerk of the Executive Council 14 Oct 1842, he resigned from the management of *Le Canadien*, although he continued to contribute to it occasionally (1847, 1851-54). He became assistant secretary for Lower Canada in 1847 and federal undersecretary of state from 1868 to his retirement in 1872. After 1840 he was often consulted by political figures, and between 1846 and 1852

he gave 8 important lectures at the INSTITUT CANADIEN of Montréal. In these he invited his compatriots to become involved in industry and business and to study political economy; he proposed ways to improve education and ameliorate the lot of the working class; and he stressed the importance of the intellectual, spiritual and of the priest in society. Nourished by the best American and European sources, his strong-minded originality was rooted in Canadian soil. He was called the Nestor of the Canadian press and the Victor Cousin of America.

RENÉ DIONNE

Parent, Madeleine, labour organizer (b at Montréal June 1918). Despite her conventional upbringing in a middle-class Canadian family, Parent dedicated herself to organizing the ununionized. In 1943, she joined Kent Rowley as an organizer for the United Textile Workers of America. In 1946, 6000 workers they had organized in Montréal and Valleyfield won a strike against the combined forces of the employer, Dominion Textile, the church and the state. A year later, after a 3-month trial, Parent was convicted of seditious conspiracy. In DUPLESSIS's Québec, she had to wait until 1954 for her acquittal in a new trial. Fired by the international headquarters of the UTWA in 1952 on the false charge that she was a communist, she, with Rowley, established the Canadian Textile and Chemical Union (1952) and the Confederation of Canadian Unions (1969). She led some bitter strikes in the 1970s, including the 1979 Purtex strike over surveillance of workers via closed-circuit TV. MARGARET E. MCCALLUM

Parent, Mimi, painter, engraver (b at Montréal 1924), daughter of architect Lucien Parent. While enrolled at the École des beaux-arts in Montréal, she met Alfred PELLAN, who introduced her to surrealism, a genre in which she and fellow student Jean BENOÎT are 2 of the world-leading contemporary practitioners. Expelled from the École des beaux-arts because she contested the kind of painting the students were taught, she proceeded to hold a solo exhibition at the Tranquille Library and the Dominion Gallery in 1947. In 1948 she signed the *Prisme d'yeux* manifesto on artistic freedom, and left for Paris with Benoît. She joined the surrealist movement in 1959 at an international exhibition devoted to Eros, where she was in charge of the fetishism room and did the catalogue layout. André Breton cited her 1949 work, *J'habite au choc*, in the final edition of his book, *Le Surréalisme et la peinture*. She participated in all the major surrealist demonstrations and, during the 1960s in particular, published plates for some of the surrealist works of Fernando Arrabal, Joyce Mansour and José Pierre.

ANDRÉ G. BOURASSA

Parent, Simon-Napoléon, lawyer, businessman, Liberal politician, premier of Québec (b at Beauport, Canada E 12 Sept 1855; d at Montréal 7 Sept 1920). Québec City's first "modern" mayor (1894-1906), promoting city planning and economic development, Parent became provincial minister of lands and forests in 1897, and immediately began to encourage the large-scale exploitation of Quebec's forest and hydraulic resources. He became premier after Félix-Gabriel MARCHAND died in 1900, but was driven from office in 1905 by a combination of personal rivals and young nationalists critical of his concessions to foreign capitalists. He retired as mayor shortly afterwards but became chairman of the federal Transcontinental Railway Commission and later the Québec Streams Commission. BERNARD L. VIGOD

Parfleche is a variety of Plains Indians container made of rawhide. The name comes from that given by the VOYAGEURS to untanned skin. It is a single piece of prepared hide that folds much like an envelope for storage of dried meat (PEMMICAN) and other food. Saddlebags, tubular headdress containers, and small pouches for personal belongings were also all made of light, durable rawhide and were often painted or decorated with QUILLWORK. RENÉ R. GADACZ

Paris, Ont, Town, pop 7485 (1981c), inc 1855, located 50 km W of Hamilton at the confluence of the Nith and Grand rivers. It was founded 1822 by Hiram "King" Capron, whose house, later named Penmarvian, remains a local landmark. He developed the gypsum deposits, used to make plaster of Paris, from which the name derives. (It was called Forks of the Grand R until 1836.) It has always been a rural community, the centre of a farming and dairy district, but has a small manufacturing sector, principally textiles, furnishings and pharmaceuticals. The Plains Church, a unique cobblestone structure built 1845, stands as a memorial to pioneer settlement. A downtown building marks the site where in 1876 Alexander Graham BELL received from BRANTFORD the first long-distance telephone call. DANIEL FRANCIS

Parizeau, Gérard, underwriter (b at Montréal 16 Dec 1899). After graduating from the École des hautes études commerciales at U de M, Parizeau worked in the civil service from 1920 until 1925, when he became head of the francophone section of Irish & Maulson, an insurance brokerage firm. In 1925 he also founded *L'Actualité économique*, the official magazine of the École des hautes études commerciales, at which Parizeau has taught since 1928. In 1938 he founded his own brokerage house and made it one of the most important in Canada. In 1961 he helped create the reinsurance brokerage house Le Blanc, Eldridge, Parizeau and was its chairman for many years. He bought in 1965 La Nationale, a Canadian reinsurance company until then a subsidiary of La Nationale of Paris. In 1972 he founded the management firm of Sodarcan, grouping under it a dozen insurance and reinsurance companies. Parizeau and his son Robert hold majority control. Another son, Jacques, was minister of finance in the Parti Québécois government. JORGE NIOSI

Parka is a tailored garment worn by the INUIT to protect head, arms and upper body from the rigours of the arctic climate. Style varied from region to region, and parkas for women had a distinctive cut, distinguishing them from male garments. Young children ride inside the parkas, on their mothers' backs or in the hood. Fur ringed the hood or it could be tightly closed with drawstrings; both served to trap air warmed by the body inside the garment. In the past, caribou hide, often sewn in a decorative mosaic pattern, was used to make the parka. Today, materials imported from the south are most frequently used to construct the garment. THOMAS S. ABLER

Parker, Sir Horatio Gilbert George, journalist, author, politician (b at Camden E, Canada West 23 Nov 1862; d in London, Eng 6 Sept 1932). Best known for his historical novels, which introduced French Canadians and the North-West to English literature, Gilbert Parker left Canada in the mid-1880s after teaching for several years in Ontario. He settled in England from 1890, became MP for Gravesend (1900-18), and organized British propaganda directed at the US during WWI. Widely travelled, he expressed strong support for British IMPERIALISM. His fiction set in Canada contributed to the validation of Québecois culture within English Canada. His many novels consist mainly of melodramatic plots with idealistic characters in exciting or exotic settings. TERRENCE CRAIG

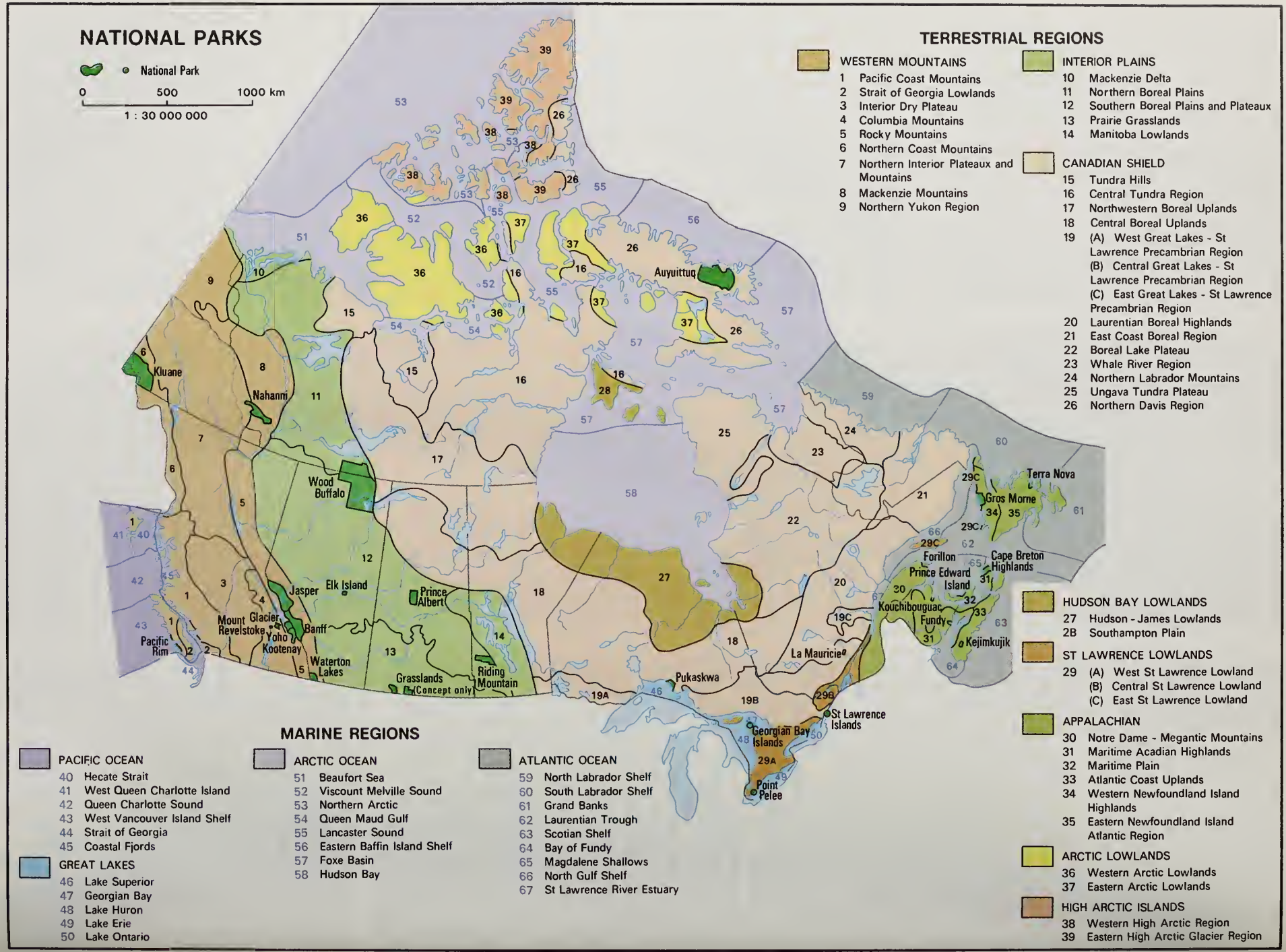
Parker, John Dickerson, "Jackie," football player (b John D. Flanagan at Knoxville, Tenn 1 Jan 1932). As a youngster, Parker excelled in baseball, and reached Mississippi State on a baseball scholarship. He turned to FOOTBALL and became an outstanding quarterback. He joined the EDMONTON ESKIMOS in 1954 and helped lead the Eskimos into the GREY CUP against highly favoured Montréal. The image of Parker scooping up a fumble in the final minutes and running 90 yards to tie the score and set up the winning convert is one of the most vivid in Canadian sports history. He returned to quarterback Edmonton to another Grey Cup win in 1955 and was a receiver and halfback in the 1956 victory. During 9 years with the Eskimos (1954-62), he won the Jeff Nicklin most valuable player trophy 7 times, and was Schenley outstanding player 3 times. Parker was traded to the TORONTO ARGONAUTS after the 1962 season. He was general manager of BC LIONS 1970-75. On retirement Parker was the Canadian Football League all-time scoring leader with 750 points. As a quarterback, he successfully completed 1089 passes for 16 476 yards. He rushed for 5210 yards and gained 2308 yards on passes. In 1983 he became head coach of the Edmonton Eskimos.

FRANK COSENTINO

Parkin, Sir George Robert, educator (b at Salisbury, NB 8 Feb 1846; d at London, Eng 25 June 1922). In his own words, the "wandering evangelist of Empire," Parkin was a successful teacher at NB high schools who became in the 1880s a leader of the Imperial Federation Movement, about which he wrote 3 books. He was principal of Upper Canada Coll from 1895 to 1902 when he became secretary of the Rhodes Scholarship Trust in England, where he lived until his death. He wrote in 1908 the first biography of Sir John A. MACDONALD, whom he had known, arguing that autonomous dominions could still co-operate in a reorganized British Empire. He was knighted in 1920 for his services to the Empire. DONALD J.C. PHILLIPSON

Parkin, John Burnett, architect (b at Toronto 26 June 1911; d at Los Angeles, Calif 17 Aug 1975). Parkin graduated in architecture from U of T in 1935 and worked in London, Eng, before returning to Toronto in 1937 to establish a small architectural practice. Joined in 1944 by John C. PARKIN (no relation), he created an integrated practice that included all the skills necessary for the design and supervision of the construction of major buildings. The firm offered landscape design under his partner and brother, Edmond T. Parkin, graphic and interior design, structural, electrical and mechanical engineering, and specialized experience with hospitals, schools, airports and factories. During the later 1950s and 1960s the firm was the largest in Canada and was responsible for such buildings as Union Station (Ottawa), the head office of IBM (Toronto) and, in collaboration with others, Toronto City Hall and the Toronto-Dominion Centre. Though still within the mainstream of modern architecture its work shows considerable variety, reflecting both the firm's size and changing international fashions. In 1970 Parkin established an associated American practice in Los Angeles, Calif. MICHAEL MCMORDIE

Parkin, John Cresswell, architect (b at Sheffield, Eng 24 Mar 1922). After graduating in architecture from U of Man and studies at Harvard under Walter Gropius, Parkin joined John B. PARKIN (no relation) in 1947. As partner in charge of design, Parkin oversaw the creation of a large number of outstanding works whose style was generally rectilinear, undecorated and classical modern. After John B. Parkin moved to Los Angeles in 1970, the firm continued as Neish, Owen Rowland and Roy, and John C. Parkin established the Parkin Partnership. His new firm won the competition for the original design of the National Gallery, Ottawa, 1976, and also that for the additions to the Art Gallery of Ontario. Through his career, Parkin has been an energetic and influential advocate for mod-


NATIONAL PARKS
National Park
0 500 1000 km
1 : 30 000 000
Kluane
Nahanni
Wood Buffalo
Jasper
Elk Island
Prince Albert
Mount Revelstoke
Glacier
Yoho
Kootenay
Banff
Pacific Rim
Waterton Lakes
Grasslands (Concept only)
Riding Mountain
Auyuittuq
Pukaskwa
La Mauricie
Kouchibouguac
Forillon
Prince Edward Island
Cape Breton Highlands
Terra Nova
Gros Morne
Kejimkujik
St Lawrence Islands
Georgian Bay Islands
Point Pelee
TERRESTRIAL REGIONS
WESTERN MOUNTAINS
1 Pacific Coast Mountains
2 Strait of Georgia Lowlands
3 Interior Dry Plateau
4 Columbia Mountains
5 Rocky Mountains
6 Northern Coast Mountains
7 Northern Interior Plateaux and Mountains
8 Mackenzie Mountains
9 Northern Yukon Region
INTERIOR PLAINS
10 Mackenzie Delta
11 Northern Boreal Plains
12 Southern Boreal Plains and Plateaux
13 Prairie Grasslands
14 Manitoba Lowlands
CANADIAN SHIELD
15 Tundra Hills
16 Central Tundra Region
17 Northwestern Boreal Uplands
18 Central Boreal Uplands
19 (A) West Great Lakes - St Lawrence Precambrian Region
(B) Central Great Lakes - St Lawrence Precambrian Region
(C) East Great Lakes - St Lawrence Precambrian Region
20 Laurentian Boreal Highlands
21 East Coast Boreal Region
22 Boreal Lake Plateau
23 Whale River Region
24 Northern Labrador Mountains
25 Ungava Tundra Plateau
26 Northern Davis Region
HUDSON BAY LOWLANDS
27 Hudson - James Lowlands
28 Southampton Plain
ST LAWRENCE LOWLANDS
29 (A) West St Lawrence Lowland
(B) Central St Lawrence Lowland
(C) East St Lawrence Lowland
APPALACHIAN
30 Notre Dame - Megantic Mountains
31 Maritime Acadian Highlands
32 Maritime Plain
33 Atlantic Coast Uplands
34 Western Newfoundland Island Highlands
35 Eastern Newfoundland Island Atlantic Region
ARCTIC LOWLANDS
36 Western Arctic Lowlands
37 Eastern Arctic Lowlands
HIGH ARCTIC ISLANDS
38 Western High Arctic Region
39 Eastern High Arctic Glacier Region
MARINE REGIONS
PACIFIC OCEAN
40 Hecate Strait
41 West Queen Charlotte Island
42 Queen Charlotte Sound
43 West Vancouver Island Shelf
44 Strait of Georgia
45 Coastal Fjords
GREAT LAKES
46 Lake Superior
47 Georgian Bay
48 Lake Huron
49 Lake Erie
50 Lake Ontario
ARCTIC OCEAN
51 Beaufort Sea
52 Viscount Melville Sound
53 Northern Arctic
54 Queen Maud Gulf
55 Lancaster Sound
56 Eastern Baffin Island Shelf
57 Foxe Basin
58 Hudson Bay
ATLANTIC OCEAN
59 North Labrador Shelf
60 South Labrador Shelf
61 Grand Banks
62 Laurentian Trough
63 Scotian Shelf
64 Bay of Fundy
65 Magdalene Shallows
66 North Gulf Shelf
67 St Lawrence River Estuary

ern design, not just in architecture but in industrial and urban design as well, and a mentor for the architects under his supervision.

MICHAEL MCMORDIE

Parkin, John Hamilton, aeronautical engineer (b at Toronto 27 Sept 1891; d at Ottawa 14 Nov 1981). After graduating in engineering from U of T, Parkin joined the faculty and worked during WWI on explosives production and aviation under T.R. Loudon. In 1917 he built a wind tunnel at U of T where models were tested for the Vickers flying boats, the first Canadian-designed aircraft, built at Montréal in the 1920s. Parkin joined the NATIONAL RESEARCH COUNCIL staff in 1929 and was director of mechanical engineering 1936-57. The Depression largely stifled the Canadian aviation industry, but Parkin wrote in that period a seminal paper on transatlantic airliners. During WWII Parkin's NRC staff provided technical support to new crown corporations building British aircraft and engines, began jet engine design in 1944, and perfected the system of keeping ice off aircraft propellors adopted throughout the world in 1945. Their work was completely reorganized in the postwar years to support the Avro and de Havilland companies' design and production of aircraft. Parkin also laid the foundations of the National Aeronautical Museum and wrote extensively on the early history of Canadian aviation, notably *Bell and Baldwin* (1964).

DONALD J.C. PHILLIPSON

Parks, National Canadians live in a land rich in natural beauty. The diversity of landscapes and seascapes and of the flora and fauna inhabiting them is part of a natural heritage preserved in national parks. In addition, this heritage encompasses the relationships of humans to the land (hunting and gathering activities, logging, agricultural development, etc). National parks serve 2 main functions: they protect in an unchanged state areas representative of major natural ENVIRONMENTS; they encourage public appreciation of the national heritage. For millenia Canada's landscape was affected only by natural forces. Now, however, agricultural and industrial activities are altering the environment at an accelerating pace. National parks protect ecosystems from the negative impact of human activities and allow ecological processes to function, ensuring the perpetuation of naturally evolving environments. National park staff inform the public about the parks, either through first-hand experience or through educational programs designed to bring knowledge of the parks to people in their homes. Opportunities are provided for recreational activities compatible with long-term preservation of park resources. Simultaneous preservation of park environments in a natural state and encouragement of public use of the parks requires the maintenance of a delicate balance. Preserving this balance is a major task for staff, who must study and document park resources and then apply this knowledge so that human impact on park ecosystems is minimized.

Beginnings

The Canadian national parks system began in Nov 1885, when an area of approximately 26 km^2 on the N slope of Sulphur Mt was set aside for public use. This area, the Cave and Basin Hot Springs, was the beginning of what is now BANFF NATIONAL PARK. The hot springs were discovered in 1883 by 2 railway employees working on the construction of the first transcontinental railway through the ROCKY MOUNTAINS. Knowledge of the discovery (and its potential as a tourist attraction) spread rapidly among the railway workers, and several conflicting claims were addressed to the minister of the interior. The government chose not to grant private title to the lands; instead, it was decided that they should be preserved for the benefit of all Canadians. In 1886 a Dominion land surveyor was hired to undertake a legal survey of the Hot Springs Reserve. This work resulted in a report by the commissioner of Dominion Lands that "a large tract of country lying outside of the original reservation presented features of the greatest beauty, and was admirably adapted for a national park." A bill to establish the first national park in Canada was introduced in the House of Commons in Apr 1887. The Rocky Mountains Park Act, establishing what is now Banff National Park, was passed on 23 June 1887.

Growth and Organization

Banff became a symbol of a new respect for the land. Interest in the development of other reserves ran high among members of Parliament and CPR officials and, in the years 1887-95, 5 new mountain reserves were set aside, unavailable for "sale, settlement or squatting." These later became YOHO, KOOTENAY, GLACIER, MOUNT REVELSTOKE and WATERTON LAKES national parks. The availability of large tracts of undeveloped public lands in western Canada had facilitated establishment of the mountain national parks. Early in the 20th century action was taken to develop national parks in eastern Canada, starting with the establishment of ST LAWRENCE ISLANDS NATIONAL PARK in 1904. The world's first distinct bureau of national parks, the Dominion Parks Branch, was formed in Canada in 1911 under the authority of the Department of the Interior. J.B. HARKIN, the first commissioner, served 1911-36. During his tenure, 9 national parks were established: ELK ISLAND (1913), Mount Revelstoke (1914), POINT PELÉE (1918), Kootenay (1920), WOOD BUFFALO (1922), RIDING MOUNTAIN, PRINCE ALBERT and GEORGIAN BAY ISLANDS (1929) and CAPE BRETON HIGHLANDS (1936). Harkin, who emphasized protection of the natural resources of the new parks, directed the passage of the National Parks Act in 1930. This Act still provides the legislative protection for national park lands.

Further establishment of national parks was sporadic until, in 1961, John I. Nicol became director of the National and Historic Parks Branch. Under his administration, 10 new national parks were created. Nicol also oversaw the preparation of the first Parks Canada Policy in 1964. The present Parks Canada Policy, written in 1979, also shows his influence as it emphasizes the preservation of natural ecological processes above all else. Since June 1979, Parks Canada (including National Historic Parks and Sites, Heritage Canals, Agreements for Recreation and Conservation, and National Parks) has been part of the Department of the Environment. Five regional offices administer park operations. The headquarters in Ottawa is responsible for policy development and long-range planning and research. Since 1884, 29 national parks have been established in Canada, ranging from AUYUITTUQ NATIONAL PARK Reserve on Baffin I to Point Pelée National Park on the most southerly tip of Canada's mainland; from TERRA NOVA NATIONAL PARK on the E shore of Newfoundland, to PACIFIC RIM NATIONAL PARK on the W coast of Vancouver I. The total area of Canada's national parks was, at last tally, 129 655 km^2, an area as large as England and equal to 1.3% of Canada's landmass.

To Protect for All Time . . .

The Parks Canada Policy (1979) states that the national parks are designed "to protect for all time representative natural areas of Canadian significance in a system of national parks, and to encourage public understanding, appreciation and enjoyment of this natural heritage so as to leave it unimpaired for future generations." To this end, national parks are protected by federal legislation from all forms of extractive RESOURCE use such as MINING, FORESTRY, AGRICULTURE and sport HUNTING. Only activities consistent with the protection of park resources are allowed. Efforts are directed at maintaining the physical environment in as natural a state as possible. If this can be done by allowing natural ecological processes to function with minimal interference, the perpetuation of naturally evolving land and WATER environments and their associated species is assured. Under certain conditions, however, active manipulation of natural ecological processes does take place. Active manipulation is necessary if the balance of park ecosystems has been so altered by human activities that a natural environment cannot be restored through natural ecological processes, or if park visitors, facilities or neighbouring lands are threatened. If active interference becomes necessary, techniques duplicate natural processes as closely as possible.

The effective protection and management of national parks requires an intimate understanding of park resources and the ecological processes controlling and influencing them. Parks Canada has developed several tools to help



Above Lake O'Hara in Yoho National Park, BC (*courtesy Parks Canada/P. McCloskey*).

achieve this understanding, eg, the natural resource management process, the basic component of which is a comprehensive natural resources data base, regularly updated for all parks. This information allows a park's capabilities and limitations for visitor use to be evaluated, problems identified, and specific plans for the protection of fragile resources or features made. Zoning, another technique for managing the tension resulting from the dual goals of preservation and use, ensures that most national park lands are protected in a wild state. The system defines 5 zones into which a park's land and water areas may be classified according to their fragility and capacity to accommodate visitors. In zone I, access is strictly limited or prohibited; zones II, III and IV provide increasing visitor facilities and allow more activities. Motorized access is prohibited in zones I and II. Zone V comprises townsites, visitor centres and park administration offices. National parks are also protected through the environmental assessment and review process, which ensures that all the possible adverse effects of any project or activity proposed for lands or waters in national parks are identified and evaluated, and that measures are taken to reduce impacts or cancel the project if its impacts are deemed unacceptable.

Representative Natural Areas of Canadian Significance ...

In the early days of park establishment, no method or set of criteria was used to designate potential park sites so as to ensure that the system of national parks would be truly representative of Canada's landscapes. Scenic vistas with potential for tourism were often chosen as locations for national parks; others were set aside to conserve unique or fragile habitats or to protect endangered species. To protect representative areas, Parks Canada developed the natural region concept. A natural region is an area containing a unique set of biological and ecological characteristics. In Canada, 48 natural regions have been identified: 39 terrestrial, 9 marine. Parks Canada plans to establish a park in each region; to date, 45% of natural regions contain national parks. The park system is far from complete. Proposals for new national parks are being considered for northern Ellesmere I; the West Isles area, S of the Bay of Fundy; northern Yukon; Bruce Peninsula; and the East Arm of Great Slave Lk. *See* map p1360.

The early emphasis was on providing recreational facilities with leisure orientation, eg, golf courses, tennis courts, ski resorts. Today the aim is to provide outdoor recreational opportunities consistent with the long-term protection of natural resources and requiring a minimum of man-made facilities. Hiking, canoeing, cross-country skiing and snowshoeing are examples of activities considered compatible with a park setting. In all national parks, naturalists are on hand to interpret the park environment to visitors. Interpretation programs are designed not simply to lecture visitors about the park, but to facilitate learning through firsthand experience. Self-guiding HERITAGE TRAILS, pamphlets and exhibits are also provided to assist enjoyment.

Beyond the park gates, naturalists work with schools, clubs and other associations, bringing park experiences to those who may never have visited a national park. Through television and motion pictures, all Canadians have an opportunity to participate. The range of visitor activities compatible with national park objectives is great, but not all acceptable activities can be carried out in all parks. To determine the appropriate activities and tolerable intensity of use for a particular park or site, the visitor activity management process (VAMP) is used. VAMP provides a framework for identifying those activities which will not adversely affect the environment of a particular park. Used with the natural resource management process, it ensures long-term protection, while providing better services to visitors.

International Role

Canada's national park system is part of a global network of more than 2000 protected areas in 120 countries. As a member of the International Union for the Conservation of Nature and Natural Resources (IUCN), Parks Canada contributes to the development of internationally accepted standards and criteria for parks the world over. Parks Canada is also the primary agency responsible for fulfilling Canada's obligations under the World Heritage Convention of the United Nations Education, Scientific and Cultural Organization (UNESCO). The convention recognizes the responsibility of all nations to protect places of such unique natural and cultural value that they are considered part of the heritage of all mankind. KLUANE and NAHANNI national parks, L'ANSE-AUX-MEADOWS National Historic Park and the BURGESS SHALE of Yoho National Park have been designated World Heritage Sites. Waterton Lakes National Park has been chosen as a Biosphere Reserve for UNESCO's Man and Biosphere Program, which recognizes outstanding examples of natural ecosystems throughout the world. *See* ARCHAEOLOGICAL SURVEY OF CANADA; FORILLON NATIONAL PARK; FUNDY NATIONAL PARK; GRASSLANDS NATIONAL PARK; GROS MORNE NATIONAL PARK; HISTORIC SITE; JASPER NATIONAL PARK; KEJIMKUJIK NATIONAL PARK; KOUCHIBOUGUAC NATIONAL PARK; LA MAURICIE NATIONAL PARK; PARKS, PROVINCIAL; PUKASKWA NATIONAL PARK; CONSERVATION.

LILLIAN STEWART AND MAX FINKLESTEIN

Parks, Provincial, areas of land and water, large or small, natural or man-modified, designated by any of the provincial governments, for the purposes of nature protection, recreation, TOURISM, historic preservation and education. They range in character from Polar Bear Provincial Park on Hudson Bay, a 29 093 km^2 wilderness park visited by less than 1000 people each year, to Bronte Creek Provincial Park, a 0.01 km^2 recreation park near Toronto that received 220 150 visitors in 1982.

History

As in the case of national parks, provincial parks originated at the end of the 19th century as a result of growing concern among civil servants, politicians and the general public about the depletion of natural resources, the degradation of scenic places and the need for an ever-expanding and increasingly urbanized population to have opportunities for recreation in a natural setting. The first provincial park established was ALGONQUIN, now a 7653 km^2 provincial natural environment park about 250 km N of Toronto. The idea for such a park was conceived in 1885 by an Irish immigrant, Alexander Kirkwood. As a clerk of the Crown Lands Department he had become concerned about the destruction of the northern forests and wildlife and was impressed by the new national parks at Yellowstone in the US and BANFF in the Canadian Rockies. Kirkwood advocated the creation of a National Forest and Park called Algonkin, to "perpetuate the name of one of the greatest Indian nations that has inhabited the North American continent." His enthusiasm and the practical support of a provincial land surveyor, James Dickson, led to the appointment of a royal commission and to the investigation of 18 townships in the District of Nipissing, S of the Mattawa R and lying between the Ottawa R and Georgian Bay. In 1893 this area, Algonquin, was declared "a public park and forest reservation, fish and game preserve, health resort and pleasure ground for the benefit, advantage and enjoyment of the people of the Province." Initially the park was a remote wilderness, still subject to lumbering but afforded improved fire and wildlife protection. However, as communications improved and accommodation was provided, its recreational function gained in importance and, in the early 1900s, it became a fashionable destination for tourists wishing to canoe, fish and camp in a wilderness setting.

The next provincial park, RONDEAU, comprising a peninsula on the N coast of Lk Erie, was declared in 1894. Featuring a Carolinian FOREST of species normally found farther S, and frequented by numerous migratory birds, it was already popular with duck hunters and picnickers. Over the next 50 years, as demands for CONSERVATION and recreation areas increased, 5 other provincial parks were established in Ontario. In the granite SHIELD and Boreal Forest Zone, Quetico was created in 1913 and LAKE SUPERIOR in 1944. Along the GREAT LAKES shoreline, Long Point was designated in 1921, Presqu'ile in 1922 and Ipperwash in 1938.

Québec's first provincial parks were created contemporaneously to those in Ontario and for similar reasons. In 1895 Laurentides Provincial Park, N of Québec City, and MONT-TREMBLANT, N of Montréal, were created to protect the forests, fish and wildlife for public benefit; however, resource exploitation continued in these areas. Other provincial parks were designated in the 1930s: Gaspésie in 1937, Mont Orford in 1938 and La Vérendrye in 1939. In the last 30 years many smaller parks have been established near cities to meet the demand for recreation in a natural setting.

British Columbia was the first western province to create provincial parks. STRATHCONA, a mountain and lake area on Vancouver I, gained park status in 1911 as a result of public support from such groups as the Alpine Club of Canada, the BC Natural History Society and the Vancouver I Board of Trade. Attention then focused on the mountains and glaciers of eastern BC, Mt ROBSON being declared a provincial park in 1913, followed by MOUNT ASSINIBOINE and Kokanee Glacier in 1922. The province's largest park, 9698 km^2 Tweedsmuir, located in the Coast Range, gained park status in 1938; Wells Gray, in 1939. In more recent years many more provincial parks, including large wilderness areas and small recreational sites, have been designated near cities in the S, as well as in the N.

Provincial status and ownership of resources came later to the Prairie provinces, and so did provincial parks. While the federal government designated national parks and forest reserves in the prairies, it was only with the transfer of resources legislation in 1930 that provincial parks, often originally forest reserves, were created. Alberta passed a Provincial Parks and Protected Areas Act in 1930; 2 years later, Aspen Beach, Park Lk, Gooseberry Lk, Saskatoon I, Lundbreck Falls, Ghost R, Hommy and Sylvan Lk were declared provincial parks. The last 3 were later deleted from the park system but, after jurisdictional changes in 1951 and 1967, more and larger parks were created. By 1972 Alberta had 51 parks, totaling 567 km^2. Saskatchewan's first 3 provincial parks were created in 1931 from the former forest reserves of Duck Mt, Cypress Hills and Moose Mt. Manitoba likewise took over the management of forest reserves such as Turtle Mt and Spruce Woods but the province's first provincial park, WHITESHELL, was only established in 1962.

The Atlantic provinces began establishing provincial parks in the 1950s, when recreation opportunities in natural areas relatively close to cities were increasingly in demand. Parks with both a recreational and nature conservation orientation have now been established but the number and area remains relatively small. Ter-

ritorial parks in YT and NWT are an even more recent innovation, primarily because most land in the territories is federally owned, recreation demand has been very limited (because of the small population and low levels of seasonal tourism), and unspoiled wilderness is generally abundant.

Provincial Parks Systems Today

Today, nearly 100 years after the first provincial park was established, all provinces have provincial park systems which usually consist of provincial parks and various other land units designated for recreational and nature conservation purposes. Each provincial system is different, and new parks are being designated each year.

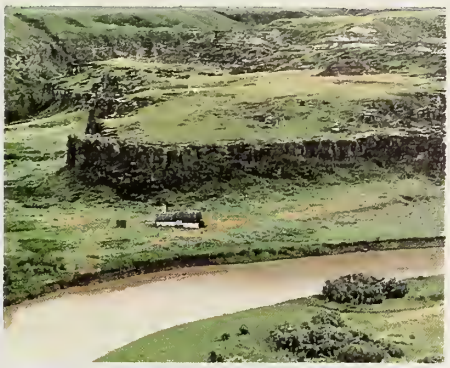
British Columbia, in 1978, had 320 provincial parks, 25 recreation areas, and one wilderness conservancy, totaling 44 817 km^2. Parks range from large, remote wilderness areas such as Tweedsmuir, to marine parks and small, recreational parks near cities. They are divided into 3 classes: class "A" comprises 252 fully protected natural or historic parks in which no commercially extractive industrial uses are permitted; discrete and regulated resource extraction is allowed in the 6 class "B" parks (no new ones will be created); the 62 class "C" parks are small, local, primarily recreational in character and, in time, will be transferred to local government jurisdiction. In 1978 the BC provincial park system received 11 million visitors.

Alberta, in 1980, had 59 provincial parks, 3 wilderness areas and 1 wilderness park together encompassing 7785 km^2. They range in character from large, lightly used, unspoiled wilderness areas in the Rockies (eg, Willmore), to lake-based recreational parks in the drier, more populated areas of eastern Alberta (eg, Sylvan Lk). They are categorized in 4 classes, there being one wildland park of 503 km^2, 19 natural environment parks covering 522 km^2, 3 preservation parks covering 698 km^2, and 36 recreation parks covering 109 km^2. In 1978 Alberta's provincial park system received 5 million visitors.

Saskatchewan, in 1978, had 125 provincial parks covering 5070 km^2. The system includes large wilderness areas in the northern forest, smaller parks on wooded prairie hills (eg, CYPRESS HILLS), and lake-based recreational parks (eg, Lac Peltier, near Swift Current). The parks are categorized as wilderness, natural environment, recreation, historic and regional, the last category containing the most parks. In 1978 Saskatchewan's provincial park system received 4.5 million visitors.

Manitoba, in 1978, had 163 provincial parks covering 10 231 km^2. They may be categorized as natural or recreational or given a designation such as wilderness, wayside, heritage, marine or historic. Whiteshell, E of Winnipeg, is a natural park as is Nopiming, a Saulteaux word meaning "into the wilderness." St Malo and Birds Hill, the latter 22 km N of Winnipeg, are primarily recreational. In 1978 Manitoba's provincial park system received 5 million visitors.

Ontario, in 1982, had 132 provincial parks encompassing 42 535 km^2. Additional lands designated by provincial conservation authorities and the St Lawrence and Niagara Park Commissions also serve nature conservation and recreational purposes. The park system includes wilderness areas (eg, 4758 km^2 Quetico), HISTORIC SITES (eg, 1555 ha Petroglyphs) and intensively used recreational areas (eg, Wasaga Beach on Lk Huron). The provincial parks are categorized as follows: wilderness, nature reserves, historical, natural environment, waterway and recreation; most are natural environment and recreation parks, which tend to be located near urban centres. In 1983, with the completion of provincial strategic land-use planning, 5 new wilderness parks were created in northern Ontario and over 100 other provincial parks identified for establishment in future. In 1982 Ontario's provincial park system received over 6 million visitors.



Milk River RCMP post at Writing-on-Stone Provincial Park (*photo by Harry Savage*).

Québec, in 1978, had 88 provincial parks encompassing 111 370 km^2. The system includes large wilderness areas (eg, La Vérendrye in the N) and small recreational parks nearer cities such as Montréal and Québec. Since 1977 they have been classified as conservation parks, recreation parks, hunting and fishing reserves and salmon-fishing reserves. In 1978 Québec's provincial park system received 7.1 million visitors.

New Brunswick, in 1978, had 62 provincial parks covering 224 km^2. Varying in size and orientation (recreation or conservation), they can be classified as recreation, rest areas, campgrounds, beach, marine, resource and wildlife areas. In 1978 they received 3.1 million visitors.

Nova Scotia, in 1978, had 100 provincial parks covering 130 km^2. Primarily oriented to roadside, coastal and urban recreation, they were classified as campgrounds, picnic, beach or roadside rest sites. An estimated 154 424 campers used these parks in 1978.

Prince Edward Island, in 1978, had 40 provincial parks, encompassing 31 km^2. While small in number and area they include nature preserves, natural environment, recreation, beach and historic parks. In 1978 the provincial parks of PEI received 1 million visitors.

Newfoundland, in 1978, had 81 provincial parks covering 1109 km^2. Most are small and recreation oriented, including public beaches, camping areas, day use parks and natural scenic attractions. However, there are several SEABIRD sanctuaries and the AVALON PENINSULA has a wilderness area. In 1978 an estimated 3 million people visited these parks.

Yukon Territory has a number of territorial campgrounds, primarily along the highways, used by tourists. Larger territorial parks are still in the planning stage.

Northwest Territories have established some campgrounds near tourist destinations but no territorial parks have been set up as yet.

Administration

Provincial parks are administered by provincial government agencies, commonly part of departments dealing with natural resources, tourism or culture. For example, in Ontario the provincial parks branch is part of the Ministry of Natural Resources; in BC it belongs to the Ministry of Lands, Parks and Housing. Staff are located in offices in the provincial capitals, in regional offices and in the parks, where a superintendent is normally in charge, assisted by wardens and interpreters.

Most provincial agencies have developed park-system plans that guide decisions on how many parks are needed, and what characteristics, size and location are appropriate. A management plan is normally prepared for each park to facilitate decisions on the protection of the park environment, the development of facilities and the provision of services. Given the wide variation in the character and purpose of parks, many agencies classify parks (eg, as wilderness, recreation or historic) and manage them accordingly. Because individual parks, especially large ones, are diverse in character and purpose, they are often zoned, some areas being designated for strict nature protection and others for tourism development. Deciding on the classification and zoning of a park is difficult and may require public involvement.

In trying to protect park environments, yet allow them to serve the needs of visitors, park agencies face many management problems. Few parks are now ecologically self-sufficient; hence, management is needed to deal with fires, wildlife imbalances, diseases of animals and vegetation, and human impacts. The use of parks by visitors necessitates the provision and management of accommodation, transport and recreation facilities, information and education services, and safety features. Some of the problems facing park managers in recent years include maintaining fish stocks; preventing FOREST FIRES, littering and vandalism; protecting visitors from bears; eliminating poaching; reducing crowding in popular areas; dealing with new technologies (eg, snowmobiles, hang gliders, wind surfers); and reducing accidents from risk activities (eg, mountaineering, canoeing, winter camping). In recent years, to improve planning and management, environmental protection and visitor satisfaction, park agencies have undertaken more research and have regularly consulted the public through surveys and public hearings. Increasingly, opportunities are being provided for private enterprise, public interest groups and volunteers to become involved in running parks. JOHN S. MARSH

Parks, William Arthur, geologist, paleontologist, teacher (b at Hamilton, Ont 11 Dec 1868; d at Toronto 3 Oct 1936). A graduate of U of T (BA, 1892; PhD, 1900), he joined its staff in 1893 and became professor and head of the geology department in 1922. One of the founders and original directors of the ROYAL ONTARIO MUSEUM, he trained many students who became professional geologists and paleontologists. Parks was noted for his pioneer explorations in northern Ontario, his reports on Canadian building and ornamental stones, his studies on Paleozoic invertebrate fossils, and his discoveries and descriptions of Alberta dinosaurs. A fellow of the RSC and the Royal Soc of London, he was the author of some 80 scientific papers and (with A.P. Coleman) of *Elementary Geology, with special reference to Canada* (1922). LORIS S. RUSSELL

Parksville, BC, Town, pop 5216 (1981c), inc 1945, is located on the E coast of Vancouver I, 35 km NW of Nanaimo. First known as Englishman's River, Parksville was renamed after a pioneer resident, Francis Parks. It became an important stagecoach stop when the road between Nanaimo and Alberni was completed 1886. Early settlers, chiefly English, had arrived by 1890. Parksville depends primarily on tourism; it is a popular summer resort, having fine sandy beaches and good saltwater and freshwater fishing, and numerous motels. The town is also the commercial centre for a large logging and agricultural area. The townscape of Parksville is beach oriented and includes many attractive subdivisions and tree-lined streets. Nearby geographic features include Cathedral Grove, Little Qualicum Falls Provincial Park and the Mt Arrowsmith Ski Area. ALAN F.J. ARTIBISE

Parlby, Mary Irene, née Marryat, farm women's leader, politician (b at London, Eng 9 Jan 1868; d at Red Deer, Alta 12 July 1965). An early supporter of the UNITED FARMERS OF ALBERTA, in

1913 she helped form the first women's local. In 1916 she was elected president of the UFA's Women's Auxiliary; she tranformed it into the united farm women of alberta, which played a major role in fostering legislation relating to the welfare of women. In the 1921 provincial election she won the Lacombe riding for the UFA, holding it for 14 years and serving as minister without portfolio. She supported Acts concerning women's rights and participated in the PERSONS CASE in 1929. She was Canadian delegate to the League of Nations in 1930 and she retired from politics in 1935. ERIC J. HOLMGREN

Parliament, strictly, the HOUSE OF COMMONS, the SENATE, and the Crown represented by the GOVERNOR GENERAL. When it is said that Parliament is supreme (meaning Parliament is beyond the interference of any body), all 3 institutions are included. In common usage, however, the House of Commons alone is often equated with Parliament, which derives from a time when absolute monarchs summoned their legislature to legitimate their taxing and other measures to a time when constitutional monarchs, with royal prerogatives "tamed" by a legislature, primarily acted only on the advice of ministers who were entitled to proffer advice only so long as they could maintain the support of the "commoners."

The bicameral nature of the Canadian Parliament was deemed a necessary inducement to bring provinces of varying size and power and with widely different regional concerns into the broader union that comprised Confederation. However necessary to the original union, the Senate, as a nonelective body, has been constantly subjected to cries for its abolition or reform, although as a committee of "sober second thought" or as a true institutional reflection of a federal Canada, it has many attractions. The House of Commons has become the more important chamber, not least because the government of the day stands or falls on its support. The practical consequence of invoking the supremacy of Parliament is the legislature's capacity to act as the great debating, if not educational, forum for the nation. This capacity, joined with the historic right to have grievances settled by the Crown before approving money in support of the Crown's activities ("control of the purse"), vests in the legislature not only the formal responsibility for approving statutes but also a continuing critical overseeing of executive actions. To this end, according to constitutional requirement, Parliament (as well as each provincial legislature) shall meet at least once a year and no more than 5 years should elapse between elections for a new legislature — only a war, invasion or insurrection can interfere with this guarantee. A normal parliamentary session (following rule changes in 1983) is now divided into semesters with provision for vacation adjournments. The proroguing of Parliament brings an end to a particular session and when reconvened the new session begins with a speech from the throne announcing the government's legislative program for the session. Dissolution, which marks the end of a Parliament, can occur any time within the 5-year period and is invoked by the governor general on the advice of the PRIME MINISTER. Dissolution involves an election and the formation of a new Parliament.

Protections also exist to ensure that Parliament shall not only be unconstrained in what it can debate but that the individual legislators shall enjoy complete freedom of speech. The rules of Parliament (self-prescribed) guarantee the rights of opposition parties to criticize without fear of retribution by the governing party.

The formation and operation of Parliament is dependent upon political parties; elections are fought and successful candidates find their seats in the legislature on a party basis, and it is through parties that the House and its committees conduct business. The capacity of CABINET to exert leverage on party supporters guarantees that the government's business will be piloted through the reefs of opposition. Indeed, it is the Cabinet's power, through its control of the party, that is criticized for undermining the traditional capacity of Parliament to hold government responsible through the threat of a no-confidence vote. Party discipline enables the Cabinet to counter with the threat of dissolution to force members to toe the line or place their seats at risk in an ensuing election. This shift in the balance of power puts in doubt Parliament's capacity to fulfil its traditional task of holding the executive to account. While parliamentary prerogatives are considerable, as an institution it is usually perceived as functionally inferior to the Cabinet and senior public service.

J.E. HODGETTS

Parliament, Library of, initially formed in 1841 by the amalgamation of the legislative libraries of Upper and Lower Canada. In 1849 the Parliament Buildings in Montréal were burned by a mob protesting the REBELLION LOSSES BILL and only 200 of the 12 000 books were saved. Re-established in Ottawa after completion of the original PARLIAMENT BUILDING, the present building was the only structure left after the disastrous fire of 1916. The marvellous neo-Gothic structure was preserved in the new Parliament Buildings. The library's large collection of books and documents is carefully chosen to meet the demands of its parliamentary clientele. A research section provides substantial assistance to House members and parliamentary committees. The library's collections are available to other libraries through interlibrary loan. Under the Library of Parliament Act, the library is considered a department for administrative purposes and the parliamentary librarian holds the rank of deputy minister.

Parliament, Opening of, may refer either to the beginning of the first session of PARLIAMENT after a general election or to the beginning of a subsequent session. All the proceedings take place in the Senate chamber and involve all 3 elements of Parliament — the CROWN, the SENATE and the HOUSE OF COMMONS. If there has been an election, on the first day of the session the Commons are summoned to the Senate, only to be told that the SPEECH FROM THE THRONE will not be read until they have selected one of their members as their spokesperson. The Commons then return to their own chamber and elect a Speaker. Later that day or on the next, the Commons, again pursuant to a summons delivered by the Gentleman Usher of the Black Rod, but now headed by their Speaker and the Sergeant at Arms bearing the mace, go up again to the Senate chamber. There the Speaker, standing at the bar of the Senate, presents himself or herself to the Queen's representative and requests that the traditional rights of the Commons be confirmed. When this has been done the Queen's representative (almost always the GOVERNOR GENERAL), reads the Speech from the Throne to the 2 Houses. The Senators are seated in their places; the Commons stand crowded behind their Speaker beyond the bar at the south end of the chamber. The prime minister is seated to the right of the throne. When the speech has been concluded the Commons are dismissed, and the Speaker leads them back to their own chamber. Once the governor general has departed the 2 Houses normally adjourn. On the next day both Houses begin working on the business of the session. If the session is not the first of a new Parliament, the Speech from the Throne can be delivered at once because a Speaker already has been chosen. JOHN B. STEWART

Reading: John B. Stewart, *The Canadian House of Commons* (1977).



The Parliamentary Library was the only structure left standing after the fire of 1916, and it was preserved in the new Parliament Buildings (*photo by Richard Vroom*).

Parliament Buildings, Ottawa, present one of Canada's most visually striking and historically remarkable building complexes. As first conceived, they were intended to serve a union of Upper and Lower Canada, but after CONFEDERATION had been negotiated they were available for the 4 constituent provinces. They provide space for the HOUSE OF COMMONS, SENATE, many members' offices, and committee rooms. Four main elements make up the complex: Centre Block with tower, flanking East and West Blocks, and a Parliamentary Library at the rear. The complex occupies a picturesque site above the OTTAWA R.

Architecturally the Parliament Buildings represent Canada's best example of the developed picturesque Gothic revival style. Prominent are such elements from medieval architecture as pointed arches, lancet windows with tracery, pinnacles with crockets, prominent exposed buttresses, and contrasting variegated stonework set off by brick trim. The East and West Blocks (1859-65, Stent & Laver) and the Library (begun by Fuller & Jones, 1859, redesigned with wrought-iron dome in 1870, completed in 1877) represent the original mid-19th-century Gothic revival style. The Centre Block was first designed in 1859 by Thomas FULLER and Chilion Jones, reworked in 1863 by Fuller and Charles BAILLAIRGÉ, and completed 1866; it was rebuilt (after a spectacular fire in 1916) by Pearson & Marchand in academic Gothic revival, more archaeologically correct but less colourful and eye-catching. Its grand central tower was originally called Victoria Tower, then, as rebuilt in 1917, Victoria Tower, and in 1933, the Peace Tower.

ALAN GOWANS

Reading: National Film Board, *Stones of History: Canada's Houses of Parliament* (1967).

Parliamentary Press Gallery is a loosely knit association of more than 300 journalists assigned by media organizations to cover Parliament and government. Traditionally seen as a small club of elite newspaper writers, it has expanded and become less cohesive since the admission of broadcasters in 1959 and the admission of camera and sound people in 1982.





The original Parliament Buildings (top), designed by Thomas Fuller, were a masterpiece of mid-19th-century Gothic revival style. This view is from the western approach. The current Parliament Buildings (bottom) were built after fire destroyed the original in 1916. The grand central tower was rebuilt in 1917 and named the Peace Tower in 1933 (*top courtesy Public Archives of Canada/PA-8338; bottom courtesy National Film Board/Photothèque*).

Many of its early records were destroyed in the Parliament Buildings fire in 1916, but the gallery is known to have existed at least since Confederation, and its organization has become more structured over the years. In the 19th century its members were usually attached to a political party, and even into the 20th century Conservative and Liberal reporters sat at opposite ends of the gallery, though this pattern disappeared as newspapers detached themselves from political affiliation.

As a group, members have often been described as an important instrument of political communication, but as an association the gallery has only minor influence. The executive of the association facilitates news coverage and arranges news conferences or access to information. Occasionally, it is drawn into more difficult problems, such as controversial applications for admission, the gallery's right to discipline members or its right to take a stand on public issues. A number of cases have established that although the gallery as an association has the right to deny membership, the Commons Speaker, as representative of the House, has the final authority to determine who will have access to facilities for coverage of Parliament.

CARMAN CUMMING

Parliamentary Procedure There are 5 basic principles of parliamentary procedure: first, the HOUSE OF COMMONS is master of its own proceedings; second, all discussion must be relevant to a motion and directed at a decision by the House; third, if possible, the House should not to be taken by surprise (the usual required notice for debates is 48 hours); fourth, a majority of those voting, not a majority of the membership, is required to carry a motion; and fifth, the entire session and not just one sitting is used as the basic time unit for procedural purposes.

The House of Commons has adopted a large number of *standing orders* to govern its work but it is guided also by law, by the SPEAKER's rulings, and practice. If there is no applicable Canadian rule, the House looks to the British House of Commons. All orders of the House are recorded in its minutes — the daily Votes and Proceedings and the sessional Journals — and from time to time consolidations of the standing orders are prepared for the convenience of members. The last major changes in the standing orders were made on 20 Dec 1968, 24 July 1969 and 12 Dec 1975. When points of order are being discussed members refer frequently to *Rules and Forms of the House of Commons of Canada*, by Arthur Beauchesne, and to Erskine May's *Parliamentary Practice*, a British work (1844), kept up to date by the clerks at Westminster.

The House expresses its opinions in *resolutions* and its will by *orders*. Most orders relate to its own conduct, eg, the decision that a bill be read a second (or third) time is in effect an order to the clerk to have the bill read. Most orders are particular, eg, "That Bill C-27 be now read a third time." Standing orders are those that remain in effect until altered by the House.

The House communicates by messages, addresses and bills. Messages are often sent to and received from the SENATE. The most famous address was that sent jointly with the Senate to Her Majesty in 1981 requesting the patriation of the CONSTITUTION. A *bill* is a request to the Queen that she assent to the text of the bill, making it a statute. No bill may go forward for royal assent unless it has passed the Senate and the House of Commons.

Decisions by the House are initiated by *motions*, most of which must be preceded by a printed notice which is sent to all members in the daily Notice Paper. The decision of the majority of the members voting on a question is taken as the decision of the House. Many votes are unanimous. Recorded divisions are very formal — each member rises in his place and his vote is recorded in the minutes. The expression "on division" is often used to show there is opposition but that those opposed see no point in using time for a recorded division. Since the Speaker and 19 other members constitute a quorum, a bill may pass the House even if the vote at every stage is only 10 Yeas and 9 Nays.

The many different kinds of business are dealt with in an exact program, the basic distinction being between items taking little time — often called routine proceedings — and the rest. Oral questions and routine proceedings take up a little more than an hour at the beginning of each sitting. Under routine proceedings, public bills are introduced and given first reading, standing COMMITTEES and special committees report to the House, written questions are answered and motions are made for concurrence mostly in committee reports. At the end of routine proceedings the House turns to the orders of the day. The second distinction is between private members' business and government business. Under the standing orders most of the House's time after routine proceedings is at the government's disposal (16 hours weekly), at best the private members have 4 hours a week.

Private members' business comprises *motions* (for proposed orders or resolutions), *private members' bills* (to change the general law), and *private bills*, and *motions for the production of papers*. Each new item is added at the bottom of the appropriate list. The lists are dealt with from the top and after an item has had a turn — in effect, an hour — it drops, unless completed, to the bottom of the list and is said to have been talked out. In contrast, all government orders go on one mixed list, Government Orders. The government House Leader may have items of government business dealt with in any priority, and may have the House return to the same item day after day. Government items are never talked out, although they may be delayed by FILIBUSTER. The 5 lists, together with written questions, are

printed in the *Order Paper*, which grows thicker as a session progresses. Private members' bills, which rarely become law nowadays (in 1964 the name of Trans-Canada Airlines was changed to Air Canada by a private member's bill and in 1982 Dominion Day was changed to Canada Day). Private bills are now used mainly to incorporate certain kinds of federal companies. Private members' motions are almost always talked out. Motions for the ministers to bring forth letters, documents and reports are relatively unimportant unless the government is in a minority; if the government has no objection they carry without debate, and debated motions will be defeated if the government has a majority.

The expression *orders of the day* originated with the House at Westminster which planned its work by ordering that particular items come up on specified days, even at specified hours. After a first reading the Speaker at Ottawa still asks, "When shall the said bill be read a second time?" and after the report stage, "When shall the said bill be read a third time?" Each item is really an order, and at the end of routine proceedings the Speaker announces, "Orders of the day." An item of business taken after routine proceedings is in the form of an order, and the order may be that the motion is to be moved that a particular bill be read a second (or third) time. Orders, motions and bills are often confused in the news. Government motions are intended not to change the law, but to produce an order or resolution of the House; they parallel private members' motions. The regular government motions for the Christmas, Easter and summer adjournments are debatable, unlike a simple motion to adjourn (for the day), which may initiate a division but not a debate. Government legislative business is composed of nonfinancial bills, ways and means business which results in taxation bills, and supply business which results in appropriation bills (*see* BUDGETARY PROCESS).

The first 2 motions of the ordinary legislative process — that permission be given to introduce the bill and that the bill be read a first time — are treated as routine proceedings without debate, but perhaps with a division. The motion that the bill be read a second time is debatable, so it is moved pursuant to an order of the day. If that motion carries, one of the Table Officers "reads" the bill. Nowadays the reading is symbolic; he simply says, "Second reading of this bill." Next the bill is sent to a committee, where it is studied closely, clause by clause, with or without amendments. It is then reported back to the House. If the bill has been to a committee other than a committee of the whole House, any member may move amendments to it after written notice. But if the bill has been to a committee of the whole House the report stage is only a formality. The last stage concerns the motion that the bill "be now read a third time and do pass." If this motion carries, the bill is sent to the Senate for passage there, or, if it has already passed there, it returns there to await royal assent. Bills introduced in the House of Commons are numbered C-1, C-2, etc, and Senate bills are numbered, S-1, S-2, etc. Royal assents, like SPEECHES FROM THE THRONE, are given in the Senate chamber.

Appropriation bills — allotting money for particular purposes — follow a similar process but normally take only a few minutes because the members have had time to examine the Crown's request (estimates) for supply in the standing committees. The standing orders set aside 25 days a year in the House as Opposition Days, to allow the Opposition to criticize the government before the House is asked to appropriate money.

Taxation bills, too, are advanced through a variation of the ordinary legislative process. The minister of finance usually announces major tax changes in a budget speech, moves a standard motion, "that this House approves in general the budgetary policy of the government," and the budget debate, limited to 6 days, then begins. Often the Official Opposition will move an amendment and a third party a subamendment. On 8 May 1974, the TRUDEAU government was defeated on a New Democratic Party subamendment to the budget motion, and on 13 Dec 1979, the CLARK government was defeated in the same way. During his speech the minister tables notices of ways-and-means motions outlining his proposed tax changes in some detail; these are intended to elicit comments on the practicality of the proposed changes from tax lawyers, accountants and others. Later, perhaps months later, he brings in his taxation bills, one for each ways-and-means motion. Taxation bills, which are considered in committees of the whole House, generally move slowly through the second-reading, committee and third-reading stages. The debate initiated by the Speech from the Throne is now limited to 8 days and attracts little attention unless the government is in a minority.

Debating takes place in the House, an unsuitable mode for some matters which are better considered in committees. In committees of the whole House the proceedings are far more flexible than they are in the House. Since Dec 1968, almost all nonfinancial bills are considered in the standing committees.

The defeat of the government in a division does not necessarily bring its resignation or an election — it may be prepared to carry on without the lost bill, as was the PEARSON government in Feb 1968, and the House itself may not regard the defeat as demonstrating a lack of confidence. The rules provide regular opportunities for explicit non-confidence motions by the Opposition; they can be moved as amendments to the Address-in-Reply motion, as amendments to the budget motion and as motions on 6 of the 25 Opposition Days. Even an explicit nonconfidence vote does not impose a legal obligation to resign or bring on an election, but a government that ignored such a vote would be mad. The House can force a government out of office by refusing to appropriate money.

The rules permit members to address oral questions to the CABINET daily. In Canada no written notices of the questions are required as they are in Britain, consequently the Canadian *question period* is more timely, turbulent and, some observers claim, trivial. The daily period for oral questions is the source of much of the news from Ottawa. A minister is not required to answer any or every question candidly; indeed the House would often regard completely truthful answers as contrary to the national interest.

Sometimes the House agrees to debate a matter not included among the orders of the day. Once the notice time has elapsed any government order of the day can be activated, even if it is the last one on the list, so normally the government has no need for emergency debates. Standing Order 26 enables private members to request an emergency debate. A motion to adjourn under S.O. 26 is debatable but may not be moved without special permission. The member must apply to the Speaker following routine proceedings; if the application is found valid it needs the support of only 19 others. These debates generally begin after dinner, even on Wednesday and Friday evenings, when the House does not ordinarily sit. The Speaker can terminate them when they become repetitious but in practice they continue until all members who wish to speak have done so. JOHN B. STEWART

Reading: John B. Stewart, *The Canadian House of Commons: Procedure and Reform* (1977).



Parr's print, *Hunters of Old*, was selected for a 1977 Canadian postage stamp (*courtesy West Baffin Eskimo Co-operative, Cape Dorset, NWT*).

Parlow, Kathleen, violinist, teacher (b at Calgary 20 Sept 1890; d at Oakville, Ont 19 Aug 1963). Trained entirely outside Canada, Parlow completed her studies with Leopold Auer at St Petersburg [Leningrad] Conservatory and made her professional debut in Berlin in 1907. A brilliant soloist and recitalist, renowned for tone, technique and breadth of repertoire, she toured Europe, Russia, the US, Canada and Asia. After 1927 her career was centered on teaching and chamber-music performance. Returning permanently to Canada in 1941, she taught at the Toronto Conservatory and founded the Parlow String Quartet, which, as the best-known quartet of its day (1943-58), influenced the musical taste of audiences across the country, introducing much unfamiliar music, including works by Canadian composers. BARCLAY MCMILLAN

Parr, graphic artist, hunter (b on southern Baffin I 1893; d at Cape Dorset, NWT 3 Nov 1969). Parr led a traditional nomadic existence for most of his life. A serious hunting accident obliged him to settle permanently in CAPE DORSET in 1961, where he began drawing at age 68. In his short artistic career he produced over 2000 drawings and contributed 34 prints to the annual Cape Dorset print collections. Filled with animals and hunters and drawn in a distinctive, primitive style, with little regard for naturalism or perspective, Parr's naive images are powerful expressions of an old man's love for a disappearing way of life. Often considered crude and childish, his works were largely unappreciated during his lifetime. Only after his death were there major exhibitions of his work, and a posthumously published print, *Hunters of Old*, was selected for a 1977 Canadian postage stamp. *See* INUIT ART. INGO HESSEL

Parr, John, soldier, colonial administrator (b at Dublin, Ire 20 Dec 1725; d at Halifax 25 Nov 1791). After a lengthy career in the army, he became governor of NS in 1782. Taking up his post just before some 30 000 LOYALISTS entered the maritime colonies, he was forced to deal with their resettlement and shortly found himself caught between the pretensions of the newcomers and the claims of older settlers, a situation that endured until the end of his administration. On the whole he acquitted himself well, though he won little popularity or admiration for his efforts. J.M. BUMSTED

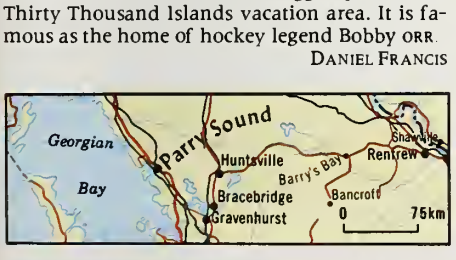
Parry, Sir William Edward, naval officer, arctic explorer (b at Bath, Eng 19 Dec 1790; d at Ems, Ger 8 July 1855). On 3 naval expeditions to the Canadian Arctic, Parry contributed to the eventual discovery of the NORTHWEST PASSAGE. He became an officer in the British Navy just as the Admiralty was turning to arctic exploration. After accompanying Sir John Ross to Baffin Bay and Lancaster Sd in 1818, he led his own expedition in 1819 up the sound as far as Melville I, where his 2 ships wintered. Only one other naval expedition would get this far W in the 19th century. In 1821 he led his second expedi-

tion in search of a navigable exit to the W out of Hudson Bay. After 2 winters in the ice, he admitted that no such channel existed. Parry returned to the Canadian Arctic for the last time in 1824, wintering in Prince Regent Inlet and losing one of his ships before returning to England. Before leaving arctic exploration altogether, he attempted to reach the N Pole from Spitzbergen in 1827 and, though he failed, he reached farther N than anyone else would do for close to 50 years. DANIEL FRANCIS

Parry Channel is a sea passage running E-W through the arctic islands. Named for explorer W.E. PARRY, it begins at LANCASTER SOUND, passes through Barrow Str, leads into Viscount Melville Sound, finally reaching the BEAUFORT SEA through M'Clure Str. The permanent pack ice in M'Clure Str is an impassable obstacle to further navigation through the Parry Channel, forcing ships making the NORTHWEST PASSAGE to detour far to the S. The straight, parallel coastlines and great depths found in Parry Channel suggest it is a deep, submerged trough caused by past intense movements of the Earth. It marks the geological divide between Precambrian rocks of the Canadian SHIELD to the S and sedimentary rocks forming the arctic islands to the N. DOUG FINLAYSON

Parry Islands, a group of High Arctic islands comprising MELVILLE, BATHURST and CORNWALLIS islands, as well as a number of smaller ones. Melville is the largest of the 3 main islands and is also the highest, exceeding 1000 m in places. The islands are topographically similar since all are part of the same geosynclinal structure; each takes the form of a level plateau 600 m in elevation that ends abruptly in 300 m high cliffs along many parts of the coast. The most striking feature of the surface of Melville and Cornwallis islands is the almost complete absence of vegetation, exposing a great number and variety of patterned ground features. DOUG FINLAYSON

Parry Sound, Ont, Town, pop 6124 (1981c), inc 1888, located on the eastern side of GEORGIAN BAY, 225 km N of Toronto. The name honours British explorer Sir William Edward PARRY. The site was purchased in the middle of the 19th century by W.H. Beatty, a land surveyor looking for fresh timber limits. The settlement was laid out after 1867. Beatty family interests were managed by a son, William, Jr, who treated the town as a personal fiefdom and was known as "the governor". He enforced prohibition and at one point circulated his own money — Beatty script. For many years logging was the major industry. The town also boasted a deep-water harbour. As logging declined, tourism increased and now the town is the centre of the ruggedly beautiful Thirty Thousand Islands vacation area. It is famous as the home of hockey legend Bobby ORR. DANIEL FRANCIS



Parsnip (*Pastinaca sativa*), perennial plant grown as an annual VEGETABLE crop and belonging to the Umbelliferae family. Of Eurasian origin, parsnips were brought to N America by European colonists. They have white, fleshy, sweet, slightly acrid roots. Stems, with ovate leaflets, are 40-75 cm high. Improved varieties (eg, Hollow Crown) have short tops and smooth roots, 25-30 cm long and 6-8 cm thick at the shoulders. Canada's temperate climate is well suited to parsnips. Seed germination and root development are slow, requiring 100-125 growing days. Seeds are sown early, 1.5 cm deep, in fertile, well-drained and slightly acid sandy loam or muck soils. Depending on soil and variety, plants are spaced 5-10 cm apart. Chemical weed control or early cultivation is essential. A few radish seeds planted with parsnips mark the rows to permit earlier weed control; they also break crusted soil. INSECT PESTS include leafhoppers and carrot rust flies; diseases, leaf-spot canker. Parsnips are rich in potassium. In 1983 Canada's production was 192 ha, 2706 t, worth nearly $1.2 million. Ontario produced one-half of this crop. V.W. NUTTALL

Parsons, Robert John, journalist, politician (b at Harbour Grace, Nfld, *c*1802; d at St John's 20 June 1883). With William Carson and other Newfoundland Liberals, he founded the weekly *Newfoundland Patriot,* in 1833 and became its sole owner and editor (1840). Eloquent and occasionally outrageous in his defence of the Liberal cause, he wrote a satirical putdown of Chief Justice Henry BOULTON in 1835 who sentenced him to jail for contempt of court. This episode won Parsons esteem in Liberal circles. He was elected to the Assembly in 1843 and sat almost continually until 1878. Although a Liberal, Parsons was prepared to break with the party line on occasion and consequently never held high office. Yet he was a powerful influence, a forceful advocate of RESPONSIBLE GOVERNMENT in the 1850s, and in 1869 one of the leaders of the anti-Confederate campaign. GEOFF BUDDEN

Parti bleu, political group formed in Québec about 1850 around the moderate reform beliefs of Louis-Hippolyte LAFONTAINE; the name derived from an attempt to establish an identity distinct from that of the extremist, anticlerical PARTI ROUGE. With the encouragement of the church, the "bleus" attracted much popular support. Members such as Augustin-Norbert MORIN and George-Étienne CARTIER provided the French Canadian leaders in the PROVINCE OF CANADA's government. The party was associated with English-speaking Tories and, through co-operation with Canada West's moderate reformers, provided the basis for the CONSERVATIVE PARTY.

Parti canadien, founded during the early 19th century, was a political party of middle-class French Canadian professionals and merchants, although it attracted some English speakers. Its newspaper, *Le Canadien,* was first published in Québec City 22 Nov 1806. Around 1810, under the leadership of Pierre Bédard, the party was involved in agitation for ministerial responsibility and for greater power and control of political patronage by French Canadians. In Mar 1810, at the insistence of Gov CRAIG, Bédard and some *Le Canadien* staff were arrested, and thereafter Bédard's control of the party declined. After about 1815 Louis-Joseph PAPINEAU emerged as leader, and the party went on to fight against the 1822 proposal for union of the Canadas. In 1826, to reflect a growing sense of FRENCH CANADIAN NATIONALISM, the Parti canadien became the Parti PATRIOTE. *See also* LOWER CANADA.

Parti national, political party fd in 1871 by Québec Liberals including Honoré MERCIER and Louis Jetté. It unsuccessfully attempted to acquire the clerical support for liberalism that the PARTI ROUGE lacked. Mercier revived it in 1885 during the uproar over Louis RIEL's execution. The Parti national, a coalition of Liberals and disenchanted Québec Conservatives using a platform based on French Canadian nationalism, won the 1886 provincial election. It governed Québec until 1891, when the Mercier ministry was dismissed by the lieutenant-governor for involvement in the BAIE DES CHALEURS SCANDAL. It was soundly defeated in the 1892 provincial election.

Parti pris, political and cultural magazine fd 1963 by Montréal writers André MAJOR, Paul CHAMBERLAND, Pierre Maheu, Jean-Marc PIOTTE and André Brochu, all in their twenties and convinced that Québec needed a revolution to produce an independent, socialist and secular state. Young activist intellectuals in QUIET REVOLUTION Québec soon began to gravitate to the magazine. During its 5 years, *Parti pris* was simultaneously a high-quality magazine (53 issues appeared, in 39 installments); an avant-garde revolutionary centre which was active in demonstrations, the training of militants, the Club Parti pris and later the Mouvement de Libération Populaire; and a publishing house which put out some 20 works, most of them literary and some outstanding. The publishing house, Éditions Parti pris, continued to exist after the magazine had disappeared, primarily because of the efforts of poet Gérald GODIN.

The magazine allied itself with the major ideological currents of its time: Marxist-Leninism, Sartrean existentialism and Third World decolonization. It drew heavily on these ideologies to develop a virulent analysis of Québec as a colonized society whose inhabitants were economically, culturally and politically deeply alienated, dispossessed of their being along with their homeland. *Parti pris* consistently rejected "French Canada" and called "Québec" into existence. On the literary level, it was known mainly for the JOUAL writing it published. The group put out powerful, shocking works, such as *Le Cassé* (1964; tr *Flat Broke and Beat,* 1964) by Jacques Renaud, *L'Afficheur hurle* (1965; tr *The Shouting Signpainters,* 1972) by Paul Chamberland, and an extraordinary essay, *Nègres blancs d'Amérique* (1968; tr *White Niggers of America,* 1971) by Pierre Vallières. *Parti pris* was a brilliant literary generation. In the words of a contemporary, it was the Québec "Intellectual" Liberation Front. ROBERT MAJOR

Parti Québécois, a nationalist party in Québec created in 1968 by a fusion of 2 independentist movements. Its objective is the establishment of SOVEREIGNTY-ASSOCIATION, ie, associate state status for Québec on an equal basis with the Government of Canada. Led by former Liberal minister of natural resources in the Lesage government and television personality René LÉVESQUE, it suffered 2 electoral defeats (in 1970 with 23.2% of the popular vote, it elected 7 members to the National Assembly; in 1973 it elected 6 candidates but garnered 30.8% of the vote), but achieved power in 1976 with 41% of the popular vote and 71 seats. A REFERENDUM was held in May 1980 in which the government asked for a mandate to negotiate with federal authorities on sovereignty-association. Despite the loss of that referendum (60-40%) the party was re-elected in 1981 winning 82 seats. The party is supported across the socioeconomic spectrum, including both the working class and the new bureaucratic class that emerged from the QUIET REVOLUTION of the early 1960s. The PQ has managed to win the participation of both labour and business in tripartite *sommets de concertations* (summit conferences) in many fields of economic activity, eg, fisheries and the textile industry, but in 1983 lost some of its traditional support from labour through its response to labour unrest. Its controversial LANGUAGE POLICY (*see* BILL 101) has been opposed by the English-speaking minority in the province and attacked by some French-speaking Québécois who feel it does not adequately protect the French language. It has delayed the pursuit of sovereignty-association largely because, according to most opinion polls, a majority of people in Québec still prefer to be part of Canada. This delay, ironically, may also have cost the PQ support from some of its traditional bases. Late in 1984, after the announcement of a neo-federalist credo by René Lévesque, the PQ government was shaken by the resignation from Cabinet of a group of *independentistes*, including Jacques Parizeau. CLINTON ARCHIBALD

Parti rouge, also known as Parti démocratique, established about 1848 by a group of radical young francophone intellectuals who had helped found the INSTITUT CANADIEN and who were inspired by the republican ideas of Louis-Joseph PAPINEAU. Members included the DORION brothers, Louis-Victor SICOTTE, Joseph Papin and Joseph DOUTRE. In the legislature and through *L'Avenir* and *Le Pays* the *rouges* advocated repeal of the ACT OF UNION, annexation of Canada to the US, extension of the elective principle of government to all offices, abolition of the SEIGNEURIAL SYSTEM and universal suffrage. Although their extremism moderated over time, they remained staunchly anticlerical and opposed to the ULTRAMONTANE doctrines of Mgr BOURGET, thereby ensuring the continued animosity of the church and limited popular support. After Confederation the Parti rouge merged with the CLEAR GRITS of Canada West to form the basis of the LIBERAL PARTY.

Partridge, Edward Alexander, farmer, farm leader, author (b at Whites' Corners [Dalston] near Barrie, Canada W 5 Nov 1862; d at Victoria 3 Aug 1931). Partridge grew up in an area where farm militancy was well established in the 1870s. He went west with brother Henry in Dec 1883 and taught school while homesteading E of Sintaluta. During the NORTH-WEST REBELLION he served in the Yorkton Company of Infantry. In the mid-1890s Partridge became active in the Patrons of Industry in the Sintaluta area. A bustling community dominated by Ontario settlers, Sintaluta became a centre for strong regional and political movements. In 1902 Sintaluta farmers charged the CPR with improperly allocating grain cars under the Manitoba Grain Act. Henry Partridge, the magristrate who judged the case, found the company guilty. This largely symbolic victory over the railway made the Partridge brothers important figures among the Saskatchewan grain growers. Early in 1905 a few neighbours sponsored a trip by Ed Partridge to investigate the operations of the Winnipeg Grain Exchange. Shocked by the speculation he found, he quickly developed a plan for a co-operative marketing program, and the Grain Growers Grain Co was organized in 1906. After a bitter struggle to join the Winnipeg Exchange in 1907, the company prospered. Partridge was its first president and he was also instrumental in starting in 1908 GRAIN GROWERS' GUIDE, the voice of Prairie farmers.

Partridge was a visionary who believed that the keys to western development were government control of the grain-marketing system to ensure reliable, inexpensive delivery of grain, and the development of the HUDSON BAY RAILWAY. He inevitably found himself in fierce struggles with politicians and other farm leaders and in 1912 he resigned from the Grain Growers Grain Company. He realized that he was a weak administrator and was primarily responsible for selecting his successor. Shortly afterward he started the Square Deal Grain Co, but when it declined in 1913 he returned to Sintaluta.

Despite a number of personal tragedies and failing health, he re-entered the farm movement as elder spokesman for a new generation of agrarian radicals at the end of the war. He was revered by many within the Farmers' Union of Canada, a radical farm movement formed in 1921. He became once again a popular spokesman for farmers and in 1926 he published *A War on Poverty*. A strange mixture of Ruskinian socialism, Old Ontario toryism, western utopianism and religious fervour, the book called for an independent western state, Coalsamao. It was a highly individualistic vision that attracted much interest but few converts. Plagued by despondency at times throughout his life, Partridge died, probably by suicide, in 1931.

IAN MACPHERSON

Party Financing Canadian political parties need money for election expenses (traditionally the only reason), to maintain organizational activities (accomplished more or less successfully) and to conduct research for policy purposes (a poor third). The financing of Canadian parties reflects the country's institutions. The Cabinet and parliamentary systems tend to centralize power and funds in the hands of the leadership, but the influences of FEDERALISM result in a dispersal of both among competing national and provincial governments and party structures. From Confederation until about 1897 party funds were an essential tool in overcoming the fissiparous tendencies of weak partisanship — the "loose fish" phenomenon and dominant ministerialism. Party chiefs such as John A. MACDONALD were intimately involved in fund raising and in distributing election funds to ensure the election loyalty of their followers. Inevitably they were also involved in questionable dealings with financial interests in search of concessions, contracts and favours, as exemplified by the PACIFIC SCANDAL of the 1870s and other railway scandals (*see* PATRONAGE). As partisanship crystallized, party leaders tried to disengage themselves from the raising of campaign war chests, but W.L. Mackenzie KING's entanglement in the Beauharnois Scandal of 1931 (King, who had accepted money from a promoter of a hydroelectric plant, called it his "vale of humiliation") proved that it continued to haunt them. Fund-raising specialists gradually assumed this role, freeing party leaders from immediate involvement in this necessary but messy aspect of party politics (*see* CORRUPTION; CONFLICT OF INTEREST).

Until recently, the large industrial and financial interests of Toronto and Montréal (hundreds rather than thousands of givers) provided nearly all the funds required by the Liberal and Progressive Conservative parties. Although recent reforms at the federal and provincial levels have modified this pattern, campaigns at all levels, including the municipal, depended largely on the same sources as the central party funds. Currently, multinational firms and their Canadian branches play a large role in the financing of the Canadian PARTY SYSTEM. Fund raising was traditionally the responsibility of committees in Toronto and Montréal and of various satellite groups in Hamilton, London, Winnipeg, Calgary and Vancouver, though western fund raisers have lately become more prominent because of shifts in the Canadian economy. The main fund raisers were not responsible to the formal, elected party organs and rarely held elective office. Appointed by the party leader, they were usually co-opted from the legal or financial communities, or else they inherited their positions from older family members. Their usual reward when a party achieved office was appointment to the Senate or the bench. The traditional model was altered by the rise of third parties and the resurgence of provincial economic and political power after WWII. The CO-OPERATIVE COMMONWEALTH FEDERATION (CCF), the SOCIAL CREDIT movement in Alberta and Québec, and the PARTI QUÉBÉCOIS tapped new financial resources and became largely self-financing. The NEW DEMOCRATIC PARTY has relied heavily on its membership but receives substantial support from trade unions, some of them headquartered in the US. The emergence of provincial power has not lessened party dependence on business but has altered the entry point for party monies and reduced the former dependence of provincial organizations on federal ones.

As a result of the demise of the notorious UNION NATIONALE machine of Maurice DUPLESSIS and because of scandals in Ottawa and the provinces, such as the RIVARD (which involved a drug peddler) and Fidinam (an Ontario real-estate scandal) affairs, and because of the effect of the American Watergate scandal, there was a movement for the control of election expenses during the 1960s and 1970s. A Federal Advisory Committee on Election Expenses led to the ELECTION EXPENSES ACT (1974) while the Ontario Commission on the Legislature led to the establishment of the Commission on Election Contributions and Expenses. Reforms have now been adopted by 7 provinces, as well as by some municipal bodies. The role of party funds, formerly ignored, has been recognized. Control bodies have been instituted and ceilings imposed on party and candidate spending and contributions. Disclosure of the amounts and sources of income and expenses is mandatory. Incentives for individual donors have been provided in the form of graduated tax credits favouring smaller gifts. No other jurisdiction has yet followed Québec's lead in banning corporate and other organizational contributions. Subsidies in the form of reimbursements for a portion of the total permitted expenses for candidate and party spending at election time are now provided at the federal level and in a majority of provinces. The maximum permitted expenditures for parties and candidates at the federal level will be adjusted according to the rise in the CONSUMER PRICE INDEX. In the 1979 federal general election 1427 candidates raised over $15.6 million from 88 431 contributors and spent almost $16 million, over 50% of which was reimbursed from the federal treasury; the 1980 general-election figures were about the same. Total central registered party spending for the 1979 campaign amounted to over $10 million, of which more than $2 million (representing 50% of the broadcasting time purchased by the parties) was reimbursed by the federal treasury. Parties are permitted a combined total of 6.5 hours broadcast time; the allocation to each party is roughly determined by the number of seats held and the size of the popular vote won by each party in and for the outgoing Parliament. Total spending by the parties in the 1980 campaign rose to almost $11.5 million, but the reimbursement was sharply higher, rising 25% to nearly $2.5 million because of the increase in broadcasting expenditures. The reimbursement of 50% of broadcasting time costs has now been transformed into a reimbursement of 22.5% of the total permitted costs of qualifying political parties.

Much of the mystery surrounding political funds has been eliminated, with consequent equity among political competitors, and escalation of costs has been checked. Grass-roots donations have been encouraged and the number of individual personal gifts has multiplied. Nevertheless, the 2 major parties (particularly the Liberals) still rely heavily on the corporate sector, as does Social Credit in BC. The New Democrats are still a grass-roots party but trade-union contributions and affiliation dues are important resources. Only in Québec are personal contributions a significant source of funds. Despite reforms, the financial dependence of the Canadian party system on corporations, on the trade-union elite and on the state persists.

KHAYYAM Z. PALTIEL

Reading; Khayyam Z. Paltiel, *Political Party Financing in Canada* (1970); Howard R. Penniman, ed, *Canada at the Polls, 1979 and 1980: A Study of the General Elections* (1981); *Report of the Advisory Committee on Election Expenses* (1966).

Party System Although Canada is often thought of as a 2-party system, it is more accurate to say that (federally) it is a multiparty system in which one party usually dominates. Nationally, since 1921, there have been representatives of at least 3 and sometimes 4 or 5 political parties in Parliament. The LIBERAL PARTY, the CONSERVATIVE PARTY and the CO-OPERATIVE COMMONWEALTH FEDERATION (and its successor the NEW DEMOCRATIC PARTY) have been represented in

every Parliament since 1935. Other parties sometimes represented have included the PROGRESSIVE PARTY, the UNITED FARMERS OF ALBERTA, SOCIAL CREDIT, the BLOC POPULAIRE and the Labor Progressive Party. Indeed, more than 100 other political parties have run at least one candidate in an election. In 1984, 4 political parties were registered, ie, eligible to run candidates with the party name designated on the ballot, to receive donations and issue income-tax receipts, and to be reimbursed for certain expenses by the federal government. To be registered for a federal election, a political party must have had at least 12 members in the previous Parliament, or must nominate at least 50 candidates.

Provincially the situation is more complex. Not only have each of the Liberals, Conservatives, CCF-NDP and Social Credit parties formed the governments of at least 2 provinces, but in provinces such as BC the NDP and the Social Credit are the only political parties to have formed governments in the last 30 years. Between 1936 and 1960, Québec politics was dominated by the UNION NATIONALE which was not represented in federal elections. Alberta has been dominated by one party, as has Ontario.

Origins of Party System Despite the plethora of parties that have been formed to run candidates at the national level, only the Liberal and Conservative parties have ever had a realistic possibility of taking office. Both parties took shape in the mid-19th century. The Conservatives were formed from a Liberal-Conservative coalition, Tories and French-speaking *bleus* in the Province of Canada allied with more liberal elements. The Liberals were created from a coalition of the CLEAR GRITS of Upper Canada, the anticlerical *rouges*, and the reform element in the Maritimes. The 2 parties at their inception reflected religious, geographic and other differences. The Conservative Party was grounded in Toryism, ie, a belief in the importance of hierarchy or privilege in political and social life, in collectivism and in the nation as the fundamental basis of political life, but the party also absorbed tenets of "business liberalism," an important variant of liberalism. As a broad set of beliefs, liberalism is represented not only in the laissez-faire individualism of Western CONSERVATISM, but in the mild reformism of the moderates within the New Democratic Party. Liberalism asserts the paramountcy of the individual over the collectivity, and rejects the belief that individuals are fixed to predestined spots in a social hierarchy. Business liberalism identifies the state as a primary threat to individuals, and their freedom, particularly the right of individuals to behave as they please in the marketplace, but business liberals also attach great importance to the rule of law, the independence of the judiciary and the accountability of the executive to the legislature. In the 20th century, welfare liberalism, a rival variant, arose. Welfare liberals regard the concentrated power of large corporations as the chief menace to individual liberty and argue that the state has an important role to play in the redistribution of wealth.

In other competitive party systems, trade unions and co-operative movements are major sources of party funds, but historically (and currently) both the Liberals and Conservatives rely on the economic elite in Montréal and Toronto for PARTY FINANCING. In strategy, both parties discount the significance of class differences in Canada (*see* CLASS AND POLITICS), and have consequently found themselves in the difficult position of proclaiming a commitment to social reform while trying not to arouse the ire of their financial supporters. However, with the reforms in election financing in the 1970s this dependency has lessened, and both Liberals and Conservatives limit the size of any single contribution to avoid even the appearance that campaign contributions buy political favours.

In the 20th century, the party system in Canada was expanded by the growth of what have been described in C. Winn and J. McMenemy's *Political Parties in Canada* (1975) as movement or fragment parties, or a combination of both, the development of which was facilitated by the British parliamentary system employed in Canada. Because the focus of this system is the constituency, the election of only a few members of Parliament by a minor party still allows that party to criticize the government and initiate procedural motions in House of Commons debates. Fragment parties, ie, those established by a disenchanted ex-member of a parliamentary party have included the Nationalists, (founded by Henri BOURASSA), the Reconstruction Party (founded by H.H. STEVENS), the New Democracy Party (founded by W.D. Herridge) and Action Canada (founded by Paul HELLYER). These parties tended to be defined by the founder's personality. Parties such as Social Credit and the Co-operative Commonwealth Federation originate in SOCIAL MOVEMENTS. These class and region-based parties are usually crippled electorally by bicultural division. The populist party, Social Credit founded in Alberta by William ABERHART, has been successful as a regional or provincial party but had limited success nationally. In Alberta, it was an alternative to the Conservative and Liberal parties and the government of the United Farmers of Alberta, which had allied itself with the CCF. In Québec, where Social Credit erupted in 1962 under the leadership of Réal CAOUETTE, it exploited the concerns of rural and small-town dwellers with the economic and political establishment of the country (*see* CREDITISTES).

The social democratic CCF, a federation of many groups and movements, rejected in its structure the model of the parliamentary parties to secure regular involvement of grass-roots members; this structure was modified in the CCF's transformation into the NDP.

The Progressives were a mixed fragment movement party founded in Manitoba by T.A. CRERAR but supported by the popular United Farmers of Alberta. They represented a radical interpretation of liberalism combined with some collectivist concerns; although they were short-lived as a national party, in the early 1930s some Progressive and UFA MPs helped found the CCF, and the Progressive premier of Manitoba, John Bracken, went on to become leader of the renamed Progressive Conservative Party.

Structure of the Party System Virtually all Canadian political parties aim to promote objectives compatible with liberal-democratic values and hope to obtain their ends by achieving power through constitutional means within a parliamentary system of government. Canada's electoral system is based upon single-member constituencies, and a political party tries to win a majority of seats in a general election to form a government. The Conservative, Liberal and New Democratic parties maintain provincial associations under which are riding (constituency level) organizations that contest national and provincial elections. At annual or biannual meetings, the associations elect officers, adopt resolutions and organize party followers. The extra-parliamentary organizations are not tightly structured, and no party has a large dues-paying membership, and active involvement by ordinary party members is minimal except at election time, though NDP supporters are on balance more active.

The constitutions of all 3 federal parties protect bicultural and regional interests (eg, that of the Liberals provides for equal francophone and anglophone representation; the NDP selects an associate president and an associate secretary from a cultural group not represented by the president and secretary). Party constitutions authorize as well the appointment of paid officials. Despite some differences (eg, membership criteria) all 3 constitutions reinforce the authority of the national leader and seek to moderate internal dissension.

Each general election involves simultaneous elections in all of Canada's 282 (1985) ridings, and in each constituency there may be candidates from registered political parties, as well as representatives of other parties without registered status, whose names appear on the ballot as "Independents." The first task of the constituency party is to choose its candidate and although the procedures for doing so are normally loosely established by the national political party, there is considerable autonomy accorded the local parties, and their practices vary widely. Usually the candidate is selected by a secret vote of all members resident in the constituency over the age of 14. Although membership in a constituency party of a major national party might normally run in the 200-500 range, this figure sometimes swells to 4000-5000 for nomination meetings. Because the rules for contested nominations are not clearly established and because these events normally involve the infusion into the party of large numbers of new members only weakly committed to the party as an institution, the system often produces conflict and tension.

Once the party's candidate is chosen, the local party tries to secure his or her election. The party will choose a campaign manager, rent a campaign office and begin the process of publicizing the party and the candidate by signs and advertisements in the media. Close to the election, it will organize door-to-door canvasses and the distribution of literature. After election day the party will quickly lapse into a loosely organized social club, guarding a desultory existence and waiting to be resurrected for the next election.

It is not easy to define the exact relationship between the various provincial parties and the national units with which they share a common name. For example, in Ontario membership between the federal and provincial parties is common, but in Québec there is no provincial Conservative Party, and membership in the federal and provincial Liberal parties is separate. BC's provincial Social Credit Party has weak ties with its federal counterpart, while in practice it has close informal ties with the federal BC Conservatives who in turn largely neglect their politically insignificant provincial counterpart. Even where party membership overlaps between federal and provincial parties, it is not uncommon for either activists or ordinary members to have strong preferences for one level or the other. In most provinces, many voters consistently choose one party at the provincial level and another in federal elections. NDP supporters tend to be more consistent in their voting patterns, but even here there is considerable movement in voting preferences between one election and the next.

The primary task of both the provincial and federal parties is to choose the party leader (in effect the party's candidate for premier or prime minister) and then secure the election of a sufficient number of party supporters. Election of party leaders normally takes place after the resignation or death of the incumbent, although most parties have provisions for forcing a LEADERSHIP CONVENTION on an unwilling leader. The parties also elect a president and other executive members whose job it is to manage the party's administrative apparatus. As well as leadership conventions, most parties also hold policy conventions, the NDP regularly, the other parties more occasionally. There is often controversy between the MPs and participants in policy conventions as to how far the elected members are bound by the content of resolutions.

In a general election, it is the task of the na-

tional party to manage the overall national campaign. It plans the leader's tour, raises and spends money on advertising and campaign literature and distributes money and other resources. At other times, the parties operate offices with a small but paid staff whose responsibility it is to conduct party business and to co-ordinate the various constituency, provincial and national organizations. There is sometimes a conflict between the extra-parliamentary party and the senators and elected MPs. The latter see themselves as the top of the power pyramid and consider the volunteer and paid party workers as their agents, whereas the volunteers especially often consider themselves important political forces within the constituency, provincial or national party, and view the elected MPs as their representatives. The parliamentary caucuses of the major parties have always tended to be unrepresentative of the nation as a whole, and even of their own voters. From the late 1960s until recently the Conservatives were very weak in Québec, while the Liberals suffered in western Canada. The New Democratic Party, which was very weak in Québec, was somewhat divided between its Ontario wing, which provided much of its popular vote, and the western wing which contributed the majority of elected members.

However, all 3 of the major national parties attempt to field candidates for each of the country's constituencies, and each party ensures that its national leader will be prominently displayed in every area of the country. In general, the Liberal Party has historically been supported by Catholics, urban dwellers, French Canadians, recent immigrants, the moderately well-to-do and professionals. The Conservative Party usually attracts greater support from Canadians of British origin, small town and rural dwellers, Protestants and small businessmen. The NDP usually draws strongly from Protestants, union members, urban dwellers in Ontario, rural dwellers in the West and the better educated. Although the NDP is strongly identified by the public with the trade-union movement, the party wins most of its seats in areas that are not heavily unionized and does not receive a majority of the votes cast by union households. It is too early to determine if the 1984 federal election, which saw a major Conservative victory and significant gains in Québec, will represent the beginning of a long-term change in traditional voting patterns.

The party system in Canada has major failings. First, too few Canadians are directly involved in political activities. Second, Canadian parties generate few important policies. Governments rely heavily on the civil service and other experts for ideas. Party policies are rarely pressed by governments until the policies have been approved by the bureaucratic elite. Finally the party system has been only partly successful in enhancing national unity. Although the parties have struggled to maintain their status as national institutions, the Liberal Party has generally been identified with the interests of central Canada, and the Conservative Party with those of western Canada. Conflict, instead of being contained and resolved within political parties, has often been exacerbated because partisan controversy and distrust have complicated already difficult economic and social questions. WILLIAM CHRISTIAN

Reading: William Christian and C. Campbell, *Political Parties and Ideologies in Canada* (1983); G.C. Perlin, *The Tory Syndrome* (1980); J. Wearing, *The L-Shaped Party: The Liberal Party of Canada 1958-1980* (1981); C. Winn and J. McMenemy, *Political Parties in Canada* (1975).

Party Whip, member of a party caucus who ensures that the number of MPs in the legislature, or at committee meetings, is adequate to win a vote if one is called. The division bells in the HOUSE OF COMMONS ring until whips are satisfied that sufficient members of their own party are present. They can offer a few minor rewards, eg, trips and committee membership, but have few effective punishments and rely more on persuasion than coercion. They also arrange the order of speakers in the legislature, facilitating the Speaker's job. ROBERT J. JACKSON

Passamaquoddy Bay is a small inlet near the mouth of the Bay of FUNDY. Its mouth is restricted by a chain of islands, including DEER and CAMPOBELLO, and strong tides (range 8.3 m) prevail in the region. Rich fisheries for herring and lobster occur here and the St Andrews Marine Biological Station on its shores is an important research centre. Because of the tides and topography, several schemes for TIDAL ENERGY development have been proposed in the past. Recent international controversy relates to the passage of supertankers through Canadian waters in the region to reach a proposed refinery at Eastport, Maine. P.C. SMITH AND R.J. CONOVER

Passchendaele (Passendale, Belgium) In 1917 the Germans began unrestricted submarine warfare, Russia crumbled under the impact of revolution and withdrew from WORLD WAR I, and part of the French army mutinied following the failure of Gen Nivelle's spring offensive. To relieve the resulting German pressure on the Allied forces, British Commander in Chief Gen Sir Douglas Haig launched an attack from the British front. After the British and Australian/New Zealand troops had fought weeks of grinding battle resulting in many casualties, on Oct 26 Lt-Gen Sir Arthur CURRIE's Canadian Corps attacked over terrain that resembled a quagmire. By Nov 7, having endured appalling conditions and having suffered over 7000 casualties, the Canadians seized Passchendaele and with it 5 km^2 of mud. Haig has been severely criticized for prolonging his attack, but the Canadians gained great merit for their accomplishment in battle. R.H. ROY

Passenger Pigeon (*Ectopistes migratorius*) is extinct. Also known as wild PIGEON, this largish, long-tailed species (family Columbidae) was once abundant, nesting in vast, densely populated colonies and migrating in flocks that, at times, darkened the sky for hours or even days. The habit of concentrating in great numbers proved disastrous because it facilitated mass slaughter by man. The species was gunned, netted and clubbed into oblivion. Its decline from the uncountable numbers that were one of the natural wonders of the continent became precipitous 1871-80. Because only one egg per clutch was being laid, the passenger pigeon's reproductive potential was inadequate to maintain the sadly decreased and scattered populations that remained late in the 19th century. The last known specimen taken in the wild was at Sargento, Ohio, on 24 Mar 1900. The last survivor died on 1 Sept 1914 in a zoo in Cincinnati, Ohio. In Canada, the passenger pigeon was a summer resident, nesting from the Maritimes through southern Québec, Ontario, Manitoba, central-eastern Saskatchewan and probably parts of Alberta. It was last recorded in Canada on 18 May 1902 at Penetanguishene, Ont. Specimens were last taken in 1898 at Lk Winnipegosis, Man, and in 1899 at Scotch Lk, NB. W. EARL GODFREY

Patent A patent may be granted in Canada to the first true inventor who submits an application to the Canadian Patent Office setting out the details of the invention and the reasons why the inventor believes it to be a major step forward in that particular field. The exclusive rights guaranteed by a patent are intended to encourage the process of invention and exchange of information. An invention must meet the tests set out in the Patent Act (which is under review in 1984). The Act prescribes that the invention must not have been known or used previously in Canada and must not have been on sale or disclosed in a printed publication for more than 2 years prior to the application.

At the Patent Office, the application is examined by technically qualified staff who determine whether the application discloses the claims completely and fully and whether or not the application passes the tests of novelty and utility. If the application is successful, the inventor is granted the exclusive rights to the manufacture, use and sale of the article or process for 17 years. Special provisions are contained in the Act to ensure that the monopoly is not used to the detriment of the public, especially in the case of food, drugs and atomic energy patents. In addition, the commissioner of patents may take steps to ensure the Canadian market is being properly supplied with the products or processes in question.

International patent protection is available through the Union for the Protection of Industrial Property which allows for registration of a patent in other countries of the union. Further, an inventor has one year within which to file in other union countries and thus preserve his original filing day in Canada. PETER J.M. LOWN

Patents, Copyright and Industrial Designs, Royal Commission on, sat between 1954 and 1960. Its brief was "to enquire as to whether federal legislation relating in any way to patents of invention, industrial designs, copyright and trademarks affords reasonable incentive to invention and research, to the development of literary and artistic talents, to creativeness, and to making available to the Canadian public scientific, technical, literary and artistic creations and other adaptations, applications and uses, in a manner and on terms adequately safeguarding the paramount public interest." The commission later requested that TRADEMARKS be removed from its brief. Three reports were published: *Copyright,* Aug 1957; *Industrial Designs,* June 1958; and *Patents of Invention,* Dec 1959. Chaired by J.L. ILSLEY, the commission heard from various public and private organizations and from individuals. In June 1966 the ECONOMIC COUNCIL OF CANADA examined the issues dealt with by the Ilsley Commission and, over the next 5 years, published a series of reports, including Special Study No 8, *Science, Technology and Innovation,* by A.H. Wilson, in 1968. The report emphasized the importance of innovation to industry. ADRIANA A. DAVIES

Patrick, Thomas Alfred, physician, legislator (b at Ilderton, Ont 23 Dec 1864; d at North Battleford, Sask 6 Sept 1943). After graduating from Western in 1888, Patrick practised medicine and surgery in Saltcoats, Sask, until 1894 and in Yorkton, Sask, until 1939. Elected from Yorkton to the North-West Territories Assembly in 1897, he used his slogan "No Annexation of Manitoba" on campaign buttons in 1898, and won decisive reelection on a "2-province" platform in 1902. He was the first to propose the present boundaries of Saskatchewan and Alberta. C. STUART HOUSTON

Patrick, William, clergyman, educator (b at Glasgow, Scot 8 Sept 1852; d at Kirkintilloch, Scot 28 Sept 1911). After studying theology at the Free Church Coll in Glasgow, he was ordained in 1878. He combined an active involvement in education with his pastoral duties and in 1900 was appointed principal of Winnipeg's Manitoba Coll, where he taught philosophy and New Testament courses until his untimely death. During his career in Canada, he was a member of the Social Reform Council of Canada, acted on the royal commission to establish an agricultural college for Manitoba, and was a strong and respected Presbyterian leader in the church union movement. NEIL SEMPLE


Emily Carr
Margaret Fau
William Lyon Mackenzie King
Sir Alexander Mackenzie
Wayne Gretzky
OILERS


Canada
John Diefenbaker
Captain James Cook
Order of Canada
Gaetan Boucher
Karen Kain
Goulet